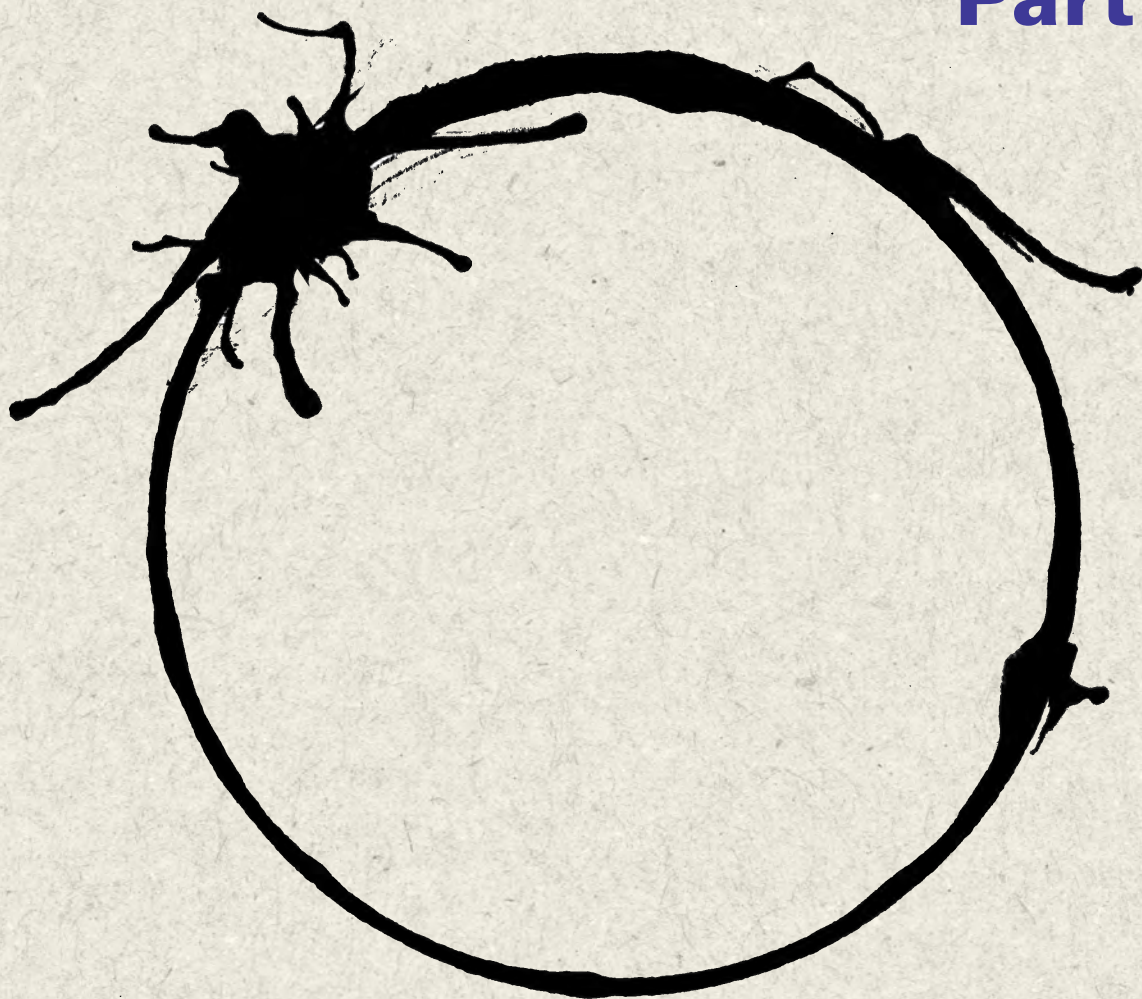GRAPHOLINGUISTICS AND ITS APPLICATIONS

Grapholinguistics
in the 21st Century—2020

/gʁafematik/
Proceedings

June 17-19, 2020
Yannis Haralambous (Ed.)

Part I

Grapholinguistics and Its Applications   4

Series Editor

Yannis Haralambous, *IMT Atlantique & CNRS Lab-STICC, France*

Series Editorial Committee

Yannis Haralambous (Ed.)

Grapholinguistics in the 21st Century

/gʁafematik/
June 15–17, 2020 (online)
Proceedings   Part I

Fluxus Editions

Cover illustration: *Human*, in heptapod B language, courtesy of Wolfram Companies (https://github.com/WolframResearch/Arrival-Movie-Live-Coding). From the movie *Arrival* (2016) by Denis Villeneuve, inspired by the short story Ted Chiang, "Story of Your Life," *Starflight*, Vol. 2, New York: Tor Books, 1998.

Cover design and typesetting: Atelier Fluxus Virus
Main fonts: William Pro by Typotheque Type Foundry, Computer
     Modern Typewriter by Donald E. Knuth, Source Han Serif
     by Adobe Systems, Amiri by Khaled Hosny
Typesetting tools: X∃LATEX, biblatex+biber (authoryear-icomp style),
     xindex, titlecaseconverter.com

Table of Contents

Preface

The second edition of the *Grapholinguistics in the 21st Century* conference was held online, owing to the COVID-19 pandemic, on June 15–17, 2020. In these *Proceedings* are collected forty-two contributions derived from oral or poster presentations.

The first five papers (Neef, Evertz-Rittich, Osterkamp & Schreiber, Presutti, and Gnanadesikan) contribute to the theoretical body of grapholinguistics, addressing core concepts: the written utterance, the written word, phonography and morphography, the interdependence of speech and writing, and the native script effect. Offering a global perspective, the paper by Meletis, author of the recently released *The nature of writing: A theory of grapholinguistics*, discusses the activity of being a grapholinguist, its challenges and promises.

The common theme of the papers by Salomon, Harbour, and Elti di Rodeano is *beginnings*: script creation or transfer (inspired by the runic script); the influence of grammar on writing system evolution and the birth of vowels; transmission of the first alphabets.

The next block of six papers deals with (typo)graphetics: Véry explores textual space; Haralambous, Landragin & Handa study graphemic and graphetic methods in speculative fiction; Wachendorff examines urban spaces in the Ruhr area; Kulish gives a survey of nonstandard, "emotional," punctuation; Bergergausen & Huot-Marchand and Pierson present their font creation projects, respectively, "Missing scripts" and "PIM" (ancient monetary inscriptions).

In the papers that follow, Neuman gives an account of spelling variation in Modern Hebrew from a sociocultural point of view; Dürscheid provides us with insight on the use of emojis in social media; Melka & Schoch investigate the possibility of communication, be it visual or auditory, with unknown intelligence/s.

The last paper of the first part of the *Proceedings* provides an artist's perspective: Kettaneh gives us an account on her very inspired work involving written language in many forms.

The second part of the *Proceedings* starts with a block of four papers in the area of sinographemics: Joyce & Masuda explore three-character and four-character words in Japanese; Honda provides us with a modular-theoretic approach to the Japanese writing system; Myers and Morioka deal with the internal structure of sinographs.

A group of eight contributions of historical nature follows. Stojanov deals with the description of punctuation in Western grammar books; Drozha-shchikh, Efimova & Meshcheryakova with form-meaning regularities in Old English; Presutti with graphemics of new Romance phonemes in Italian; Fendel with Coptic alphabets; Giunashvili with Old Aramaic script in Georgia; Fedorova with Aztec emblems; Kelly with the Bougainville Naasioi Otomaung alphabet; Schoch & Melka with the Easter Island rongorongo script.

The next block of five papers deals with applications of the computer in grapholinguistics: Jee, Tamariz & Shillcock study sound-graphic systematicity in various fonts; Sheng, Colin & Perono Cacciafoco attempt to decipher Linear A by a brute force attack; Salgarella & Castellan present a palæographical database for Linear A; Donnelly describes a system for digitizing Swahili in Arabic script; Xu presents a semantic index for the Dongba script of the Naxi people of Southwest China.

Speech and writing are not the only modalities of languages. There is also gestuality, used in sign languages. Two papers deal with the written transcription of sign languages: Danet *et al.* present the TYPANNOT system; Bianchini discusses metalinguistic awareness. Among the authors of Danet *et al.* is also Dominique Boutet who succumbed to the COVID-19 disease a few weeks before the conference.

The three papers that follow deal with the confrontation of two scripts. Koch investigates that between Roman and Cyrillic for the Moldovan language; Awad, Mourad & Elamil study the use of punctuation in French-to-Arabic translation; Rashwan investigates the visual untranslatability of the Ancient Egyptian and Arabic writing systems.

The volume concludes with a supernatural touch, as Küster leads us in a tour of magical writing, from cuneiform acrostics to modern manga.

The volumetry of these *Proceedings* is important: its 42 papers were written by 62 authors, span 1,122 pages (an average of 26.8 pages per paper, with a maximum of 102 and a minimum of 12 pages) and contain 412 figures and 1,940 bibliographical references; the index stretches to 1,247 entries. For technical reasons, the printed version of the *Proceedings* has been split into two parts: Part I, from Neef to Kettaneh (pages 1 to 577) and Part II, from Joyce & Masuda to Küster (pages 579 to 1122). Both front matter (preface, table of contents, list of participants) and back matter (index) are provided in both parts, the former in Roman page numbering (i–xii) and the latter in Greek page numbering (α′-κγ′). Some papers use different illustrations and text styles for the printed black & white version and the online color version.

All presentations at the *Grapholinguistics in the 21st Century* 2020 conference were recorded and can be viewed on Youtube. The links can be found on the conference webpage (`https://grafematik2020.sciencesconf.org/` or `https://perma.cc/3TJ6-RCJ5`).

List of Participants
at the
Grapholinguistics in the 21st Century 2020
Conference

Ahlberg, Aija Katriina
Almuzaini, Rawan
Anderson, Debbie
Ashourinia, Kaveh
Avni, Shani
Awad, Dana
Ayre, Christine
Baggio, Pietro
Beaujard, Laurence
Bergerhausen, Johannes
Berning, Bianca
Bianchini, Claudia S.
Birk, Elisabeth
Březina, David
Caren, Daniel
Castellan, Simon
Chalkley, Kendra
Chew, Patrick
Clifton, John
Contesse, Adrien
Cooley, Christopher
Crellin, Robert
Dalma, Véry
Danet, Claire
Danziger, Eve
Davison, Phil
Donnelly, Kevin
Drozhashchikh, Nataliia
Dunlavey, Nicholas
Dürscheid, Christa
Dürst, Martin
Efimova, Elena
Elti di Rodeano, Sveva
Elvira Astoreca, Natalia

Esfahbod, Behnam
Evertz-Rittich, Martin
Farrando, Pere
Fedorova, Liudmila
Fendel, Victoria Beatrix
Fisher, Filipa
Folaron, Debbie
Gardner, William
Gaultney, Victor
Gautier, Antoine
Giunashvili, Helen
Gnanadesikan, Amalia
Gomez-Jimenez, Eva
Handa, Kenichi
Handel, Zev
Haralambous, Yannis
Harbour, Daniel
Honda, Keisuke
Huot-Marchand, Thomas
Hutto, Megan
Iannucci, David
Ikeda, Elissa
Issele, Joanna
Iyengar, Arvind
Izadpanah, Borna
Jee, Hana
Joyce, Terry
Judson, Anna
Kang, Michelle
Karakılçık, Pınar
Kelly, Piers
Kettaneh, Christine
Kobayashi-Better, Daniel
Koch, Christian

Kučera, Jan
Kulish, Olga
Küster, Marc
Landragin, Frédéric
Mansour, Kamal
Martinod, Emmanuella
Meilleur, Maurice
Meletis, Dimitrios
Melka, Tomi S.
Mescheryakova, Evgenia
Morioka, Tomohiko
Myers, James
Mykolaiv, Ivan
Nicolaou, Andrew
Osborn, J.R.
Osterkamp, Sven
Papazian, Hrant
Penney, Laurence
Perono Cacciafoco, Francesco
Pierson, Morgane
Plesniarski, Allan
Poth, Christina
Presutti, Stefano
Rashdan, Amany
Rashwan, Hany
Rauff, James
Riggs, Tamye
Roux, Élie
Sadan, Meir

Salgarella, Ester
Salomon, Corinna
Schindelin, Cornelia
Schneider, Elena
Schoch, Robert M.
Schönecker, Anna-Lisa
Schreiber, Gordian
Selvelli, Giustina
Serra, Laura
Shingledecker, Anna
Steele, Pippa
Stojanov, Tomislav
Taha, Haitham
Tauber, James
Tenenbaum, Abi
Ugray, Gábor
Verheijen, Lieke
Vlachou, Irene
Vranas, Apostolos
Wachendorff, Irmi
Waldispühl, Michelle
Walther, Urs
Wang, Ruoan
Wiebe, Bruce
Williamson, Ryan
Wöhrmann, Frithjof
Xu, Duoduo
Yang, Ben
Ziegler, Monica

The Written Utterance
as a Core Concept in Grapholinguistics

Martin Neef

Abstract. In the analysis of written language, the distribution of the punctuation marks dot, exclamation mark, and question mark is usually explained with reference to the concept of sentence. For this reason, these characters are referred to in German linguistics as 'Satzschlusszeichen' ('sentence closing marks'). However, if the term *sentence* is understood as in syntax, e.g., as a phrase with a finite verb as its head, it turns out that (e.g., in English) in some cases the marks in question actually follow what can be considered a sentence (*Where are you now?*), but in many other cases they do not. In particular, the marks may follow less than a sentence (*Here!*) or more than a sentence (*I am here and you are there.*) or they may be interspersed in a sentence (*Stop! Being! Stupid!*). In order to arrive at a proper analysis of such data, it is necessary to distinguish between two different structural concepts, the sentence as a strictly syntactic notion on the one hand and another concept belonging to the field of grapholinguistics on the other hand. There are numerous suggestions how to conceive this other concept. In the approach to be presented, it is termed *written utterance* and is considered to be what a writer understands as a coherent thought. It is important that the concepts of sentence and written utterance are completely independent of each other, since they belong to different areas of linguistics. A grapholinguistic analysis has to explain the well-formedness conditions of written utterances. In the grapholinguistic model, which serves as the background for the following analysis, the language system is considered as part of the writing system, so that in the analysis of written forms all concepts established for the analysis of the language system can be used. This model provides a specific answer to the pertinent question of the relationship between written language and spoken language.

1. On the Term Grapholinguistics

Grapholinguistics is a branch of linguistics that has developed into an independent field of research over the last 50 years.[1] The term *grapholin-*

Martin Neef   ⓘ 0000-0001-6786-3562
TU Braunschweig, Institut für Germanistik, Bienroder Weg 80, 38106 Braunschweig, Germany
E-mail: Martin.Neef@tu-braunschweig.de

1. The reasons why grapholinguistics has long been neglected as a relevant part of linguistics are explained in Ludwig (1980, p. 324) and Günther and Günther (1983, pp. ix–x); cf. also Neef (2012, p. 215).

guistics, as I use it, originates from the tradition of the German-speaking research in this field. Dieter Nerius, the most important founder of grapholinguistics in Eastern Germany, outlines the general development of grapholinguistics in Germany as follows:

> die Orthographietheorie [...] hat [...] seit den 70er Jahren einen erheblichen Wissenszuwachs erfahren. Für das Deutsche begann die grundlegend neue Phase der linguistischen Erforschung der Orthographie Mitte der 70er Jahre in der Forschungsgruppe Orthographie des Zentralinstituts für Sprachwissenschaft an der ehemaligen Akademie der Wissenschaften der DDR in Berlin und Rostock sowie in der Kommission für Rechtschreibfragen am Institut für deutsche Sprache in Mannheim. Die hier entstehenden Arbeiten beschäftigten sich zunächst vorwiegend mit den theoretischen Grundlagen einer Reform der deutschen Orthographie, weiteten sich aber bald auf allgemeine Probleme der Orthographietheorie und Schriftlinguistik aus, die auch die internationale linguistische Diskussion von Fragen der Schriftlichkeit wesentlich beeinflußten". (Nerius, 1994, S. 1–2)[2]

When it became clear that the analysis of written language is more than the study of orthography, a unifying term was needed to replace the then prevailing term of 'Orthographieforschung' ('orthography research'). An important two-volume handbook on this topic, edited by Hartmut Günther and Otto Ludwig, was published in 1994 and 1996 under the rather unclear title 'Schrift und Schriftlichkeit', translated into English in a hardly appropriate way as 'Writing and its use'. While other publications in this series of handbooks bear such catchy names as *Morphology* or *Psycholinguistics*, scientific research into written language at that time still lacked a uniform and at the same time unifying term. It was not until 1988[3] that Dieter Nerius first proposed the term 'Schriftlinguistik' for this purpose in a published text, namely in an introduction of an edited volume:

> Diese Publikation reiht sich ein in die Vielzahl von Arbeiten, die in jüngster Zeit zu Problemen der geschriebenen Sprache und der Orthographie in

---

2. "the theory of orthography [...] has [...] experienced a considerable increase in knowledge since the 1970s. For German, the fundamentally new phase of linguistic research into orthography began in the mid-1970s in the Orthography Research Group of the Central Institute of Linguistics at the former Academy of Sciences of the GDR in Berlin and Rostock, and in the Commission for Orthographic Issues at the Institute for the German Language in Mannheim. The work that emerged here initially dealt primarily with the theoretical foundations of a reform of German orthography, but soon expanded to general problems of orthography theory and grapholinguistics, which also had a significant influence on the international linguistic discussion of questions of writing.

3. According to Dieter Nerius (1994), his research group began to use this term around the year 1980. Independently of this tradition, Helmut Glück (p.c.) coinded the same term in his 1984 habilitation thesis, published as Glück (1987, pp. 13, 59)) (cf. Neef, 2020).

mehreren Ländern erschienen sind. Solche Arbeiten dokumentieren das ak-
tuelle Interesse der internationalen Linguistik an diesem Forschungsgegen-
stand und zeigen, daß sich hier eine eigenständige linguistische Teildisziplin,
die Schriftlinguistik oder Grapholinguistik entwickelt hat." (Nerius, 1988,
S. 1)[4]

The term 'Schriftlinguistik' then became widespread in German linguis-
tics. Milestones for this were a Festschrift for Dieter Nerius with this
term in the title (Ewald and Sommerfeldt, 1995) and an introductory
book to the respective field of research written by Christa Dürscheid
entitled 'Einführung in die Schriftlinguistik', which was first published
in 2002 and is currently available in its fifth edition of 2016.[5] In 2004,
Rüdiger Weingarten and I began editing a terminological dictionary on
the topic in question as part of a series of dictionaries. The editors of the
series suggested the title 'Schrift und Schriftlichkeit' for this book, while
Weingarten and I chose 'Schriftlinguistik', with reference to Dürscheid
(2002). The publication of the dictionary began in 2012 in digital form
(Neef, 2012). In 2013, an English translation of the title became neces-
sary. The publisher recommended the title 'graphemics', the series ed-
itors suggested 'writing', while Weingarten and I, after discussing the
options 'grammatology', 'grammatography', and 'graphonomy', chose
'grapholinguistics' as the English equivalent to 'Schriftlinguistik', argu-
ing that Nerius, in the above quote from 1988, had suggested as German
terms both 'Schriftlinguistik' and 'Grapholinguistik', the latter term be-
ing easily translated into English as 'grapholinguistics'.[6]

   I first used the term *grapholinguistics* in published form in Neef (2015).
Dimitrios Meletis took up this suggestion in his talk *Naturalness of scripts
and writing systems: Prolegomena to a Natural Grapholinguistics*, held at the *10th
International Workshop of Writing Systems* in May 2016 in Nijmegen (The
Netherlands). A written version of this text was published in the pro-
ceedings of this conference under the title *What is natural in writing? Prole-
gomena to a natural grapholinguistics* (Meletis 2018), where he traces the his-
tory of this term (see also Dürscheid and Meletis 2019: 170). According
to him, the

---

4. This publication is one of the many works on problems of written language and
orthography that have appeared recently in several countries. Such studies document
the current interest of international linguistics in this field of research and show that
an independent linguistic sub-discipline, 'Schriftlinguistik' or 'Grapholinguistik', has
developed.

5. An English version of this book that Christa Dürscheid co-authors with Dimi-
trios Meletis is in preparation. To my knowledge, the title of this book is still under
discussion.

6. The term 'Grapho-Linguistics' was already used earlier in English linguistics to
designate a completely different field of research, cf. Platt (1974; 1977).

term *grapholinguistics* refers to 'the linguistic sub[-]discipline dealing with the scientific study of all aspects of written language' (Neef 2015: 711). It is the equivalent of German *Schriftlinguistik*, which was first proposed by Nerius & Augst (1988) and adopted by Dürscheid (2016) for the title of her seminal textbook. I follow Neef, Sahel & Weingarten (2012ff.) as well as Neef (2015) in using this term instead of one of numerous alternatives, such as *grammatology* [...], *graphonomy* [...], or *writing systems research* (the title of a prominent journal in the field). The term grapholinguistics not only can be aligned with designations used for other linguistic subdisciplines, such as psycholinguistics and sociolinguistics, but also originated in the long German tradition of acknowledging and investigating writing in its own right. (Meletis, 2018, p. 61)

I am pleased that the term grapholinguistics has now even become part of the name of a book series, the one in which the present text is published.

2.   Grapholinguistics for German: How to Deal With Official Rules

The background for the fact that linguists working on German have been unusually busy with orthography lies in the codification history of German orthography. Since 1901, there exists a state-regulated, uniform, explicitly codified orthography for the German language, that is binding for all German-speaking countries. Throughout the entire 20th century, there were efforts to reform this supranational orthographic regulation. For essential areas of spelling had not yet been explicitly addressed in 1901, including punctuation. The first reform took place in 1996 (effective since 1998), followed by a further reform in 2005 (cf., e.g., Johnson, 2005). In the run-up to these reforms, German linguistics finally recognized the relevance of research on written language.

Unlike many other languages, written German thus has a codified standard. However, this codification has its problems, and this is exactly what grapholinguists are concerned with. Typically, the standard is criticized in two different ways: On the one hand, certain codified spellings are considered unsystematic from a certain theoretical perspective and are therefore made the subject of a proposal for amendment. A suitable example is the change in spelling of words with the letter <ß> to <ss> when following a letter for a 'short' vowel, which was the most visible change of the 1996 reform. On the other hand, the official rules can be considered incomplete, vague, or contradictory. An example is word division at the end of lines, for which there are three different levels of codification in the official rules, a 'rule of thumb', a set of explicit rules, and an individual provision in the dictionary entries of each single word. These three levels are incompatible with each other.

In Neef (2008), I analyzed this issue in the context of a specific theory and made suggestions on how to reconcile the set of explicit rules with the individual cases, without giving an impetus to change the latter.

Punctuation can be studied in the same way. In the following, I will concentrate on the question how the distribution of the so-called 'sentence closing marks' can be explained. I will look at attempts to solve this problem for the English and the German writing systems. After outlining a specific grapholinguistic theory, I will then analyze the current topic within this theory by introducing the unit of written utterance.

3.   What Is It That Ends With a Full Stop?

The set of sentence closing marks is generally considered to consist of at least the full stop, the exclamation mark, and the question mark. The full stop can be regarded as prototypical for these elements. An answer to the linguistic task of analyzing the distribution of this mark could be that the full stop is used to close a specific unit. Once this unit is defined, the question is solved. So, the research question is: What is it that ends with a full stop? The answer to this question could be language-specific or it could apply to many different writing systems, especially those that have the three elements in question.

Starting with the English writing system, a definition of the respective unit might be found in monographs on this writing system. Cook (2004) is a relevant example. He gives the obvious answer by stating that it is the sentence that ends with a full stop. Interestingly, he uses two different concepts of 'sentence', one for 'spoken language' and one for 'written language'. According to Cook (ibid., p. 42), a sentence as a unit of spoken language is "grammatically complete and can stand by itself," while a sentence as a unit of written language "is anything that starts with a capital letter and ends with a full stop". The following examples in (1) are sentences that Cook uses to illustrate his concept, while the examples in (2) are cases that are obviously not sentences in the sense of the given definition:

(1)   *Sentences according to Cook (ibid., p. 42)*
    a.   Come in.
    b.   Green.
    c.   In the morning.

(2)   *Non-sentences according to the definition of Cook (ibid., p. 42)*
    a.   You are mad!
    b.   Who are you?
    c.   Come in

The sentences in (1) are special in that they constitute 'verbless sentences' or 'non-clausal units'. Nevertheless, they count as sentences for Cook. The first two examples in (2) may actually be unproblematic for Cook in so far as the definition given should be extended to exclamation marks and question marks, thus to the set of sentence closing marks in general. At least this is how I would like to interpret Cook's explanations. More problematic is example (2c) which cannot count as a sentence for Cook, because it does not end with a sentence closing mark.

The central problem with Cook's definition is that it answers the current question circularly: What is it that ends with a full stop? It is the sentence, and a sentence is defined as a unit that ends with a full stop. In other words, this approach does not allow to give rules when to use a sentence closing mark. At the same time, this approach does not provide a basis for the concept of an error in the use of sentence closing marks. If such a mark is used (and the initial letter of the unit is a capital one), we have a sentence. Thus, the written form <I. Want. To. Go. Home.> would count as a sequence of five sentences. In general, the relation between the two concepts of sentence remains unclear. It only seems to be that *sentence* is the designation of two terms in English, which are in a relationship of homonymy.

A more refined approach is presented in Nunberg (1990) who distinguishes between the concepts 'lexical sentence' and 'text sentence'. According to him, lexical sentences are traditionally defined in

> any of three ways: either syntactically (as a group of words 'that contains a subject and a predicate'); or prosodically (as a group of words 'that can be uttered by itself' or 'that can be followed by a pause'); or semantically (as a group of words 'that expresses a proposition' or 'that conveys a statement, question, command, or explanation' or 'that expresses a complete thought'). [...] But none of them deals with what we will call a 'text-sentence'. (ibid., pp. 21–22)

From this quote, it is clear that the definitions given for the lexical sentence do not apply to the text sentence. What a text sentence actually is, however, remains rather vague. Nunberg does not give a real definition, but only a structural characterization: "A text sentence consists of a single text-clause, or of two or more text-clauses" (ibid., pp. 25–26). The concept of text-sentence, thus, depends on the concept of text-clause. For the latter term, however, Nunberg (ibid., p. 26) states: "It is at the level of text-clause structure that complications begin to set in". I do not want to discuss such complications here. In any case, it is helpful to distinguish the concepts of lexical sentence and text sentence. However, in order to have categories that enable the analysis of linguistic data, clear and straightforward definitions of both these units would be necessary. Moreover, if both terms have the word *sentence* as a part, they should also

have something in common. At best, there is a clear structural relationship between lexical sentences and text sentences.

The situation in German linguistics is comparable. The official guidelines ([Deutsche Rechtschreibung], 2018) distinguish between the syntactic term *Satz* ('sentence') and the grapholinguistic term *Ganzsatz* ('whole sentence').[7] The latter term, however, is only defined via examples. The following list of these examples is comprehensive; the English translations (in some cases literal ones (marked by *), to show the structure of the German example) indicate that the concept of *Ganzsatz* resembles both Cook's 'sentence' and Nunberg's 'text sentence':

(3) *Examples for the unit 'Ganzsatz' (ibid., p. 74)*

Gestern hat es geregnet.	Yesterday, it rained.
Du kommst bitte morgen!	Please come tomorrow!
Hat er das wirklich gesagt?	Did he really say that?
Im Hausflur war es still, ich drückte erwartungsvoll auf die Klingel.	It was quiet in the hallway, I pressed the bell expectantly.
Ich hoffe, dass wir uns bald wiedersehen.	I hope to see you again soon.
Meine Freundin hatte den Zug versäumt; deshalb kam sie eine halbe Stunde zu spät.	My friend had missed the train; that's why she was half an hour late.
Niemand kannte ihn.	Nobody knew him.
Auch der Gärtner nicht.	Not even the gardener.
Bitte die Türen schließen und Vorsicht bei der Abfahrt des Zuges!	*Please to close the doors and attention when the train leaves!
Ob er heute kommt?	*If he will come today?
Nein, morgen.	No, tomorrow.
Warum nicht?	Why not?
Gute Reise!	*Good trip!
Hilfe!	Help!

The *Ganzsatz* seems to be defined here basically as a grapholinguistic unit that begins with a capital letter and ends with a sentence closing mark. Such a definition is explicitly given (for the corresponding unit *graphematic sentence*), e.g., in Schmidt (2016, p. 237), similar to Cook's definition quoted above.

From this brief look at linguistic texts that deal with punctuation, I conclude that the unit that ends with a full stop in written language (at least in English and German, but probably in many other writing systems as well) is different from a syntactic unit, whether it is called sentence, lexical sentence, or clause. If there is a close correspondence be-

---

7. The term *Ganzsatz* was coined by Admoni (1968, p. 150) and is regarded there a syntactic unit. Baudusch (1980, p. 217) adopts this term for the analysis of punctuation, but nevertheless treats it as a syntactic unit. The definitions given by Admoni and Baudusch, in contrast to the concept of [Deutsche Rechtschreibung] (2018), seem to capture only examples that at least contain a verb.

tween the two different concepts, they should have similar names; otherwise, they should be clearly distinguishable from each other in terms of expression.

Apart from questions of expression, explicit definitions for all relevant terms are necessary to allow for a sound linguistic analysis. Definitions of terms belong to theories and are therefore theory-specific. At the same time, definitions are language-universal. Once a concept X is defined, the task of the linguist is to formulate the conditions of well-formedness (via rules, constraints, or the like) of instances of X. Such conditions are in principle language-specific. In this way, grammatical instances of X are distinguished from ungrammatical ones. Grammatical instances of X obey all conditions of well-formedness that apply to X in a specific language, whereas an ungrammatical instance violates at least one such condition.

If a theory aims at explaining under which conditions a 'sentence closing mark' can be used, the definitions of the terms used in this explanation must not contain the feature 'sentence closing mark'. In particular, a sentence must not be defined as a unit ending with a sentence closing mark. Otherwise, the explanation would be circular. In the next paragraph, I sketch a theory that allows to formulate an analysis which meets these requirements, based on the conviction that explanations are only possible within specific theories.

4.   A Theory for Writing Systems Research

Linguistic theories differ in the way they understand language as their object of investigation. According to Katz (1981), three different concepts of language can be identified in linguistic theories: The first is the use of language, i.e., the use that individuals make of certain languages. Use of language is an empirical object, to be investigated with empirical methods. When grapholinguists discuss the relationship between spoken and written language, the discussion is usually at the level of language use. Secondly, if individuals are able to use language, they must have as a prerequisite knowledge of language. Knowledge of language, i.e., the knowledge that individuals have about certain languages, is a mental object that can be explored using mental methods such as those used in psycholinguistics. When grapholinguists emphasize the degree of learnability of theoretical proposals as the main criterion for evaluating the quality of a theory, they argue at the level of knowledge of language. The decisive argument for Katz is that, thirdly, knowledge of language presupposes that the known object has its own theoretical status. The concept of knowledge of language thus presupposes that language has an existence outside of this knowledge. In this sense, lan-

guage is an abstract object. Theoretical linguistics reconstructs these objects as systems and thus explains them.

Approaches that understand languages as abstract objects form the paradigm of Linguistic Realism (cf., e.g., Neef, 2018). Based on the genuinely linguistic task of modeling languages as systems, the investigation of knowledge of language and language use becomes possible in an interdisciplinary way. However, a number of linguists consider knowledge of language to be the central object of linguistics (they equate language with knowledge of language). Such approaches form the paradigm of Conceptualism (Generative Linguistics belongs to this field). Still other linguists regard the use of language as the central concept of linguistics (they equate language with use of language). Such approaches form the paradigm of Nominalism. I think that it is essential for linguistic theories to make explicit the respective concept of language. My own work falls, naturally, under the paradigm of Linguistic Realism.

One of the shared assumptions of all linguistic paradigms is that languages have both regular and irregular data, a characteristic that makes linguistics a peculiar science. This assumption demands a model of the language system for these two types of data. Following Bloomfield (1933), it is a common conception to distinguish within the model a grammar as the module for treating regular data from a lexicon as the module for treating irregular data. Within grammar, regularities are typically divided among the sub-modules phonology, morphology, syntax, and semantics (cf., e.g., Neef, 2018, p. 188).

A central question for grapholinguistic theories that focus on aspects of the system is 'What is the relationship of the language system to the writing system?' (as a specification of the more pre-theoretical question of the relationship of spoken language and written language). To my knowledge, at least four different answers to this question have been given (in different linguistic paradigms, though):

(4)   *What is the relationship between the language system and the writing system?*
   a.   The writing system is part of grammar (e.g., Eisenberg, 1983; 2013)
   b.   The writing system is part of the language system (e.g., Bierwisch, 1972, Wiese, 1987)[8]
   c.   Language system and writing system stand side by side on the same level (e.g., Neef, 2005, p. 5)
   d.   The language system is part of the writing system (e.g., Neef, 2012, p. 217)

The basic idea of assumption (4d) is: Typically, a writing system is a system for a specific language system. While a language system can exist without a writing system, a writing system is regularly linked to a given language system. Consequently, a writing system depends on a given language system. For the writing system, the language system counts as given information to which it has access. The constituting part of a writing system is a set of units (characters) which correspond to units of the language system. The module of the writing system model that deals with this aspect is what I call 'graphematics'. In addition, natural writing systems typically (but not necessarily) contain another module, 'systematic orthography', which deals with the correct spelling of grapholinguistic units. This also includes the field of punctuation. The following diagram depicts the general conception of the *Modular Theory of Writing Systems* (cf. Neef, 2015, p. 718).

(5)   *Model of the writing system*
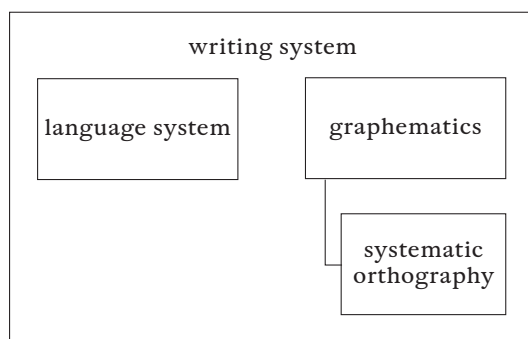
5.   Distinguishing the Written Utterance From the Sentence

In a theory of the writing system that takes information of the language system as given information, it is the theory of the language system that provides definitions of terms that are relevant for the analysis of language systems. These terms are readily available for the analysis of writing systems. Syntax theory could provide a definition of the sentence like the following:

(6)   *Definition of the syntactic unit sentence*
       A sentence is a phrase with a finite verb as its head.

---

8. This is my interpretation of these approaches, which belong to the framework of Generative Linguistics. The authors themselves would possibly choose other interpretations.

Such a formal definition is used by various theories of syntax in one way or another. The definition in its current form is not entirely precise, since the terms phrase, finite verb, and head need their own definitions. For the term finite verb, this is less problematic, but for the other two terms it is a problem. What a more precise definition would need to clarify is where the boundaries of a sentence lie: A sentence consists of at least a finite verb, but what other elements could be within the same phrase? For present purposes, I consider the definition sufficient. An analysis of syntax must also give conditions to determine the well-formedness of sentences in specific languages. With respect to English, the following examples represent two grammatical sentences:

(7) *Two grammatical sentences of English*
    a. YOU SAY YOU WANT A REVOLUTION
    b. WE ALL WANT TO CHANGE THE WORLD

Since sentences are abstract objects, tokens are needed to represent sentences and to enable communication about them. The continuous capital spelling in (7) shall indicate that here not the written form, but the abstract unit sentence is represented. Both sentences are complex in that they contain either a further sentence as in (7a) (YOU WANT A REVOLUTION) or an infinitive construction as in (7b) (TO CHANGE THE WORLD). By definition (6), an infinitive construction is not a sentence but a unit of a different kind.

    An analysis of written language then shows that syntactic units occur in written forms. The following examples are again tokens of abstract objects, this time of written objects. I render them in standard orthography.

(8) *Syntactic units in written English*
    a. You want a revolution.
    b. You say you want a revolution.
    c. All the leaves are brown.
    d. All the leaves are brown and the sky is grey.

Assuming that all the units in (8) are well-formed with respect to the English writing system, it can be seen that a sentence in written form sometimes starts with an uppercase letter like the sentence YOU WANT A REVOLUTION in (8a) and sometimes it starts with a lowercase letter like the same sentence in (8b). In addition, sometimes a sentence ends with a sentence closing mark like the sentence ALL THE LEAVES ARE BROWN in (8c) and sometimes it does not like the same sentence in (8d). A grapholinguistic task is to determine the distribution of uppercase and lowercase letters as well as the distribution of sentence clos-

ing marks. From the discussed data it is clear that the syntactic unit sentence is not decisive for this purpose. In order to explain the distribution of uppercase letters and sentence closing marks based on a specific unit or domain, the definition of this unit has to be independent of the features requiring explanation.

What is needed is a strictly grapholinguistic unit, which is in principle independent of the syntactic unit sentence. Next, I consider the ontological status of this unit, which is to be captured in a definition. Given that in earlier approaches, the designation *sentence* was often used to denote a concept that belongs in the first place to written language (and given that the lay concept of sentence is closely connected to written forms), it seems promising to consider such definitions as a starting point. Nunberg (1990, pp. 21–22) in the above quote offers three types of definitions of the sentence, namely syntactic, prosodic, and semantic ones. Among the 'semantic' definitions, the definition as 'a group of words that conveys a statement, question, command, or explanation' is interesting because there is a clear correlation between the sentence closing marks exclamation mark and question mark and the concepts of command and question, respectively. Usually, such concepts are considered pragmatic ones and they are connected to the concept of speech acts in the sense of Austin (1962) and Searle (1969). A core unit of pragmatics is the utterance. It seems natural to relate the grapholinguistic unit under consideration to this pragmatic concept of utterance. Engel (1991, p. 33), e.g., states that texts consist of utterances. Therefore, I term this grapholinguistic unit 'written utterance' (German 'Schreibäußerung').[9]

Another definition Nunberg (1990, p. 22) lists is that a sentence as a group of words 'expresses a complete thought'. This is akin to Baudusch's definition of 'Ganzsatz' in Baudusch (1981, p. 210): "Als größte syntaktische Einheit des Sprachsystems stellt der Ganzsatz eine Bedeutungseinheit innerhalb eines größeren Gedankenzusammenhangs dar".[10] I think this is an appropriate base to give a definition of the written utterance as a genuine grapholinguistic unit related to the pragmatic unit of utterance:

(9)   *Definition of grapholinguistic unit written utterance*
       A written utterance is a grapholinguistic unit that is constituted by comprising what can be regarded as a coherent thought.

---

9. Related terms are 'written act' ('Schreibakt'; Stetter, 1989) and the classical term 'period' (cf. Rinas, 2017).

10. "As the largest syntactic unit of the language system, the Ganzsatz represents a unit of meaning within a larger context of thought".

The writer has a certain flexibility what to conceive as a coherent thought, although he is not completely free. Some writers prefer simple thoughts, other prefer complex ones. Examples to illustrate this idea follow in the next paragraph, where there are also examples showing that a coherent thought does not necessarily have to be a complete thought.

6.   Well-Formedness Conditions of the Written Utterance in Selected Languages

Based on the definition of the written utterance, the task of grapholinguistics is to capture the well-formedness conditions of this unit in specific writing systems. In principle, linguistic theories can be applied to all languages. A sound theory is characterized by the use of a set of terms with explicit definitions. This set of terms allows the analysis of data from different languages. The differences between languages are thus not rooted in the terms used for an analysis but in the analyses themselves. The unit written utterance, for example, is defined in the present context of the Modular Theory of Writing Systems in the way given in (9). In this section, I will begin with two well-formedness conditions of written utterances which hold in the writing system of English and certainly also in a large number of other writing systems. English— in contrast to German—does not have a codified norm of orthography and consequently no codified norm for punctuation. Nevertheless, there is a standard of punctuation holding for the English orthography, although "the use of punctuation is not nearly so standardized as spelling" (Rogers, 2005, p. 15).

6.1.   Condition on Letters As Initial Elements

(10)   *Condition 1*   If the first element of a written utterance (not including opening brackets and opening quotation marks) is a letter, it must be an uppercase letter.

This is a condition of well-formedness and not a rule to transform a given input into a different output. This formal characteristic is consistent with the declarative conception of Systematic Orthography as part of the Modular Theory of Writing Systems. With respect to Condition 1, it is irrelevant whether the first word of a written utterance regularly begins with an uppercase letter (as is the case for proper names, for example) or not. A violation of this condition leads to an orthographic error. In this sense, the conditions formulated in the present theory (unlike in Optimality Theory) are conceived as being inviolable. This allows a clear distinction between correct (well-formed) data and false (ill-formed) data. The unit addressed by Condition 1 is the letter and

not the grapheme, because a spelling of a written utterance in English as <THe book is green.> with the supposed complex grapheme <th> written in uppercase would be wrong. The formulation of Condition 1 assumes that the regular appearance of a letter is in the form of its low-ercase variant. Well-formedness conditions have to capture when the uppercase variant (as the marked form of a letter) is to be used instead.

An alternative way to formulate Condition 1 would be to state that exactly the first letter of a written utterance has to be an uppercase one. However, this alternative would be empirically inadequate because written utterances may well begin with a series of uppercase letters un-der certain circumstances, e.g., if the first word is an abbreviation (<USA and Canada are comparable in price.>) or if uppercase letters are used throughout.

In contrast to the works cited in paragraph 3, the need for a specific type of initial letter is not part of the definition of the unit written ut-terance, but part of its well-formedness conditions. It is therefore to be expected that there are writing systems to which this condition does not apply, although the unit written utterance does play a role. In fact, it is likely that writing systems which are not based on a dual alphabet (like the Roman script) have different kinds of well-formedness conditions in this respect. The Arabic script, for example, has up to four different let-ter forms (isolated, final, medial, initial; cf. Rogers, 2005, p. 136). Since there is no concept of uppercase letter in this script, Condition 1 can-not hold for written utterances in writing systems based on the Arabic script (but a modified version could). The Chinese script, on the other hand, does not have different letter forms in the present sense, so that there can be no analogue of Condition 1 for writing systems based on the Chinese script. Whether the written utterance is a useful category of analysis for such writing systems is a question to be dealt with inde-pendently.

Furthermore, Condition 1 gives a statement for the first letter of a written utterance but it does not determine that the first element of a written utterance has to be a letter. In front of the first letter, there could be a word punctuation sign like an apostrophe or a quotation mark (cf., e.g., Schmidt, 2016, p. 240).

(11)   *Written utterances with initial elements other than letters*
          a.   [T]hat pale-face is my friend.
                 'Hope' is a positive word.
          b.   … und gab keine Antwort.   '… and did not answer.'
                 's ist schade um sie.   't's a pity for them.'
                 52 volle Wochen hat das Jahr.   '52 full weeks is the year.'

The examples in (11a) show that written utterances beginning with the opening part of a punctuation mark that constitutes a symmetrical pair

behave as if this element was not present (cf. ibid., p. 240). The examples in (11b) from [Deutsche Rechtschreibung] (2018, p. 56) show that sometimes the first element of a written utterance is neither a letter nor the opening part of a symmetric punctuation mark; in such cases, the first letter of the written utterance is not subject to Condition 1 (as specified in the formulation of this condition). These examples prove that Cook's definition of the crucial unit as "anything that starts with a capital letter" (Cook, 2004, p. 42) is inadequate. The second part of this definition, which concerns the final element of a 'sentence', is also inadequate, as the following section will show.

6.2.   Condition on the Final Element

The property in question can be easily translated into a condition of well-formedness for written utterances in the following way:

(12)   *Condition 2*   The final element of a written utterance has to be an end punctuation mark.

So far, I have used the traditional term 'sentence closing mark' to denote the set of elements full stop, exclamation mark, and question mark. Now this term turns out to be inappropriate, because it is not the unit sentence that is closed by these elements. Therefore, I use the alternative term 'end punctuation mark'.[11] For the purpose of Condition 2, the term 'end punctuation mark' has to be defined. As the set of elements which fall under this term is finite and, moreover, relatively small, an enumerating definition is possible. I have used this kind of definition already above. Regarding the full stop, however, some refinements are to be made. This term connects an element of a certain form with a certain function. The form is called dot (or point), the function is that of ending a 'sentence', thus a written utterance. The dot, however, also occurs in other functions. Of particular interest is the dot as an abbreviation marker and as a decimal point, respectively. If such a sign is the final one in a written utterance, its presence is sufficient to fulfil Condition 2 above.

(13)   *Written utterances with a final dot with a specific function*
    a.   She knows the rules for periods, commas, semicolons, etc.
    b.   He knows Queen Elizabeth II.

Therefore, it is better to include the dot in the set of end punctuation marks, with the full stop being only one of the possible functions of this element. Furthermore, a written utterance can have three dots indicat-

---

11. In German, the respective term is *Schlusszeichen*, replacing *Satzschlusszeichen*.

ing an ellipsis after its last letter. In some standards of English punctuation, these three dots are sufficient to end a written utterance with, while others require the addition of a fourth dot. From the formulation of Condition 2, three dots would be sufficient, since the final element is then a dot, as required. This explicitly holds true for the German orthography (cf. [Deutsche Rechtschreibung], 2018, p. 101). The following determination of the set of end punctuation marks is valid for English and German, but also for many other orthographic systems:

(14)   *Set of end punctuation marks (for English and German)*
        dot
        exclamation mark
        question mark

All these punctuation marks can also occur within written utterances. This is theoretically unproblematic as long as the written utterance is not defined by the presence of specific punctuation marks, as in the approach presented here. For a complete analysis of a punctuation system, the valid conditions must be formulated for each individual punctuation mark.

Orthographic systems have conditions regarding the number of end punctuation marks allowed in a row. In German, for example, in standard orthography only one exclamation or question mark in a row is allowed. In non-standard varieties like in comics or in internet communication, this condition is not valid. In any case, the condition on the number of punctuation marks in a row is independent of the unit written utterance.

For standard orthography, a distinction between two modes to writing is relevant, text mode and list mode (Bredel 2008: 32-34). Condition 2 applies in text mode but not in list mode. The regular mode of writing is text mode, while list mode has special functions. List modal writing pertains to lists, headings, and tables, for example. The title of this paper is conceived by me as its writer as a written utterance. Therefore, it begins with an uppercase letter. But it does not end with an end punctuation mark because it belongs to list mode.

For quoted written utterances, a further note is required. The following examples show that there are differences between the use of the dot compared to that of the exclamation and the question mark. In addition, there are differences between English and German that do not only concern to the form of quotation marks.

(15)   *Quoted written utterances*
        English   German
        a.   He said: "The book is green."   Er sagte: „Das Buch ist grün."
        b.   "The book is green," he said.   „Das Buch ist grün", sagte er.
        c.   "The book is green!" he cried.   „Das Buch ist grün!", schrie er.
        d.   "The book is green?" he asked.   „Das Buch ist grün?", fragte er.

The examples in (15b) shows that under certain circumstances, a written utterance does not have to not end with an end punctuation mark. I do not want to go into further details here and merely note that there seem to be different standards for English regarding the use of quotation marks. To a certain extent, the data in (15) fall within the scope of the formulation of comma conditions.

6.3. Condition for Written Utterances Ending With an Exclamation Mark or Question Mark

Writing systems based on the Roman script can use special punctuation marks that are not widely used among such systems. One example is Spanish (cf. Meisenburg, 1996, p. 1440). Written utterances that do not end with a dot but with an exclamation mark or question mark must contain an inverted exclamation mark or inverted question mark as the first element.

(16)   *Written utterances with final exclamation or question marks in Spanish*
    a.   ¿El libro es verde?   'Is the book green?'
    b.   ¡El libro es verde!   'The book is green!'

A motivation for the introduction of these punctuation marks was that utterances of different function (declarative, exclamation, question) can have the same wording. This property, however, is not sufficient to require such punctuation marks because other languages with the same properties (e.g., German) do not use these punctuation marks. The following Condition X tries to capture the regularities for Spanish, although on closer examination it might turn out that the conditions are more complex.

(17)   *Condition X*   If the final element of a written utterance is an exclamation or question mark, the first element has to be an inverted exclamation or question mark, respectively.

Due to the formulation of the conditions, this condition does not conflict with Condition 1 in (10). While Conditions 1 and 2 cover a wide range of orthographic systems, Condition X seems to apply to only one orthographic system, namely Spanish.

6.4. Condition on Sentences in Written Utterances

Sequences of sentences can in principle be conceived either as a single written utterance or as different written utterances. This corresponds to the definition of a written utterance as what is generally thought to be a coherent thought. The following German examples from the [Deutsche

Rechtschreibung] (2018, p. 75) are intended to indicate that different punctuation marks are possible between sentences, leading to more or less minor differences in meaning (Nunberg, 1990, p. 13 discusses similar examples for English).

(18) *Different written constructions of sequences of sentences*
      a. Im Hausflur war es still. Ich drückte erwartungsvoll auf die Klingel.
          'The hallway was quiet. I pressed the bell expectantly.'
      b. Im Hausflur war es still, ich drückte erwartungsvoll auf die Klingel.
          'It was quiet in the hallway, I pressed the bell expectantly.'
      c. Im Hausflur war es still; ich drückte erwartungsvoll auf die Klingel.
          'It was quiet in the hallway; I pressed the bell expectantly.'

On the other hand, a single sentence may be divided among different written utterances. For such a constellation, I will propose a further condition of well-formedness for written utterances that applies to sequences of written utterances. This condition goes beyond the scope of traditional definitions of (written) sentences and refers to the formal relationship between the syntactic unit sentence and the grapholinguistic unit written utterance. Such a condition will hardly be considered in approaches that do not distinguish between these two types of units but rather combine them into a broad concept of 'sentence'. The formulation of the following condition is only tentative; detailed studies are necessary to obtain a clearer picture of the regularities. I formulate this condition with regard to the writing systems of English and German, but its scope is certainly broader.

(19) *Condition 3*   If a sentence is divided over more than one written utterance, the first of the written utterances concerned must contain a construction which has the status of a well-formed sentence.

In the regular case, a sentence is not divided among successive written utterances. Gallmann (1985, p. 44) for German and Nunberg (1990, p. 22) for English give examples that contradict this regularity in a way that is covered by Condition 3. Coincidentally, all the examples seem to come from car advertising.

(20) *Examples illustrating Condition 3*
      a. Er läuft. Und läuft. Und läuft.
          'It is running. And running. And running.'
          Er läuft. Weil er einen starken Motor hat.
          'It is running. Because it has a strong engine.'
      b. The L9000 delivers everything you wanted in a luxury sedan. With more power. At a price you can afford.

Nunberg (ibid., p. 22) takes example (20b) as evidence that a written utterance ('text-sentence' in his terms) "need not be a lexical [= syntactic] sentence in its own right, notwithstanding the fulminations of schoolroom grammarians". This observation applies to German as well. But according to Condition 3, writers are not free to divide a sentence among several written utterances at will. If the first of the written utterances in question does not contain a well-formed sentence, the written construction is questionable, as illustrated by the following construed examples:

(21)   *Sequences of written utterances violating Condition 3*
    a.   I watch. The children play.
    b.   The. Book. Is. Green.

In itself, the written form <The children play.> in (21a) is a perfect written utterance. It becomes an error if it is meant to be part of a sentence, the rest of that sentence being realized in a preceding written utterance that contains another part of the same sentence which in itself is not a well-formed sentence. The same is true for the four written utterances in (21b), although it may be more difficult to imagine contexts in which they might occur; cases at issue could be answers to appropriate questions. Looking at Cook's (2004, p. 42) definition of sentence, (21) could only be said to be sequences of two or four 'sentences', since all forms at issue begin with an uppercase letter and end with a 'full stop'. I do not see any possibility to describe the flawedness of these written examples within Cook's approach.

However, examples like the ones in (21) can still be found in language use. A particularly nice example is a quote from Suvarna Baheti, posted on November 26, 2017 on www.yourquote.in.

Grammatically, the quote consists of only one sentence. Grapholinguistically, it is conceived as a sequence of four written utterances, each beginning with an uppercase letter and ends with a dot (two of them also have three ellipsis dots at the end before the final dot). The first of the written utterances does not contain a grammatical sentence. Thus, the written utterances obey Conditions 1 and 2, but the sequence of written utterances violates Condition 3.

However, instead of discarding Condition 3 in the face of examples such as Baheti's poem, I will consider the scope of orthographic conditions in general. In the German-speaking countries, the official rules are only binding in certain areas:

> Das folgende amtliche Regelwerk, mit einem Regelteil und einem Wörter-verzeichnis, regelt die Rechtschreibung innerhalb derjenigen Institutionen (Schule, Verwaltung), für die der Staat Regelungskompetenz hinsichtlich der Rechtschreibung hat. Darüber hinaus hat es zur Sicherung einer einheitlichen Rechtschreibung Vorbildcharakter für alle, die sich an einer allgemein gültigen Rechtschreibung orientieren möchten (das heißt Firmen, speziell Druckereien, Verlage, Redaktionen – aber auch Privatpersonen). ([Deutsche Rechtschreibung], 2018, S. 7)[12]

This means that there are areas of language use for which the official rules of the German orthography are not binding. In particular, a writer may do anything he likes in private correspondence with regard to orthography. A limiting factor may be that he wants to be understood by a potential reader. Other relevant areas are advertising and works of art, areas where playing with language and playing with rules of orthography has its own value. With regard to languages that do not have an explicitly codified norm of spelling, the implicit norm is consequently more reliably derived from administrative text than, for example, from poems.

Therefore, I maintain that Condition 3 applies to writing systems such as English and German, but the standard writing system does not have authority in a number of areas of written language use. Autonomous sub-systems may develop among certain communities as in chat communication. Such non-standard systems deserve linguistic analysis, but they should not be equated with standard orthography.

7. Conclusion

When the question is asked: "What is it that ends with a full stop?" the scientific answer from grapholinguistics is not: "A sentence." The term *sentence* should be reserved for a structural unit in syntax, while the unit in question is an original grapholinguistic one. It is essential to distinguish between these two units, as has occasionally been done in grapholinguistic research before in one way or another. Since this unit

---

12. "The following official set of rules, with a rule section and a dictionary, regulates spelling within those institutions (school, administration) for which the state has regulatory competence with regard to spelling. Furthermore, in order to ensure a uniform spelling, it serves as a model for all those who wish to orient themselves towards a generally valid spelling (i.e., companies, especially printers, publishers, editorial offices—but also private individuals)."

is more closely related to the utterance as a pragmatic unit than to the sentence as a syntactic unit, it should not bear the designation *sentence* in its name but the designation *utterance*. In the present paper, I propose the designation *written utterance*. A written utterance is a grapholinguistic unit which is constituted by comprising what can be conceived as a coherent thought. The writer has a certain freedom in what he considers a coherent thought, but there are limitations. If a sequence of two sentences is conceived as one coherent thought, this sequence can sometimes be interpreted differently than if it were conceived as two different coherent thoughts.

If the written utterance is defined in this way, different writing systems can be analyzed in terms of the well-formedness conditions that apply to them. For the writing systems of English and German, the respective conditions require that the first element (disregarding brackets and quotation marks), if it is a letter, has to be an uppercase letter and the final element an end punctuation mark. Thus, in the present conception these properties are treated as well-formedness conditions, while other approaches typically consider them as defining features (of concepts termed, e.g., *text sentence* or *Ganzsatz*). These different conceptions have significant consequences for 'errors'. If a written utterance, as defined here, immediately begins with a lowercase letter, it is characterized by a spelling error. If, on the other hand, one takes the feature of the initial uppercase letter as a defining criterion, everything that does not begin with an uppercase letter does not fall under the term in question. With such an approach, it would be inadequate to mark a supposed 'text sentence' beginning with a lowercase letter as misspelled, because the unit in question would not even meet the defining criteria of a text sentence.

Different writing system can have different well-formedness conditions for written utterances. Spanish is a case in question because it has a special condition for such written utterances that end with an exclamation mark or question mark. In addition, English and German have slight differences with respect to quoted written utterances. Based on definitions such as that of the written utterance in (9), a contrastive analysis of writing systems is feasible. Defined terms form the core of a theory, which must be kept constant for the analyses. Differences among writing systems can then be revealed in terms of the well-formedness conditions. Furthermore, the concept of the written utterance provides a frame for the analysis of conditions for other punctuation marks. In Neef (2020), I analyze the comma in the German writing system by using the concept of written utterance.[13]

---

13. The text was made with the help of DeepL, which is gratefully acknowledged.

References

Admoni, Wladimir (1968). "Der Umfang und die Gestaltungsmittel des Satzes in der deutschen Literatursprache bis zum Ende des 18. Jhs." In: *Beiträge zur Geschichte der deutsche Sprache und Literatur*. Vol. 89, pp. 144–199.

Austin, John L. (1962). *How to do things with words*. Oxford: Clarendon Press.

Baudusch, Renate (1980). "Zu den sprachwissenschaftlichen Grundlagen der Zeichensetzung." In: *Theoretische Probleme der deutschen Orthographie*. Ed. by Dieter Nerius and Jürgen Scharnhorst. Vol. 16. Sprache und Gesellschaft. Berlin: Akademie-Verlag, pp. 193–230.

———— (1981). "Prinzipien der deutschen Interpunktion." In: *Zeitschrift für Germanistik* 2.1, pp. 206–218.

Behme, Christina and Martin Neef, eds. (2018). *Essays on Linguistic Realism*. Vol. 196. Studies in Language Companion Series. Amsterdam: John Benjamins.

Bierwisch, Manfred (1972). "Schriftstruktur und Phonologie." In: *Probleme und Ergebnisse der Psychologie* 43, pp. 21–44.

Bloomfield, Leonard (1933). *Language*. New York: Holt.

Bredel, Ursula (2008). *Die Interpunktion des Deutschen*. Vol. 522. Linguistische Arbeiten. Tübingen: Niemeyer.

Cook, Vivian (2004). *The English writing system*. London: Hodder Education.

[Deutsche Rechtschreibung] (2018). *Regeln und Wörterverzeichnis. Aktualisierte Fassung des amtlichen Regelwerks entsprechend den Empfehlungen des Rats für deutsche Rechtschreibung 2016*. Mannheim. URL: https://www.rechtschreibrat.com/DOX/rfdr_Regeln_2016_redigiert_2018.pdf (visited on 26 November 2020).

Dürscheid, Christa (2002). *Einführung in die Schriftlinguistik*. 2nd ed. Wiesbaden: Westdeutscher Verlag, (5th ed., Göttingen: Vandenhoeck & Ruprecht, 2016).

Dürscheid, Christa and Dimitrios Meletis (2019). "Emojis: A Grapholinguistic Approach." In: *Graphemics in the 21st Century*. Ed. by Yannis Haralambous. Vol. 1. Grapholinguistics and Its Applications. Brest: Fluxus Edition, pp. 167–183.

Eisenberg, Peter (1983). "Writing systems and morphology. Some orthographic regularities in German." In: *Writing in focus*. Ed. by Florian Coulmas and Konrad Ehlich. Berlin: Mouton, pp. 63–80.

———— (2013). *Grundriss der deutschen Grammatik, Band 1: Das Wort*. 4th ed. Stuttgart: Metzler.

Engel, Ulrich (1991). *Deutsche Grammatik*. Heidelberg: Groos.

Ewald, Petra and Karl-Ernst Sommerfeldt, eds. (1995). *Beiträge zur Schriftlinguistik: Festschrift zum 60. Geburtstag von Professor Dr. phil. habil. Dieter Nerius*. Vol. 15. Sprache—System und Tätigkeit. Frankfurt: Lang.

Gallmann, Peter (1985). *Graphische Elemente der geschriebenen Sprache*. Vol. 60. Reihe Germanistische Linguistik. Tübingen: De Gruyter.

Glück, Helmut (1987). *Schrift und Schriftlichkeit*. Stuttgart: Metzler.

Günther, Hartmut and Ludwig Otto, eds. (1994). *Schrift und Schriftlichkeit/ Writing and its use*. Vol. 10.1, 10.2 (1996). Handbooks of Linguistics and Communication Science. Berlin, Boston: De Gruyter.

Günther, Klaus B. and Hartmut Günther (1983). "Einleitung." In: *Schrift, Schreiben, Schriftlichkeit*. Ed. by Klaus B. Günther and Hartmut Günther. Vol. 49. Reihe Germanistische Linguistik. Tübingen: Niemeyer, pp. vii–xiv.

Johnson, Sally (2005). *Spelling trouble? Language, ideology and the reform of the German orthography*. Clevedon, UK: Multilingual Matters.

Katz, Jerrold J. (1981). *Language and other abstract objects*. Totowa, NJ: Rowman & Littlefield.

Ludwig, Otto (1980). "Geschriebene Sprache." In: *Lexikon der germanistischen Linguistik*. Ed. by Hans Peter Althaus, Helmut Henne, and Herbert Ernst Wiegand. Vol. 3. Tübingen: Niemeyer, pp. 323–328.

Meisenburg, Trudel (1996). "Das spanische Schriftsystem." In: *Schrift und Schriftlichkeit/Writing and its use*. Ed. by Hartmut Günther and Ludwig Otto. Vol. 10.1. Handbooks of Linguistics and Communication Science. Berlin, Boston: De Gruyter, pp. 1437–1441.

Meletis, Dimitrios (2018). "What is natural in writing? Prolegomena to a natural grapholinguistics." In: *Written Language & Literacy* 21.1, pp. 52–88.

Neef, Martin (2005). *Die Graphematik des Deutschen*. Vol. 500. Linguistische Arbeiten. Tübingen: Niemeyer.

——— (2008). "Worttrennung am Zeilenende: Überlegungen zur Bewertung und Analyse von orthographischen Daten." In: *Zeitschrift für Germanistische Linguistik* 35.3, pp. 283–314.

——— (2012). "Graphematics as part of a modular theory of phonographic writing systems." In: *Writing Systems Research* 4, pp. 214–228.

——— (2015). "Writing systems as modular objects: proposals for theory design in grapholinguistics." In: *Open Linguistics* 1, pp. 708–721.

——— (2018). "Autonomous Declarative Phonology: A realist approach to the phonology of German." In: *Essays on Linguistic Realism*. Ed. by Christina Behme and Martin Neef. Vol. 196. Studies in Language Companion Series. Amsterdam: John Benjamins, pp. 185–201.

——— (2020). *Zur Kommasetzung im Deutschen: Eine Analyse mittels dreier systematisch-orthographischer Bedingungen*. Braunschweig: TU Braunschweig (submitted).

Neef, Martin, Said Sahel, and Rüdiger Weingarten (2012–today). *Schriftlinguistik*. Vol. 5. Wörterbücher zur Sprach und Kommunikationswissenschaft Online. Berlin, New York: de Gruyter.

Nerius, Dieter (1988). "Einleitung." In: *Probleme der geschriebenen Sprache. Beiträge zur Schriftlinguistik auf dem XIV. internationalen Linguistenkongreß*

1987 in Berlin. Ed. by Dieter Nerius and Gerhard Augst. Vol. 173. Linguistische Studien. Berlin: Akademie der Wissenschaften der DDR, pp. 1–3.

Nerius, Dieter (1994). "Zur Struktur, Geschichte und Benutzung deutscher Orthographiewörterbücher. Vorstellung eines Projekts." In: *Symposium on lexicography VI*. Ed. by Karl Hyldgaard-Jensen and Viggo Hjørnager Pederson. Tübingen: Niemeyer, pp. 1–20.

Nunberg, Geoffrey (1990). *The linguistics of punctuation*. Stanford: Center for the Study of Language and Information.

Platt, Penny (1974). "Grapho-linguistics: the study of communicative properties of children's drawings and their role in the initial acquisition of writing and reading skills." Paper presented to the Annual Meeting of the International Reading Association, New Orleans, May 1-4, 1974.

———— (1977). "Grapho-linguistics: Children's drawings in relation to reading and writing skills." In: *The Reading Teacher* 31.3, pp. 262–268.

Rinas, Karsten (2017). *Theorie der Punkte und Striche*. Vol. 62. Germanistische Bibliothek. Heidelberg: Winter.

Rogers, Henry (2005). *Writing systems: a linguistic approach*. Malden, MA: Blackwell.

Schmidt, Karsten (2016). "Der graphematische Satz: Vom Schreibsatz zur allgemeinen Satzvorstellung." In: *Zeitschrift für germanistische Linguistik* 44, pp. 215–256.

Searle, John R. (1969). *Speech acts*. Cambridge: Cambridge University Press.

Stetter, Christian (1989). "Gibt es ein graphematisches Teilsystem der Sprache? Die Großschreibung im Deutschen." In: *Schriftsystem und Orthographie*. Ed. by Peter Eisenberg and Hartmut Günther. Vol. 97. Reihe Germanistische Linguistik. Tübingen: Niemeyer, pp. 297–320.

Wiese, Richard (1987). "Laut, Schrift und das Lexikon." In: *Deutsche Sprache* 15, pp. 318–335.

What Is a Written Word?
And if So, How Many?

Martin Evertz-Rittich

Abstract. The linguistic unit *word* seems to be an intuitive notion for language users. However, linguists have failed so far to provide a uniform definition of that unit. Instead, there are definitions pertaining to different subsystems of language. In this paper, we will discuss how we can define the unit word in writing. We will start by examining definitions of the graphematic word in alphabetical writing systems such as German and English. We will then discuss how the written word relates to other suprasegmental units in writing systems, such as the syllable and the foot, and to which spoken unit or units a written word corresponds to. Finally, we will show that the discussed definitions of the graphematic word are not employable universally since in alphabetical writing systems definitions of the graphematic word pertain to interword spacing. By examining the Chinese and Japanese writing systems as examples, we will try to explain why these writing systems do not mark words by spaces and discuss whether there are graphematic words in these writing systems. Based on these considerations we will provide a tentative universal definition of graphematic words.

1. Introduction

Although the notion *word* seems to be an intuitive unit for language users—it might even be "the most basic of all linguistic units" (Taylor, 2015, p. 1)—it is a notoriously elusive concept in linguistics. This is due to the various criteria of wordhood in each linguistic subsystem, which often contradict each other. For instance, a phonological word, which (among other criteria) must exhibit exactly one primary stress, is not the same as a syntactic word, which (among other criteria) is moveable in a sentence (cf. *fish and chips* are three syntactical words but two phonological ones {fish and}{chips} with an unstressed *and*, cf. ibid., p. 7). Moreover, the criteria to identify a word in most subsystems of language are

Martin Evertz-Rittich   0000-0001-5434-6267
University of Cologne, Albertus Magnus Platz, 50923 Köln, Germany
E-mail: martin.evertz@uni-koeln.de

often quite subtle and sometimes not even unambiguous (cf., e.g., the criteria for wordhood in semantics).

When it comes to the written word, however, things seem to be quite easy. Most often, the graphematic[1] word is defined as a string of letters bordered by spaces. And that seems to be the only noteworthy thing about that linguistic unit.

In this paper, I will show that there is more to the graphematic word. I will begin with the seemingly easy definition of the graphematic word and show that it is actually quite problematic. I will discuss the definition of the graphematic word in alphabetical writing systems, such as the writing systems of English and German, and show that the definitions found in the literature are insufficient. Based on typographic considerations, I present a promising alternative. In the next part, I will discuss the role of the graphematic word in the graphematic hierarchy and which properties can be derived from it. After that I will discuss the correspondence of the graphematic word to units in spoken language, such as the phonological and syntactical word (see above). Lastly, I will have a look at two writing systems that do not mark graphematic words by inter-word spacing: Japanese and Chinese. I will discuss why this is the case and whether there are graphematic words in these writing systems at all. In the conclusion, I will revisit the definition of the graphematic word presented in section 2 in light of the findings in section 5.

2.   Definitions in Alphabetical Writing Systems

We will start our endeavor by examining definitions of graphematic words in alphabetical writing systems such as English or German. Probably the simplest definition is the one provided in (1).

(1)   A graphematic word is a string of graphemes that is bordered by spaces and may not be interrupted by spaces.

This kind of definition is quite common in the literature (e.g., Coulmas, 1996, p. 550; Jacobs, 2005, p. 22; Fuhrhop, 2008, 193f). This definition seems to be intuitively correct and for most linguistic approaches—even grapho-linguistic ones—this definition suffices (cf., e.g., Evertz, 2018, p. 21). However, closer examination reveals that it is indeed problematic.

----

1. In this paper, I will use the notion *graphematic* when conferring to a writing system. I refrain from using the term *orthographic* in this context since the orthography of a given writing system is the conventionalized spelling of that writing system and thus a subset.

But before we can begin discussing the definition, the terms within it must be clarified. In alphabetical writing systems, there are two traditions of defining the notion *grapheme*:

- A grapheme is a written unit that corresponds to exactly one phoneme (e.g., Wiese 2007).
- A grapheme is the smallest contrastive unit within a given writing system (e.g., Henderson, 1985, Kohrt, 1985, Eisenberg, 2006, Rogers, 2005).

While the first one defines the grapheme by its correspondence to phonological units, the second definition pertains to the distribution of the grapheme and thus is independent of phonology. The second definition closely corresponds to its counterpart in phonology, the definition of the *phoneme*. That entails that the grapheme, just like the phoneme, can be identified by minimal pair analyses.

The other term in the definition in (1) is the notion *space*. According to Bredel (2008, 31–32; 2011, 19–20) we can imagine the writing space as a threefold structure consisting of segmental slots, linear slots and two-dimensional slots, cf. Fig. 1.
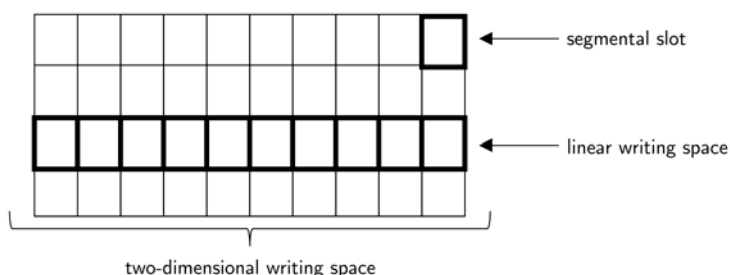
FIGURE 1. Writing Space (Bredel, 2011, p. 31; my translation)

Segmental slots are spaces that can be filled by certain graphic elements, e.g., letters. Linear writing spaces are horizontally oriented strings of slots. A two-dimensional writing space is a vertically oriented sequence of linear writing spaces (cf. Bredel, 2008, p. 19). A space according to (1) can be defined as an empty segmental slot.

Now that the terms in (1) are reasonably well clarified, we can have a closer look at this definition. Consider the examples in (2).

(2)   <you.>, <you?>, <you!>
      <Smiths'> (e.g., in *the Smiths' house*), <mother-in-law>

Let us start with the examples in (2a). According to the definition in (1), a word starts and ends with a grapheme. The examples in (2a), however, end in punctuation marks. These are not graphemes—regardless which definition of grapheme we employ: punctuation marks do not correspond to phonemes and they are not contrastive on the word level.

Thus, a word like <you> corresponds to the definition in (1), the examples in (2a), however, do not because they end in a punctuation mark.

If the definition in (1) is understood as being exhaustive (only those entities described in the definition qualify as graphematic words), the examples in (2a) are no graphematic words. But if they are not, what are they? If the definition in (1) is not exhaustive, it is not complete and additionally, the question arises, if the examples in (2a) are one or more words.

Similar problems arise with the examples in (2b). The word-status of <Smiths'> is unclear as is the question whether a hyphenated word (?) like <mother-in-law> constitutes one or more graphematic words.

One alternative to the definition in (1) is proposed by Zifonun, Hoffmann, and Strecker (1997, p. 259), my translation:

(3)   A graphematic word is a string of graphemes that is preceded by a space and may not be interrupted by spaces.

This definition only seemingly solves the problems we have encountered so far. The examples in (2a) constitute according to this definition exactly one graphematic word, <you>, because the "string of graphemes" is interrupted by a punctuation mark in each case. The same is true for the first example in (2b). This string of graphemes is interrupted by the apostrophe. The case of the second example in (2b) is more complicated, however. According to the definition in (3), <mother-in-law> constitutes exactly one graphematic word: <mother>. The status of <-in-law> is unclear.

Moreover, there are examples like in (4) that do not only end but also begin with punctuation marks.

(4)   <"you">, <(you)>, <¿tú?> (Span.)

Thus, the definition in (3) is also problematic.

The solution I propose is based on typographic considerations by Bredel (2008; 2011). Based on the model of writing space (cf. Fig. 1) we can distinguish between two classes of punctuation marks and graphemes: *fillers* and *clitics*. Fillers can independently fill a segmental slot whereas clitics need the support of a filler.

Bredel (2008) proposes two criteria by which fillers and clitics can be distinguished. The first one is symmetry. One element is called symmetric, if elements of the same class can stand adjacent to the left and

right side of that element. Fillers are symmetric, clitics are not. The second criterium is the ability of an element to appear at the beginning and the end of a line. Fillers can appear at the end and the beginning of a line, clitics cannot.

According to Bredel (2011, pp. 20–23) letters, numbers, apostrophes and hyphens are fillers; periods, colons, semi-colons, commas, brackets, question marks, quotation marks and exclamation marks are clitics.

Based on this distinction, we propose the following definition of graphematic words in alphabetical writing systems such as German and English (Evertz, 2016a, pp. 391–392); based on works of Bredel; my translation):

(5)   A graphematic word is a sequence of slot-filler-pairs surrounded by empty slots in which at least one filler must be a letter.

The supplement to the definition (at least one filler being a letter) was added to exclude numbers from the scope of the definition. Let us examine one of our examples in light of this definition, cf. Fig. 2.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	m	o	t	h	e	r	-	i	n	-	l	a	w!	

FIGURE 2. Slot-filler-pairs of <mother-in-law!>

In Fig. 2 there are 15 segmentals slots. Slots 2 to 14 are occupied, slots 1 and 15 are empty. Slots 2 to 7, 9 to 10 and 12 to 13 are occupied by one letter each, slot 14 is occupied by a letter and a punctuation mark. Slots 8 and 11 are each occupied by one non-letter filler. Thus, <mother-in-law> meets all requirements for a graphematic word according to the definition in (5).

The consequence of the definition in in (5) is that we can distinguish between the graphematic word proper and its surface form. Clitics are only part of the graphematic surface whereas fillers are part of the graphematic surface *and* of the graphematic word proper. This is true for all fillers: letters and non-letters (cf. ibid., pp. 391–392).

In the case of the examples in (2a) and (4), the graphematic word proper consists of the fillers: <you>. The clitics (in these cases the punction marks) are part of the graphematic surface. Thus, the examples in (2a) and (4) are graphematic surface forms of exactly one graphematic word (cf. ibid., pp. 391–392).

The examples in (2b) consist exclusively of fillers. This means that all characters (letters and non-letters alike) make up the graphematic word proper. The non-letter fillers are part of the graphematic word since

they have important roles within it. In the case of <mother-in-law> (cf. Fig. 2), the non-letter fillers indicate that the morphological processing is not completed after <mother> and <in> but that everything between the empty slots must be processed as whole (Evertz 216a, 391). In the case of <Smiths'> as in *the Smiths' house*, the apostrophe indicates a zero morpheme (Bunčić, 2004, p. 190). A consequence is, however, that <Smiths'> and <Smith> are two different graphematic words.

This definition is very promising for writing systems such as English and German. We will see however, that it is a poor candidate for a universal definition, cf. section 5.

3.   Properties of Graphematic Words

The graphematic word is a unit in writing systems that issuprasegmental, i.e., it is larger than a single segment. It is not the only suprasegmental unit in alphabetical writing systems. The graphematic syllable is well-established in psycho- and grapholinguistic literature (e.g., Butt and Eisenberg, 1990; Domahs, Bleser, and Eisenberg, 2001; Eisenberg, 2006; Primus, 2003; Rollings, 2004; Roubah and Taft, 2001; Weingarten, 2004) and more recently, the graphematic foot gained attention (Evertz, 2016a,b; 2018; 2019; Evertz and Primus, 2013; Fuhrhop and Peters, 2013; Primus, 2010; Ryan, 2018). With these units it is possible to constitute a graphematic counterpart of the phonological hierarchy, cf. Fig. 3.
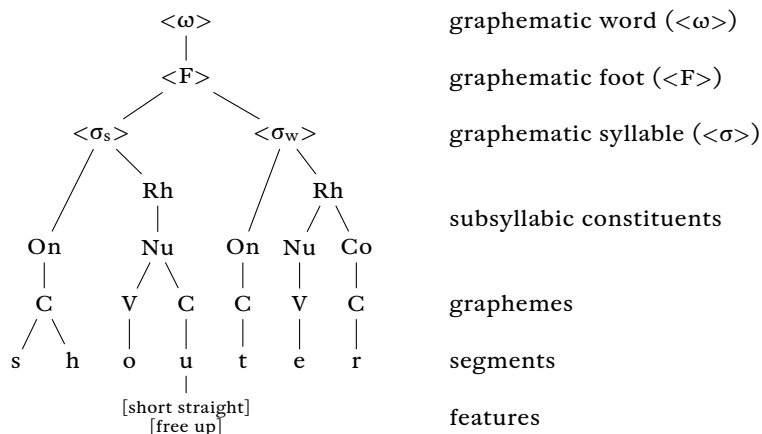
FIGURE 3. The graphematic hierarchy (Evertz, 2018; Evertz and Primus, 2013

This hierarchy is—just as its phonological counterpart—accompanied by the *Strict Layer Hypothesis* (Nespor and Vogel, 1986). This hypothesis states in its strong form that each unit of a non-terminal category is composed of one or more units of the immediately lower category. The second part of the Strict Layer Hypothesis states that a unit of a given level of the hierarchy is exhaustively contained in the superordinate unit of which it is part (ibid., p. 7). Previous work showed that this hypothesis also holds in graphematics, although it seems that the first principle is violable in case of so called extrametrical syllables (cf. Evertz, 2018).

A consequence of these considerations are that:

– a graphematic word consists of at least one graphematic foot and
– a graphematic foot consists of at least one graphematic syllable.

Since larger units in a hierarchy are made up of the immediately smaller units, the larger units inherit traits of the smaller units. For instance, if a syllable must adhere to certain well-formedness requirements and if a foot is constituted by syllables, the syllables of the foot must adhere to the very the same requirements. The same is true on every level of the hierarchy. This means that a graphematic word must adhere to well-formedness requirements of graphematic feet and graphematic syllables.

This relationship can be exemplified by so called *minimal words* (Evertz, 2016b). Consider following examples:

(6)   in/inn, oh/owe, no/know, by/bye/buy, so/sew, to/two, we/wee, or/ore/oar, be/bee, I/aye/eye

The pairs or triplets in (6) are homophones. Interesting is that function words can obviously be shorter than content words. This can be described by the so called *three-letter-rule* (e.g., Cook, 2004, p. 57):

(7)   Content words must have more than two letters.

The existence of a minimality restriction like the three-letter-rule can be explained with the help of the graphematic hierarchy.

Just like in phonology, we can expect that function words behave differently than content words. For instance, while content words always constitute phonological words, which exhibit exactly one prime stress, function words can be unstressed. In phonology, this can be described by following constraint:

(8)   Lexwd = Prdwd: Every lexical word corresponds to a prosodic word (ibid., p. 101).

Let us assume that this constraint also holds for writing systems:

(9)   Every lexical word corresponds to a well-formed graphematic
       word.

The difference in the pair and triples in (6) can now be explained by
the well-formedness constraints the graphematic word inherits from the
smaller units in the hierarchy.

In phonology, feet must conform to a certain well-formedness con-
straint, called *foot-binarity* (McCarthy and Prince, 1995, pp. 320–324):

(10)   FOOT-BINARITY: Feet are binary at a syllabic or moraic level of
        analysis.

This means that a well-formed phonological foot must consist of two syl-
lables or one heavy syllable. Evertz (2016b; 2018) shows that a similar
constraint holds for graphematics. A graphematic foot must consist of
either one heavy graphematic syllable or two graphematic syllables (of
any weight). Whether a graphematic syllable is heavy or light depends
on its syllabic structure. In order to be heavy, a graphematic syllable
must have a rhyme that dominates at least two segments and in total the
syllable must consist of at least three segments (Evertz, 2016b, p. 208;
see the fist syllable in Fig. 3 as an example of a heavy graphematic syl-
lable).

    Although the three-letter-rule is not wrong, the explanation provided
here is superior in explanatory strength. Moreover it is empirically su-
perior. If having three letters was the only restriction for graphematic
words, there should be more words like <gnu>, which end in a single
vowel letter but still consist of three letters. Words of this type, how-
ever, are quite rare (cf. ibid.).[2]

    Even the fact that content words have at least one vowel letter can be
derived from the graphematic hierarchy: A graphematic word consists
of at least one foot. A graphematic foot consists of at least one graphe-
matic syllable. And a graphematic syllable must have a core dominating
at least one vowel letter (e.g., Evertz, 2018; Fuhrhop and Peters, 2013;
Primus, 2003).

    There are, however, exceptions to the well-formedness constraints
described here. Graphematic words that systematically violate these
constraints are abbreviations:

---

    2. Evertz (2016b, p. 193) reports that only 20.4% of monosyllabic phonological
words ending in a vowel are written as a monosyllabic graphematic word ending in a
single vowel letter. Of these 20.4%, 4.6% are function words, 9.2% are loanwords, in-
terjections or abbreviations, leaving a rest of 6.7%. Monosyllabic phonological words
ending in a vowel are rather coded with the help of so called mute letters like in *blow,
bee, high*. Evertz (ibid., pp. 207–208) argues that these mute letters add graphematic
weight in order to meet the weight restriction for graphematic feet.

(11)   Examples for graphematic words violating well-formedness con-
        straints:
        – ill-formed graphematic syllables: Mr., Mrs., vs., Dr.
        – ill-formed graphematic feet: BA, MA, no.

The examples in (11a) violate the constraint that the cores of graphe-
matic syllables dominate a vowel letter. The examples in (11b) violate
the constraint that graphematic feet need to have a minimal weight.

Those words that violate well-formedness constraint are marked by
special orthographic devices like dots or all-caps. We may thus describe
such abbreviations as untypical and marked graphematic words (Evertz,
2016a, p. 393).

4.   Relations to Phonological Units

After having discussed the definition of the graphematic word and some
of its properties, let us now try to discuss the relationship of the graphe-
matic word to other word-like units.

Let us begin with the *phonological word*. It is quite obvious that the
phonological word and the graphematic word are not congruent. A
phonological word is a linguistic unit that consists of at least one phono-
logical foot and exhibits exactly one primary stress. Within phonolog-
ical words, syllable boundaries are drawn according to *onset maximiza-
tion* (assign as many intervocalic consonants to the onset as possible
(in accordance with the phonotactical constraints of a language); e.g.,
Giegerich, 1992, p. 170). For instance, *tomato* constitutes exactly one
phonological word. There are several potential ways to divide the word
into syllables, e.g., **tom.at.o* vs. *to.ma.to*. Only the second way conforms to
the onset maximization principle. However, onset maximization does
not incur, if a border of a phonological word is interfering.

One example for that is the German compound *Tierart* 'animal
species'. According to onset maximization, the intervocalic consonant
/r/ should be the onset of the second syllable. However, this syllabifi-
cation is ungrammatical: *[tiː.ʁaːɐ̯t]. Instead, the word is syllabified like
this: [tiːɐ̯.ʔaːɐ̯t]. Thus, we can conclude that a phonological word border
is interfering with onset maximization. In other words, *Tierart* consists
of two phonological words: {*Tier*}{*art*}. However, it is realized graph-
ically as one graphematic word <Tierart>. Therefore it seems that in
German, the phonological word and the graphematic word are incon-
gruent.

An example of the incongruity of phonological and graphematic
words in English was mentioned in the first section: *fish and chips*. While
this phrase consists of three graphematic words, it consists of only two
phonological words: {fɪʃn̩}{ʧɪps} (Taylor, 2015, p. 7).

A *morphological word* can be described a an entity that inflects uniformly (Wurzel, 2000, p. 36) and is constituted by word building rules (Jacobs, 2005). Thus, our example *Tierart* is a morphological word since it is constituted according to the composition rules of German and is inflecting uniformly: *Tierarten* (Pl.) vs. **Tierearten*. Fuhrhop (2008, p. 224) comes to the conclusion that the morphological word is congruent with the graphematic word in German.[3]

A *syntactic word* can be defined as a syntactically free form that is commonly designated X^0 in *generative grammar* (cf. Gallmann, 1999). This entails that a syntactical word is permutable in a sentence and may not be interrupted by linguistic material. Gallmann (ibid.) and Fuhrhop (2008) come to the conclusion that the syntactic word and the graphematic word are almost congruent[4] in German.

From a writer's perspective the congruity of graphematic words with syntactical and morphological words means that phrases must be realized as single graphematic words with empty slots in between. Complex morphological words, however, must be realized as one graphematic word without empty slots in between. Conversely, from a reader's perspective this means that a slot-filler-sequence without spaces must be interpreted morphologically and slot-filler-sequences with spaces must be interpreted syntactically. This can be exemplified by *wohlgeraten* 'great, outstanding' vs. *wohl geraten* 'probably guessed'. Because there are no empty slots in *wohlgeraten*, it must be interpreted as one graphematic word and therefore as one morphological word. And because there is an empty slot in *wohl geraten*, this expression must be interpreted as two graphematic words and therefore two syntactic words, a phrase in this case.

The case for English is not as straightforward as in German. This is due to the fact that there is a considerable stylistic freedom in the spelling of compound words. For instance, the website *Wiktionary* lists three spellings of *secondhand*: <secondhand>, <second-hand> and <second hand>. However, as the same website points out, <secondhand> and <second-hand> "may be preferred spellings for the adjective meaning 'not new', to avoid confusion with the noun 'second hand' referring to the hand of a clock or watch."[5]. This means that

---

3. Whether there are exceptions to the congruity of morphological and graphematic words is debatable. Wurzel (2000, p. 37) points to the case of *(mit seiner) Langenweile* '(with his) boredom (Dative)' a variant of *Langeweile*. This (not too common) variant may suggest that *Langeweile* is actually consisting of two morphological words but one graphematic word.

4. Examples include particle verbs like *anfangen* 'to begin' in sentences like *er fängt an zu schreiben* 'he starts writing'.

5. https://en.wiktionary.org/wiki/second_hand#English, retrieved August 21st, 2020.

spellings without empty slots are quite clearly interpreted as one morphological word while spellings with empty slots can have ambiguous readings. Evertz (2016a, p. 394) points to the example *old furniture dealer*: an <old-furniture dealer> is a dealer of old furniture, an <old furniture-dealer> is a furniture dealer who is elderly.

Thus it seems that just like in the German writing system, the graphematic word is congruent with the morphological and syntactical word in English although the English writing system allows more variation in writing compound words.

5.   Graphematic Words Without Spaces?

So far we examined the graphematic word in English and German as examples of alphabetical writing systems that use empty slots to mark the beginning and end of graphematic words. However, there are writing systems, alphabetical and non-alphabetical, that do not use empty slots in that way. In this section, we will have a look at two examples and discuss why in these cases there are no empty slots and whether we still can find reasons to assume that the graphematic word is a relevant unit in these writing system.

5.1.   The Case of Japanese

The Japanese writing system (JWS) is regarded as one the most complex writing systems in the world (e.g., Joyce, 2011). Sproat (2010, p. 47) for instance writes that "Japanese is a complex system, certainly the most complex writing system in use today and a contender for the title of the most complex system ever." The reason for this consensus regarding its complexity is the multitude of scripts employed in the Japanese writing system. In the contemporary JWS there are five separate scripts: morphographic *kanji*, the mora-based (Ratcliffe, 2001) scripts *hiragana* and *katakana*, the phonemic Roman alphabet *rōmaji* and Arabic numerals (e.g., Joyce and Masuda, 2018, p. 182).

The different scripts are used for different purposes. Kanji are generally used to represent native and Sino-Japanese content words like nouns, the stem of verbs etc. (ibid., p. 184). For instance, the compound 日本語 *nihongo* 'Japanese' consists of three kanji 日本 'Japan' and 語 'language'.Hiragana, on the other hand, generally represent function words such as auxiliaries, and inflectional endings (ibid., p. 184). In this use they are referred to as 送り仮名 *okurigana* 'accompanying letters'. An example for okurigana are the hiragana following the kanji in 見る *miru* '(to) see' vs. 見た *mita* 'saw'. Katakana are usually used to write non-Chinese loanwords, foreign names, animal and plant species names,

onomatopoeic expressions, and for emphasis and as glosses. Rōmaji are similarly used to represent non-Japanese words and names, especially within advertising and mass media. And finally, Arabic numerals are used to represent numbers, particular in financial and scientific contexts (Joyce and Masuda, 2018, p. 184).

While on first sight this multitude of different scripts might seem confusing, it can actually be beneficial for readers as they enable them to distinguish lexical content from grammatical elements (Joyce and Masuda, 2016). This is because of the visual distinctiveness of the three scripts the JWS mainly uses. First, kanji are visually salient because of their complexity. In contrast to hiragana and katakana, which are usually written with no more than six strokes (Kajii, Nazir, and Osaka, 2001, p. 2504), kanji can consist of up to 29 strokes with an average of 10.47 strokes (Joyce, Hodošček, and Nishina, 2012, p. 256; Joyce and Masuda, 2018, p. 186). Since these salient units usually represent lexical content, it can be identified at first glance. Second, hiragana are also easily identifiable: they consist of relatively few strokes, which tend to be curved, in contrast to katakana, which consist of more or less the same amount of strokes, which, however, tend to be straight. Thus, grammatical elements, which are usually represented by hiragana, are also quite easily identifiable. Reading experiments confirmed that readers can distinguish the three types of characters effortless, even in peripheral vision (Osaka, 1989; 1992). Given the foreignness in appearance of rōmaji and Arabic numerals, it is quite reasonable to assume that they too can be distinguished easily by readers of the JWS.

Let us demonstrate the interplay of the different scripts within the JWS, cf. the example in (12).

(12)   Example for the interplay of different scripts in the JWS (Shibatani, 1990, p. 129)

花子	は	あの	ビル	で	働	いている	O L	です。
Hanako	wa	ano	biru	de	hatari-	i-te-i-ru	ooreu	desu
Hanako	Topic	that	building	at	work-	ing	OL	is

'Hanako is an OL (office lady) working in that building'

Content words (in one case a verb stem) are represented by kanji (花子, 働), by katakana (ビル) or rōmaji (*OL*). Since in Japanese inflectional endings are following the stem, word beginnings coincide with characters that usually represent lexical content, especially kanji (cf. Rogers, 2005, p. 66). Thus, characters frequently appearing in the word beginning may serve as effective segmentation cues to signal word boundaries.

This points to the conclusion that graphematic words do not need to be explicitly marked by empty slots in Japanese, since the words are already marked *graphotactically*. This conclusion is supported by psycholin-

guistic findings. Sainio, Hyönä, Bingushi, and Bertram (2007) found that interword spacing facilitated Japanese readers—but only when they read a text composed of hiragana only. In normal Japanese texts, which mainly consist of kanji and hiragana, interword spacing did not facilitate reading.

5.2. The Case of Chinese

Like the Japanese writing system, the Chinese writing system (CWS) does not display empty slots between individual characters, which represent most likely a morpheme or a syllable, cf. (13).

(13)   Example of a Chinese sentence without interword spacing
        中国这几年的变化的确很大。

The sentence neither displays spacing between words or phrases nor does it display graphotactical cues to word boundaries like in the JWS. Yet there are linguistic units greater than single syllables, morphemes or characters. (14) provides a translation of the sentence in (13), in which syntactic words are separated.

(14)   Translation of the sentence in (13) (Coulmas, 2003, p. 59)

中国	这	几	年	的	变化	的确	很	大。
Zhōngguó	zhè	jǐ	nián	de	biànhuà	díquè	hěn	dà
China	these	several	years	GEN	change	really	very	big

'China underwent big changes during the past several years'

In the CWS, syntactic words can be written with one or more characters, as seen in (14). A word comprising two characters is not necessarily a compound word. For instance, in 蚯蚓 *qiūyǐn* 'earthworm' neither character represents a morpheme but both characters combined do (Chen, 1996, p. 46). An example for the difference between a phrase and a syntactic word written with two characters is the contrast between 红鸟 *hóngniǎo* 'red bird' and 红花 hónghuā 'safflower' (examples from Zhang, 1985, p. 64 as cited in Packard, 2000, p. 15). Notice that in both cases the first character is 红, which in isolation denotes 'red'. In 红鸟, there are two syntactic words because both components can be substituted by nearly any adjective and any noun while it still retains its compositional meaning. In 红花, on the other hand, the idiomatic meaning gets lost by substituting one component (ibid., p. 15).

The Common Words in Contemporary Chinese Research Team (2008) analyzed a corpus consisting of 56,008 words and found that 6% of Chinese words are written with a single-character, 72% are 2-character words, 12% are written with 3 characters, and 10% are 4-character

words; fewer than 0.3% of Chinese words are written with more than 4 characters. Analyzing the token frequencies, 70.1% of words are written with a single character, 27.1% are 2-character words, 1.9% are 3-character words, 0.8% are 4-character words, and 0.1% are words longer than 4 characters.

This means that 94% of words (types) are longer than one character and even by taking tokens into account, nearly 30% of words are still larger than a single character. This leads to the question why the CWS does not display empty slots between words and whether there is a graphematic counterpart to the syntactic word in Chinese.

One reason for the lack of interword spacing might lie in the development of the CWS. Classical Chinese was mostly monosyllabic and monomorphematic, thus words and characters were almost congruent (Hoosain, 1992, p. 119; Li, Zang, Liversedge, and Pollatsek, 2015, p. 232). Therefore, the writing system of Classical Chinese had simply no need for interword separation.

Packard (1998; 2000) mentions the fact that there was no term for the syntactic word in the Chinese language until the concept was imported from the West at the beginning of the twentieth century. This new term is called 词 cí 'syntactic word'. It describes a concept that is quite different from the older word that is still used in non-linguistic contexts when talking about word-like entities in Chinese, 字 zì, which can be translated as 'morpheme-syllable' or 'character' (Hoosain, 1992, p. 112).

A reason why interword spacing did not develop over time in the Chinese writing system (CWS) might be due to the linguistic features of contemporary Chinese. It is noteworthy that modern Chinese almost completely lacks inflection. Thus, unlike in the JWS, there is no need for a non-morphemic script for grammatical information in the CWS. Moreover, Hoosain (ibid., pp. 118–120) reports that morphemes in Chinese can be free or bound. However, there are degrees of freedom as the free-bound status of a morpheme can vary by context, register and dialect. Lastly, bound morphemes can appear before or after a free morpheme, unlike in many other languages which do only allow bound morphemes to either appear before or after a free morpheme (Chen, 1996, p. 46). According to Hoosain (1992, p. 120), these factors contribute to a "fluidity of word boundaries" in the mind of Chinese speakers. Thus, a distinction between morphemes and words in the CWS would not be appropriate. Packard (2000, pp. 17–18), however, disputes this argument. He argues that Chinese speakers might only be uncertain in their metalinguistic judgment but will have no problems in actual language usage.

As an interesting side note, Meng et al. (2019) compared the efficiency of deep learning-based Chinese natural language processing algorithms. They benchmarked neural word-based models which rely

on word segmentation against neural character-based models which do not involve word segmentation in four tasks (language modeling, machine translation, sentence matching/paraphrase and text classification). They found that character-based models consistently outperformed word-based models.

While the linguistic argument of Hoosain (1992) is under dispute, there is however consensus about the average word length in Chinese. As reported further above, ca. 78% of word types and ca. 97% of word tokens are one or two characters in length. This leads Li, Zang, Liversedge, and Pollatsek (2015) to another interesting explanation why there is no interword spacing in the CWS: the variance in word length in Chinese is reduced relative to the word length variability in alphabetic languages. The number of potential sites within a character string at which word segmentation might occur is therefore significantly reduced in Chinese. Consequently, decisions about word boundaries might be less of a challenge in Chinese than in English (given English had no empty slots). Thus, word spacing may have been less of a necessity for efficient reading in Chinese (ibid., pp. 232–233).

These considerations are supported by psycholinguistic findings. The interspersing of spaces (or other highlighting) between syntactic words does not facilitate reading Chinese, but did not interfere with reading in adult readers as well (Bai et al., 2008; Inhoff, Liu, Wang, and Fu, 1997). Inserting a space after a word facilitates its processing but inserting a space before a word did not facilitate processing and in fact may even interfere with its integration into sentential meaning as indicated by total reading times (Li and Shen, 2013; Liu and Li, 2014).

To sum these considerations up: In classical Chinese, there was no need to introduce a delimiter of words since words and characters were almost congruent. In contemporary Chinese this is not the case. There is a considerable amount of syntactic words that are written with more than a single character. But because of linguistic features of the Chinese language which allow morphemes to occur relatively freely in different syntactical contexts and because of the relatively reduced word length variability in Chinese, it seems that the character is the central unit for reading Chinese.

Thus it seems that the graphematic word is simply not a relevant—or existing—unit in the CWS. This is an important insight for suprasegmental graphematics pertaining to the role of the graphematic hierarchy across languages. While the phonological counterpart of the graphematic hierarchy, the prosodic hierarchy, is assumed to be universal[6], the writing system of Chinese demonstrates that at least the graphe-

---

6. But see, e.g., Schiering, Bickel, and Hildebrandt (2010), who question the universality of the phonological word and find evidence that there are more units within the prosodic hierarchy than assumed.

matic word is not a universal category of the graphematic hierarchy. This opens the debate whether all units within the graphematic hierarchy are universal and whether the graphematic hierarchy as a whole is universal across writing systems at all.

6.   Conclusion

The definition that the graphematic word is a string of graphemes bordered by spaces, which is well-accepted in the literature, turns out to be problematic because it does not take the role of punctuation marks into account. A promising alternative to this definition is typography-based. In this definition a graphematic word is defined as a sequence of slot-filler pairs, in which at least one filler is a grapheme, bordered by empty slots. This definition has the benefit that it allows to distinguish between the graphematic surface and the graphematic word proper. Clitics belong to the graphematic surface of a word only.

The graphematic word is part of the graphematic hierarchy, the graphematic counterpart to the phonological hierarchy. Taking the strict layer hypothesis into account, it is possible to explain certain features of the graphematic word. Since graphematic words consist of graphematic feet, which in turn consist of graphematic syllables, the graphematic word inherits traits of the foot and the syllable. One example for such a trait is the fact that graphematic words must have at least one vowel letter: because graphematic syllables need to have a vowel letter in their core, a graphematic word needs to have at least one vowel letter as well. Another example provided in this paper is the minimal weight restriction for graphematic words. The existence of this restriction can be explained by a well-formedness constraint of graphematic feet stating that a foot must be binary in syllabic or moraic terms.

Examining the German and English writing systems, it seems that the graphematic word mainly corresponds to the morphological and syntactical word in spoken language. A graphematic word written with no empty slots in between is interpreted as one morphological unit in both writing systems. Empty slots on the other hand indicate distinct syntactical units in the German writing system. In the English writing system, there is a greater variety in writing compound words. The use of a hyphen (a filler according to the typographic considerations in section 5) or the avoidance of empty slots may however disambiguate unclear cases.

In some writing systems there are no empty slots between characters. However, it can be argued that there are graphematic words in the Japanese writing system, which are not marked by empty slots but by graphotactical means. In the Japanese writing system, hiragana are used to represent function words and inflectional endings while other

scripts (especially kanji) are used to represent lexical information. Because lexical words usually start with a kanji character (or katakana or rōmaji), the beginning of a graphematic word can easily be spotted.

If we accept that graphematic words do exist in Japanese, which is a writing system without empty slots between words, the definition of graphematic words in (5) is not universal. A universal definition of graphematic words has to include that in some writing systems, graphotactical means are used to mark the borders of graphematic words.[7] This universal definition must therefore be quite broad and unspecific. Sub-definitions pertaining to certain writing systems or families of writing systems are needed to supplement this broad universal definition. The definition in (15) is a first tentative proposal.

(15)   A graphematic word is a sequence of slot-filler pairs, in which at least one filler must be a basic unit of the given writing system.

    1. This sequence is bordered by empty slots or
    2. the beginning of that sequence is indicated by other graphotactical means (e.g., the change of scripts).

The term basic unit is a deliberately broad term to accommodate different types of writing systems. However, it might not be quite clear what the basic unit of a given writing system is. In case of the JWS, it is fair to say that the characters of kanji, hiragana and katakana are basic units of the writing system. But it is unclear whether the characters of rōmaji are belonging to this class. Furthermore, while the notion of empty slots is quite clear, the term "graphotactical means" is quite fuzzy as well. In both cases, writing system specific sub-definitions must be supplemented.

Another insight we gained from examining writing systems without empty spaces pertains to the graphematic hierarchy. In the Chinese writing system, words are neither marked by empty slots nor by other graphotactical means. Thus it seems that the graphematic word is not a relevant unit in the Chinese writing system. This is an interesting finding for suprasegmental graphematics. In suprasegmental phonology, it is claimed that all the units of the prosodic hierarchy are universal. In graphematics, however, it seems that this is not the case—at least for the graphematic word. Further typological investigations are needed to explore the role of the graphematic hierarchy in non-alphabetical writing systems.

---

7. The Thai writing system may also be a candidate for a system marking its graphematic words by graphotactical means.

References

Bai, Xuejun et al. (2008). "Reading spaced and unspaced Chinese text: Evidence from eye movements." In: *Journal of Experimental Psychology: Human Perception and Performance* 34, pp. 1277–1287.

Bredel, Ursula (2008). *Die Interpunktion des Deutschen. Ein kompositionelles System zur Online-Steuerung des Lesens*. Tübingen: Max Niemeyer.

———— (2011). *Interpunktion*. Heidelberg: Winter.

Bunčić, Daniel (2004). "The apostrophe: A neglected and misunderstood reading aid." In: *Written Language and Literacy* 7.2, pp. 185–204.

Butt, Matthias and Peter Eisenberg (1990). "Schreibsilbe und Sprechsilbe." In: *Zu einer Theorie der Orthographie*. Ed. by Christian Stetter. Tübingen: Niemeyer, pp. 33–64.

Chen, May Jane (1996). "An overview of the characteristics of the Chinese writing system." In: *Asia Pacific Journal of Speech, Language and Hearing* 1.1, pp. 43–54.

Cook, Vivian (2004). *The English Writing System*. London: Routledge.

Coulmas, Florian (1996). *The Blackwell Encyclopedia of Writing Systems*. Oxford: Blackwell.

Domahs, Frank, Ria de Bleser, and Peter Eisenberg (2001). "Silbische Aspekte segmentalen Schreibens – neurolinguistische Evidenz." In: *Linguistische Berichte* 185, pp. 13–30.

Eisenberg, Peter (2006). *Grundriß der deutschen Grammatik. Bd. 1: Das Wort*. 3rd ed. Stuttgart: J.B. Metzler.

Evertz, Martin (2016a). "Graphematischer Fuß und graphematisches Wort." In: *Laut – Gebärde – Buchstabe*. Ed. by Beatrice Primus and Ulrike Domahs. Berlin/New York: De Gruyter, pp. 377–397.

———— (2016b). "Minimal graphematic words in English and German. Lexical evidence for a theory of graphematic feet." In: *Written Language & Literacy* 19.2, pp. 189–211.

———— (2018). *Visual Prosody—The graphematic foot in English and German*. Berlin, New York: De Gruyter.

———— (2019). "The History of the Graphematic Foot in English and German." In: *Graphemics in the 21st Century*. Ed. by Yannis Haralambous. Brest: Fluxus Editions, pp. 27–40.

Evertz, Martin and Beatrice Primus (2013). "The graphematic foot in English and German." In: *Writing Systems Research* 5.1, pp. 1–23.

Fuhrhop, Nanna (2008). "Das graphematische Wort (im Deutschen): Eine erste Annäherung." In: *Zeitschrift für Sprachwissenschaft* 27, pp. 189–228.

Fuhrhop, Nanna and Joerg Peters (2013). *Einführung in die Phonologie und Graphematik*. Stuttgart: J. B. Metzler.

Gallmann, Peter (1999). "Wortbegriff und Nomen-Verb-Verbindungen." In: *Zeitschrift für Sprachwissenschaft* 18.2, pp. 269–304.

Giegerich, Heinz J. (1992). *English phonology: An introduction*. Cambridge: Cambridge University Press.

Henderson, Leslie (1985). "On the use of the term 'grapheme'." In: *Language and Cognitive Processes* 1.2, pp. 135–148.

Hoosain, Rumjahn (1992). "Psychological reality of the word in Chinese." In: *Advances in psychology 90: Language processing in Chinese*. Ed. by Hsuan-Chih Chen and Ovid J.L. Tzeng. Amsterdam: North-Holland, pp. 111–130.

Inhoff, Albrecht W. et al. (1997). "Use of spatial information during the reading of Chinese text." In: *Cognitive research on Chinese language*. Jinan: Shan Dong Educational Publishing, pp. 296–329.

Jacobs, Joachim (2005). *Spatien. Zum System der Getrennt- und Zusammenschreibung im heutigen Deutsch*. Berlin: De Gruyter.

Joyce, Terry (2011). "The significance of the morphographic principle for the classification of writing systems." In: *Written Language & Literacy* 14.1, pp. 58–81.

Joyce, Terry, Bor Hodošček, and Kikuko Nishina (2012). "Orthographic representation and variation within the Japanese writing system: Some corpus-based observations." In: *Written Language & Literacy* 15.2, pp. 254–278.

Joyce, Terry and Hisashi Masuda (2016). "Just mixed up or a pretty neat idea? Some reflections on the multi-script nature of the Japanese writing system." In: *Understanding writing systems: From core issues to implications for written language acquisition'—10th International Workshop on Written Language and Literacy*. Radboud University, Nijmegen.

——— (2018). "Introduction to the multi-script Japanese writing system and word processing." In: *Writing Systems, Reading Processes, and Cross-Linguistic Influences: Reflections from the Chinese, Japanese and Korean Languages*. John Benjamins, pp. 179–200.

Kajii, Natsumi, Tatjana A. Nazir, and Naoyuki Osaka (2001). "Eye movement control in reading unspaced text: the case of theJapanese script." In: *Vision Research* 41, pp. 2503–2510.

Kohrt, Manfred (1985). *Problemgeschichte des Graphembegriffs und des frühen Phonembegriffs*. Tübingen: Niemeyer.

Li, X. and W. Shen (2013). "Joint effect of insertion of spaces and word length in saccade target selection in Chinese reading." In: *Journal of Research in Reading* 36.1, pp. 64–77.

Li, Xingshan et al. (2015). "The role of words in Chinese reading." In: *Oxford library of psychology. The Oxford handbook of reading*. Ed. by Alexander Pollatsek and Rebecca Treiman. Oxford: Oxford University Press, pp. 232–244.

Liu, P. and X. Li (2014). "Inserting spaces before and after words affects word processing differently: Evidence from eye movements." In: *British Journal of Psychology* 105, pp. 57–68.

McCarthy, John J. and Alan Prince (1995). "Faithfulness and reduplicative identity." In: *University of Massachusetts Occasional Papers in Linguistics 18: Papers in Optimality Theory*. Ed. by Jill Beckman, Laura Dickey, and Suzanne Urbanczyk. Amherst: GLSA, pp. 249–384.

Meng, Yuxian et al. (2019). "Is Word Segmentation Necessary for Deep Learning of ChineseRepresentations?" In: *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics*, pp. 3242–3252.

Nespor, Marina and Irene Vogel (1986). *Prosodic Phonology*. Fordrecht: Foris.

Osaka, Naoyuki (1989). "Eye fixation and saccade during kana and kanji textreading: comparison of English and Japanese text processing." In: *Bulletin of the Psychonomic Society* 27, pp. 548–550.

——— (1992). "Size of saccade and fixation duration of eye movements during reading: psychophysics of Japanese text processing." In: *Journal of the Optical Society of America A* 9.1, pp. 5–13.

Packard, Jerome L. (1998). "Introduction." In: *New approaches to Chinese word formation: Morphology, phonology and the lexicon in modern and ancient Chinese*. Ed. by Jerome L. Packard. Berlin: De Gruyter, pp. 1–34.

——— (2000). *The Morphology of Chinese: A Linguistic and Cognitive Approach*. Cambridge: Cambridge University Press.

Primus, Beatrice (2003). "Zum Silbenbegriff in der Schrift-, Laut- und Gebärdensprache – Versuch einer mediumübergreifenden Fundierung." In: *Zeitschrift für Sprachwissenschaft* 22, pp. 3–55.

——— (2010). "Strukturelle Grundlagen des deutschen Schriftsystems." In: *Schriftsystem und Schrifterwerb: linguistisch – didaktisch – empirisch*. Ed. by Ursula Bredel, Astrid Müller, and Gabriele Hinney. Tübingen: Niemeyer, pp. 9–45.

Prince, Alan and Paul Smolensky (1993). *Optimality Theory: constraint interaction in generative grammar*. Ms., Rutgers University (= Rutgers University Center for Cognitive Science Technical Report 2).

Ratcliffe, Robert R. (2001). "What do "phonemic" writing systems represent?" In: *Written Language & Literacy* 4.1, pp. 1–14.

Rogers, Henry (2005). *Writing Systems: A Linguistic Approach*. 3rd ed. Oxford: Blackwell.

Rollings, Andrew G. (2004). *The spelling patterns of English*. Muenchen: Lincom Europa.

Roubah, Aïcha and Marcus Taft (2001). "The functional role of syllabic structure in French visual word recognition." In: *Memory & Cognition* 29, pp. 373–381.

Ryan, Des (2018). "Principles of English spelling formation." PhD thesis. Trinity College Dublin.

Sainio, Miia et al. (2007). "The role of interword spacing in reading Japanese: An eye movement study." In: *Vision Research* 47, pp. 2575–2584.

Schiering, René, Balthasar Bickel, and Kristine E. Hildebrandt (2010). "The prosodic word is not universal, but emergent." In: *Journal of Linguistics* 46.3, pp. 657–709.

Sproat, Richard (2010). *Language, technology and society*. Oxford: Oxford University Press.

Taylor, John R. (2015). "Introduction." In: *Oxford Handbook of the Word*. Ed. by John R. Taylor. Oxford: Oxford University Press, pp. 1–23.

Weingarten, Rüdiger (2004). "Die Silbe im Schreibprozess und im Schriftspracherwerb." In: *Schriftspracherwerb und Orthographie*. Ed. by Ursula Bredel, Gesa Siebert-Ott, and Tobias Thelen. Baltmannsweiler: Schneider, pp. 6–21.

Wurzel, Wolfgang Ulrich (2000). "Was ist ein Wort?" In: *Deutsche Grammatik in Theorie und Praxis*. Ed. by Rolf Thieroff et al. Tübingen: Niemeyer.

Zhang, S. (1985). "On some problems with Chinese phonetic writing orthography." In: *Chinese Phonetic Writing Group*, pp. 61–66.

Zifonun, Gisela, Ludger Hoffmann, and Bruno Strecker, eds. (1997). *Grammatik der deutschen Sprache*. Berlin/New York: De Gruyter.

Challenging the Dichotomy Between Phonography and Morphography: Transitions and Gray Areas

Sven Osterkamp · Gordian Schreiber

Abstract. Traditionally, glottographic writing is divided into the two fundamental categories of phonographic and (logo-, or increasingly) morphographic writing, each with further more fine-grained subdivisions where necessary. In recent decades, various revisions to the earlier either/or approach have been proposed, leading to more flexible typological models that, e.g., allow for a mixture of different types of phonography with different amounts of morphography in a given writing system. While it is thus common to acknowledge the mixed nature of writing systems as a whole, graphs or strings of graphs forming functional units (such as digraphs) are nevertheless typically assigned to either of the two basic typological categories. On closer scrutiny, however, there is an abundance of cases challenging this strict dichotomy on the level of graphs.

Having reviewed the different notions of logo- or morphography found in the literature, this paper revisits the fundamental distinction between phonography and morphography in writing systems, drawing upon cases from the following areas: First, we will address transitions from morphograms to phonograms as well as from phonograms to morphograms. The dividing line between morphograms and phonograms is, however, not always easy to draw, thus leading us to gray areas and indeterminable cases. Finally, we will have a closer look at semantically motivated phonograms, as even in phonography the level of semantics is not necessarily irrelevant altogether.

1.   Preliminaries

In taxonomies of writing systems, so-called glottographic writing is commonly divided into phonography on the one hand and something else on the other that goes by several names, usually 'logography' (e.g.,

———————————

Sven Osterkamp   0000-0002-4596-9283
Ruhr University Bochum, Faculty of East Asian Studies, Universitätsstr. 150, 44801 Bochum, Germany
E-mail: sven.osterkamp@rub.de

Gordian Schreiber   0000-0002-7811-2518
Ruhr University Bochum, Faculty of East Asian Studies, Universitätsstr. 150, 44801 Bochum, Germany
E-mail: gordian.schreiber@rub.de

Sampson, 1985, p. 32; Sampson, 2015, p. 24) or, increasingly, 'morphography' (Rogers, 2005, pp. 14–15; Joyce, 2011; Whittaker, 2011, p. 936 among others).[1] Owing to the fact that the term morphography has been used in several different meanings, it is mandatory to first outline the understanding the present paper adheres to:

> A morphographic subsystem of a writing system is one in which the most fine-grained, systematically observed mapping possible is between one or more morphemes and one or more graphs (also referred to as morphograms).

As Joyce (2011, 58–59, emphasis in original) observes, there is a "practice of some scholars of writing systems to continue using the term logographic while at the same time admitting that morphographic is *more precise*." Indeed, logographic writing systems and logograms have repeatedly been described with an explicit reference to morphemes instead of words as the relevant linguistic units (e.g., Daniels and Bright, 1996, p. xlii), or also to either morphemes or words at the same time (e.g., Taylor and Taylor, 1983, pp. 20–21; Coulmas, 1996, p. 309). In other words, logography is not necessarily understood as implied by the term itself, with some scholars being fully aware of the discrepancy between the literal and intended meanings of the term.[2] We concur with Joyce (2011) that whenever a writing system involves a mapping between graphs and morphemes (which may or may not be words at the same time), it should accordingly be labeled as morphographic. Logographic on the other hand should be reserved for systems involving a mapping between graphs and words (whether mono- or polymorphemic).[3] In doing so, we follow, e.g.,

---

1. Hill (1967, p. 93) already distinguished between ('discourse systems'), 'morphemic systems' and 'phonemic systems,' thus foreshadowing our current terminology. Different in terminology but similar in terms of the overall conceptualization is also French's (1976, pp. 118, 126) dichotomy of 'pleremic' and 'cenemic' writing systems, which we will briefly return to further below.

2. Consider for instance Gnanadesikan (2009, p. 7): "Writing systems that concentrate on representing morphemes—as complete meaning-pronunciation complexes—are called *logographic* (the name, meaning 'word-writing,' is traditional, though it ignores the difference between morphemes and words)."

3. Hill (1967, p. 93) already stated that "there are no systems based on words," counting the Chinese writing system and others among what he termed "morphemic scripts" (ibid., p. 95). While typically opting for a somewhat less definite wording, more recent scholarship tends to subscribe to that view as well (e.g., Sampson, 1985, p. 39; Rogers, 2005, p. 14; Gnanadesikan, 2009, p. 7; Joyce, 2016, p. 294).

While 'morphographic' is without doubt the more appropriate choice for many cases traditionally labeled as 'logographic,' there may be good reasons to retain the latter term as well in its specific meaning. Consider for instance the case of Old Chinese as reconstructed in Baxter and Sagart (2014a,b). Here, Chinese characters typically correspond to entire words, which in turn can be mono- or polymorphemic, involving various affixes. See also already Chao (1968, pp. 102–103) for a similar position, referring however to Literary Chinese as an isolating language.

Hill (1967, p. 96) and French (1976, p. 126) who contrast 'morphemic' and 'logographic' depending on the linguistic units represented.

Note that our understanding as outlined above explicitly refers to 'one or more' morphemes and graphs. The present paper thereby acknowledges one-to-one correspondences *as well as* deviations from this ideal. In previous scholarship on the question as to what linguistic units are represented by sinograms in particular (see DeFrancis, 1989 and Unger, 2011 for Chinese, or Matsunaga, 1996 for Japanese), it has repeatedly been argued that the label of 'logography' is inappropriate, as sinograms in the *modern* Chinese writing system frequently do not correspond to entire words, but merely to portions of words (which may or may not be morphemes in their own right). Sproat (2013) has convincingly argued that this reasoning is flawed, as we cannot necessarily expect consistent one-to-one correspondences between graphs and linguistic units in writing systems—be they phono- or morphographic in nature (see also Osterkamp & Schreiber, forthcoming). The classification of the modern Chinese writing system as largely morphographic rather than logographic is still valid, but for a different reason: When we consider what the most fine-grained units are that are involved in the mapping between graphs and linguistic units, we notice that suffixes and other bound morphemes that do not occur as words on their own are mapped onto graphs the same way as free morphemes are.[4] Every word consists of one or more morphemes but not every morpheme constitutes a word. As sinograms writing a single bound morpheme cannot be satisfactorily explained via a mapping between graphs and words, a morphographic interpretation of the modern Chinese writing system is to be preferred. While numerous details differ, this by and large also applies to the case of sinograms in the Japanese writing system.

Apart from labeling 'logography' what is less misleadingly and thus better referred to as morphography, the labels 'logography' and 'morphography' are sometimes also applied to what is more appropriately described as semantography, or ideography, i.e., a direct mapping between graphs and meanings (rather than linguistic units carrying meaning). This may result, at least in part, from an understanding of words or morphemes chiefly as units of meaning, thereby losing sight of their phonological form. In the present paper, morphography is by definition taken to relate to morphemes, which in turn are understood as linguistic units—i.e., single phonemes or strings of phonemes—carrying meaning. A phonological form is therefore part and parcel of a morpheme, so that

---

4. In DeFrancis' (1984, pp. 184–187) count, about 44% of the sinograms in the modern Chinese writing system are mapped onto free morphemes (or lexemes) and 45% are mapped onto bound morphemes, while the remaining 11% of the graphs form one part of the spellings of polysyllabic free morphemes (as in *shānhú* 珊瑚 'coral').

both morphography and phonography relate to the level of phonology, even if indirectly in case of the former.

While the above might seem obvious, this understanding nevertheless stands in stark contrast to how 'logography' or 'morphography,' as well as 'logograms' and 'morphograms,' have often been understood in previous scholarship—namely as relating to phonology only optionally or not at all. For instance, Daniels and Bright (1996, p. xlii) define a 'logogram' as "a character that denotes the meaning but not the pronunciation of a morpheme," whereas Taylor and Taylor (1983, 20–21, emphasis in original removed) state that a "writing system in which one grapheme represents primarily the meaning (and sometimes secondarily the sound) of one word or morpheme may be called a logography." 'Logography' has also been "defined as the graphical encoding of nonphonological linguistic information" by Sproat (2000, p. 143), who "view[s] any component of a writing system as having a logographic function if it formally encodes a portion of non-phonological linguistic structure, whether it be a whole morpheme, or merely some semantic portion of that morpheme" (ibid., p. 131). If a morpheme is taken to have both a phonological form and a meaning, it is also difficult to see the necessity of "suggest[ing] 'morphophonic' or 'morphonic'" as an inclusive term for all three kinds of writing systems of a "meaning-plus-sound" type DeFrancis (1989, p. 58) posits "as drawing attention to the dual aspect of the systems, namely the primary phonetic aspect plus the secondary but nonetheless important nonphonetic, that is semantic or morphemic aspect." The dual aspect of such system can sufficiently be captured by terms like 'morphographic' or 'morphemic'—and it goes without saying that if understood as in this paper, both phonographic and morphographic writing systems relate to phonology.

In the preceding paragraphs our focus was solely on morphography in a narrow sense, involving the mapping of graphs onto entire morphemes. In fact, the same label of 'morphography' (or 'logography') is also applied to typologically speaking entirely different cases pertaining to what are essentially phonographic writing systems, which however may be characterized as requiring morpheme-specific knowledge to get from pronunciation to spelling and vice-versa (be it from the reader's perspective, the writer's perspective, or both).[5] It is in this sense that the modern English writing system is sometimes called "partly logographic" (Sampson, 1985, p. 203; Sproat, 2016, p. 37), "pseudologographic" (Sproat, 2000, p. 82), or is described "as having moved some way away from the phonographic towards the logographic principle" (Sampson, 2015, p. 259) and thus "as being partly phonographic and partly logographic" (Sproat, 2016, p. 33).

---

5. A basic distinction between mapping rules from the writer's perspective as opposed to mapping rules from the reader's perspective has already been drawn in Haas (1983, pp. 18–19).

In a similar vein, Unger (2004, p. 29) states that "English spellings are full of logographic hints," and Gnanadesikan (2017, p. 15) acknowledges a "logographic component" in English orthography.

While these two different notions of morphography relate to fundamentally different phenomena, they have often been conflated in previous studies on the typology of writing systems. For instance, Rogers' (2005) typological matrix indicates the 'type of phonography' (abjad, alphabetic, etc.) on its x-axis, and the 'amount of morphography' on its y-axis. Moreover, writing systems are classified as being either deep or shallow in terms of orthographic depth (understood here in the sense of morphological constancy in spellings).[6] Leaving aside the problems involved in measuring the 'amount of morphography,'[7] we may note that morphography is understood here in *both* senses at the same time: In English (classified here as an orthographically deep system exhibiting a medium amount of morphography), for instance, "the use of numerals such as <7 8 9> adds to the amount of morphography, as does the fact that the spelling distinguishes homophonous morphemes such as *by*, *bye*, *buy*" (Rogers, 2005, p. 275). Only the numerals represent morphograms proper, i.e., on the level of mapping, and in fact it is only cases along these lines that are mentioned (ibid., p. 15) when the term morphographic is first introduced in the book to describe "a writing system where the primary relationship of graphemes is to morphemes" (ibid.,

---

6. In Rogers' (2005, p. 275) model, "[o]rthographic depth is greater if different allomorphs of the same morpheme are written the same […], e.g., *south-south*ern, *child-child*ren, *sign-sign*al." Note, however, that it is merely represented as a binary parameter (i.e., either deep or shallow), instead of another continuum parallel to the 'amount of morphography'—possibly in order to avoid having to add a z-axis to an already complex taxonomy.

7. The problem of quantification is carried over into Rogers' matrix from its precursor as originally proposed by Sproat (2000, p. 142), which measures the 'amount of logography' on its y-axis. Yet, as Sproat (ibid., p. 142) himself readily admits, "the degree of logography is tricky to estimate […] and the arrangement of particular writing systems in this second dimension is largely impressionistic." (Note also that Sproat's understanding of 'logography' as quoted earlier is radically different from Rogers' notion of morphography.)

For instance, in both taxonomies, the Japanese writing system is considered to feature a greater amount of logography or morphography than the Chinese writing system. But what exactly is being measured here, and how? Are *hiragana* and *katakana* syllabograms excluded from the count? And if not, how is the type-token distinction taken into account? Even if the total number of morphograms in use within the Japanese writing system is considerably higher in terms of types than the number of *kana*, the token distribution for sinograms as opposed to *kana* is often in the vicinity of 1:2 in an average modern Japanese text. As long as no objective criteria on how to measure the amount of logography or morphography have been established, the critical stance adopted by Fukumori and Ikeda (2002, pp. 42–43) to the effect that such taxonomies should be avoided seems well justified. See Joyce (2016, p. 296) for similar criticism.

p. 14; also cf. the definitions on p. 295). Morphography is thus primarily conceptualized as a mapping phenomenon (as also in this paper), but not consistently so by also referring to morpheme-specific but nevertheless phonographic spellings for homophones such as *by*, *bye*, and *buy*.

Envisioning a rather different taxonomy, Unger (2004, pp. 30–33) posits a continuum on a single axis with the extremes of 'pure phonography' and 'pure logography.' Writing systems are then assigned a position on this continuum, ranging from Finnish and Spanish closer to the phonographic end, to Chinese and Japanese closer to the logographic end. English ranges in the middle here: It is classified as being less phonographic and more logographic than Finnish, but more phonographic and less logographic than Chinese or Japanese. Again, one might receive the impression that the two different notions of morphography (logography in Unger's terms) are not distinguished here, the difference between the two being reduced to a matter of degree. In fact, however, Unger's understanding of logography is quite unlike Rogers' notion of morphography, as the former remarks: "All writing systems incorporate techniques that are logographic—that is, make use of linguistic structures beyond the merely phonological" (ibid., pp. 28–29).

The question to be asked at this point is: What exactly, then, is the common denominator of the two notions of morphography (or logography) as found in the literature, as it were morphography as observed in the Chinese and English writing systems respectively? It is, evidently, their common reliance on morpheme-specific knowledge, as already briefly mentioned above. In both cases, knowing a morpheme's pronunciation and a number of general sound mapping rules is not sufficient to write it in its conventional way, be it by means of a morphogram (e.g., in Chinese 鹿 for *lù* 'deer,' but 路 for *lù* 'road') or by means of phonograms, the exact choice of which is determined by the morpheme in question (e.g., <deer> for /dɪɹ/ 'hoofed ruminant mammal,' but <dear> for /dɪɹ/ 'precious'). Or from the reader's perspective: The knowledge of morphograms as morpheme-specific graphs is necessary in reading (cf. the two different Chinese words pronounced *lù* above), as is, in the case of phonograms, the knowledge of morpheme-specific sound values of certain graphs or strings of graphs (e.g., <ea> in <bread> and <break> read as /ɛ/ and /eɪ/ respectively), or also the knowledge of unwritten or underspecified sounds to be supplied in reading (e.g., Arabic <fndq> فندق for /funduq/ 'hotel'). The driving factors behind the increase in morpheme-specific knowledge required can thus be described as heterography from the perspective of the writer, and as homography (whether related to morphological constancy or not) as well as underspelling from the perspective of the reader.[8] All this must not, however,

_____

8. The notion of underspelling refers to the phenomenon of linguistic elements that are left out in writing but are expected to be added by the reader to correctly

obscure the fact that the actual mappings involved in these two kinds are quite distinct, being morphographic on the one side and in the end still phonographic on the other.

We are thus dealing with three basic types here: morphographic mappings (which by definition require morpheme-specific knowledge) as well as phonographic mappings, which may either require morpheme-specific knowledge of the kinds outlined above or not. Put differently, English 'morphography' and Chinese 'morphography,' for instance, do not differ in quantitative terms alone—first and foremost we are dealing here with a qualitative difference. It is not only crucial for the issues to be discussed in the following sections of this paper, but also desirable for future research in the field of grapholinguistics in general to take these distinctions into due account for greater clarity.

Such a tripartite distinction in fact turns out to agree well with the approach already pursued by French (1976, p. 126). French broadly distinguishes between 'pleremic' and 'cenemic' systems, corresponding to what we refer to as morphography (with systems involving morphographic mappings) and phonography (involving phonographic mappings); the 'cenemic' systems are further subdivided into a 'complex cenemic' (or 'alternational') as well as a 'simple cenemic' (or 'non-alternational') type. Taking the terms for systems of minimal grain-sizes as examples, he distinguishes between 'morphemic' (= pleremic), 'morphophonemic' (= complex cenemic) and 'phonemic' (= simple cenemic) writing systems. According to French (ibid., p. 124), 'morphophonemic' systems differ from 'phonemic' systems merely in that "they represent a morpheme in just one way," so that it remains unclear as to how other kinds of phonographic mappings involving morpheme-specific knowledge are accounted for in French's taxonomy.

Taking our own considerations above and the tripartite distinction made by French (ibid.) as a starting point, we may thus arrive at an understanding of glottography and its basic subtypes as summarized in

---

retrieve the encoded utterance. The term has been applied to various writing systems, such as Mayan, Sumerian, Egyptian, or Linear B (Zender, 1999, pp. 131–135). By not representing all vowels in writing, abjads can be viewed as featuring underspelling in a systematic fashion.

The terms heterography and homography are adopted from Rogers (2005, pp. 16–17). Heterography refers to a situation, in which two or more graphs are mapped onto one or more linguistic units in different contexts, e.g., both <f> and <ph> to the same phoneme /f/ in English, depending on the morpheme in question. In cases of homography, on the other hand, one graph or one string of graphs is mapped onto two or more linguistic units in different contexts, such as the digraph <th> representing either /ð/ or /θ/, again depending on the morpheme in question.

Orthographic depth as understood by Rogers (ibid., p. 275), i.e., as morphological constancy in spellings alone, constitutes a subset of homography. In competing understandings, orthographic depth may however also refer "to the reliability of print-to-speech correspondences" (Schmalz et al., 2015, p. 1614) in more general terms.

Figure 1. For the sake of simplicity, the further subdivisions to be made
for phonographic mappings are left out of consideration here. To name
but a few examples, morphonography is not limited to alphabets as in
English, French or also Korean, it is similarly observed among others in
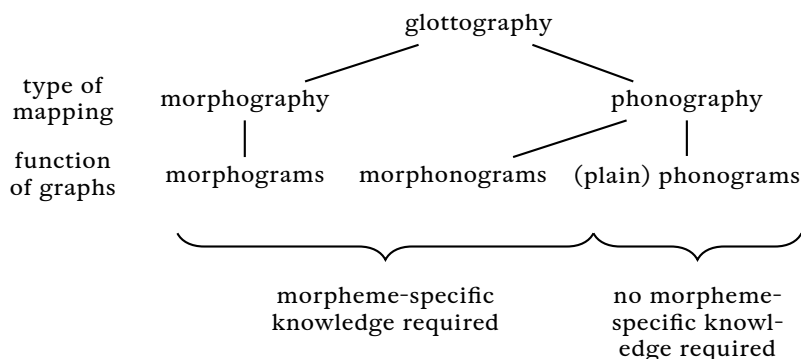abjads such as in Arabic or in abugidas as in Tibetan.

FIGURE 1. Basic subtypes of glottography and the respective functions of graphs

The different types of mapping as well as functions of graphs posited
here are in the first place intended as categories for specific instances,
i.e., to describe how a given graph or a string of graphs relates to the
linguistic units (phonemes or morphemes) encoded. They are likewise
applicable to subsystems of writing system, e.g., when speaking of the
morphographic subsystem of Arabic numerals in English or the phono-
graphic subsystem of *katakana* in Japanese. However, broadening the
scope even further and using these terms as typological labels to clas-
sify writing systems as a whole is not advisable, as writing systems are
generally "taxonomically 'messy'" and "mixtures of some sort or other"
(Rogers, 2005, p. 272). It is questionable whether typologically pure
writing systems (i.e., systems not comprising any typologically distinct
subsystems) exist at all, particularly in the case of morphography (cf.
Coulmas, 1996, p. 521; Daniels in Daniels and Bright, 1996, p. 4).[9] There-
fore, it seems problematic to apply 'morphography' as a broad label to
refer to an overall writing system, despite the fact that it reflects the
typology of a single subsystem only.

---

9. As writing systems coming comparatively close to pure morphography one
might consider the cases of Literary Chinese, Tangut, or of a number of morpho-
graphic modes of inscription employed throughout the history of writing in Japan,
commonly (and misleadingly so) referred to as *hentai kanbun* 変体漢文 (lit. 'variant
Chinese'; cf. Schreiber, forthcoming for details). However, even in these writing sys-
tems there are graphs used phonographically to transcribe, e.g., loanwords, in part
even exclusively.

With these preliminaries in mind, we will in the remainder of this paper revisit the fundamental distinction between phonography and morphography in writing systems, drawing upon cases from four areas: First, we will address transitions from morphograms to phonograms as well as from phonograms to morphograms (sections 2 and 3 respectively). The dividing line between morphograms and phonograms is, however, not always easy to draw, thus leading us to gray areas and indeterminable cases (section 4). Finally, we will have a closer look at semantically motivated phonograms (section 5), as even in phonography the level of semantics is not necessarily irrelevant altogether.

2. Transitions From Morphograms to Phonograms

Transitions from morphograms to phonograms are crucial for the development of full-fledged writing systems whenever a strong morphographic component is present from the outset. They likewise occur on a regular basis during the process of adapting an existing writing system to another language. This type of transition is commonly referred to under the label of 'rebus principle' and has received widespread scholarly attention as "the cardinal strategy for increasing the expressive power of logographic systems" (Coulmas, 1996, p. 433). In a similar vein, DeFrancis (1984, p. 139) vividly elaborates that "[t]he rebus idea seems obvious to us since we use it in children's games, but it actually constitutes a stupendous invention, an act of intellectual creation of the highest order—a quantum leap forward beyond the stage of vague and imprecise pictures to a higher stage that leads into the ability to represent all the subtleties and precision expressible in spoken language."

In the early history of the Chinese writing system, but also during its later course of development, graphs already established as morphograms were commonly extended to phonographically write (near-)homophones of the morphemes in question. An example from the early stages of the Chinese writing system, i.e., prior to its standardization starting in the 3rd century BCE (Galambos, 2006, p. 3), is the case of the graph 其 as outlined in Figure 2.

In its earliest etymographical stage, the graph 其 was a pictographic representation of a winnowing basket, and it was accordingly employed as a morphogram to write Old Chinese *k(r)ə 'winnowing basket' (1).[10] From early on, the graph could also be desemanticized (Boltz, 1994, p. 21; Handel, 2019, pp. 38–39) and used as a phonogram (highlighted in gray in Figure 2) to spell (near-)homophones of *k(r)ə in a rebus

---

10. Here and elsewhere Old Chinese reconstructions are quoted from Baxter and Sagart (2014a,b). Round brackets enclose elements that may or may not have been present and are accordingly often omitted in simplified notations.
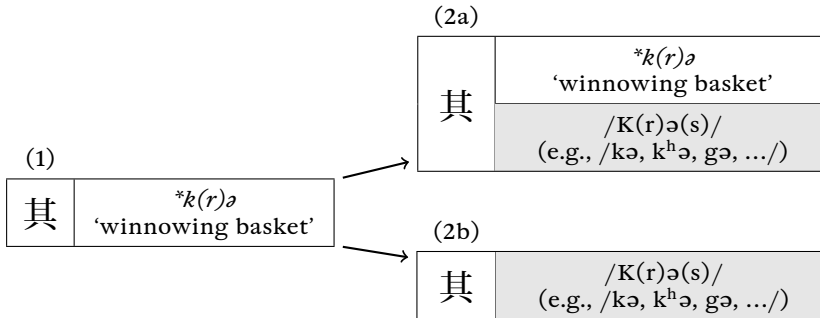
FIGURE 2. Example for a transition from morphogram to phonogram

fashion. These (near-)homophones included the high frequency function word *gə ' 3rd person possessive pronoun'—which much like various other function words did not lend itself to a pictographic representation. It is now a matter of interpretation whether the use of 其 for such (near-)homophones of *k(r)ə should be considered to cancel the original morphographic value of the graph. In the second stage shown in Figure 2 we are thus either dealing with a polyvalent graph having both the original morphographic value of *k(r)ə 'winnowing basket' and an additional phonographic value of /K(r)ə(s)/ (2a),[11] or the graph is treated as a simple phonogram for /K(r)ə(s)/ in all contexts (2b). While the latter possibility (2b) is certainly worth considering as a theoretical option, the former interpretation (2a) appears to be more widely accepted. Regardless of this question, in both analyses we can observe the creation of a phonogram on the basis of a pre-existing morphogram.

Transitions from morphograms to phonograms are also widely attested in later stages of the Chinese writing system, and in fact up to present day. Throughout history, the demand for phonograms was naturally most pressing whenever the need arose to transcribe foreign names and loanwords. One of the major earlier donor languages was Sanskrit (e.g., *nièpán* 涅槃 'nirvana' < *nirvāṇa*), while in more recent times English has occupied a central position (e.g., *bāshì* 巴士 'bus'). All of these spellings can be considered as being phonographic in nature, at least originally. Apart from loans, phonograms also played an important role whenever new elements emerged in the spoken language due to language-internal change and scribes felt the need to unambiguously record these new forms in writing. Contracted forms in Old Chinese are cases in point: When the conservative disyllabic *[g]ˤaj pə* 何不 'why not?'

---

11. /K-/ here represents the class of velar stop initials in Old Chinese, i.e., /k-/, /kʰ-/ and /g-/.

was shortened to a single syllable in speech, it came to be written by the graph 盍—originally a morphogram for *m-[k]ˤap 'to cover,' but here undergoing desemanticization to act as a phonogram. As the traditional morphographic spelling with two graphs would have been decoded by readers as the linguistically conservative form, the change in pronunciation could only be highlighted by devising a distinct phonographic rendering. Such transitions typically involve the *ad hoc* desemanticization of morphograms that were not in productive use as phonograms in other contexts. Therefore, even if the resulting spellings can only be explained via a transition from morphogram to phonogram, they might eventually be reanalyzed as being morphographic in nature (also cf. section 3).

While there is not necessarily a clearly delimited set of graphs exclusively employed as phonograms in the modern Chinese writing system, there are nonetheless a number of graphs that appear particularly often in phonographic use. For this reason, analyzing 巴士 for *bāshì* 'bus' as a string of two phonograms and not reanalyzing them *en bloc* as a digraphic morphogram may be a valid approach as both 巴 and 士 are frequently used in phonographic spellings for the syllables *bā* and *shì* respectively (Kashima, 1993, p. 18). The dividing line between the two analyses as a digraphic morphogram and as two phonograms is not necessarily clear-cut, however, thus hinting at the difficulties involved in classifying graphs in an either/or approach (see section 4 for more on this issue).

Transitions from morphograms into phonograms do not only occur sporadically on an *ad hoc* basis, but often also on a larger scale and more or less systematically, leading to the creation of entire sets of phonograms. A well-known example is the emergence of the Old Japanese inventory of phonographically employed sinograms known as *man'yōgana* 万葉仮名, the precursor to the later *hiragana* and *katakana*. Similar developments involving large-scale transitions from morphograms to phonograms can also be seen in a number of other writing systems such as Egyptian hieroglyphs, Mayan (Mora-Marín, 2003) and a number of cuneiform-based systems (Boltz, 1994, pp. 12–13; Coulmas, 2003, pp. 173–174, 176–178; Handel, 2019, p. 46 among many others).

3.   Transitions From Phonograms to Morphograms

In principle, morphograms can at any given time be desemanticized and employed as mere phonograms due to their inherent phonological value deriving from the morphemes they are associated with. Transitions of this type may appear as being more natural than the reverse, but transitions of phonograms to morphograms are likewise well attested—even

if the conditions appear to be much more heterogeneous (Matsumoto, 2017, p. 102).

As we have already observed in Figure 2, an expanded version of which is given below as Figure 3, the graph 其 originally writing *k(r)ə 'winnowing basket' (1) was first borrowed to write (near-)homophones, notably including the high-frequency function word *gə '3rd person possessive pronoun' (2a/b). This latter usage was eventually conventionalized—i.e., the graph came to be firmly associated with that specific morpheme (cf. the notion of resemanticization in Handel, 2019, pp. 38–39)—so that the graph was reanalyzed as a morphogram (3). This conventionalization is precisely what marks the transition from phonogram to morphogram. It is worth noting that the low-frequency word the graph 其 had originally been devised for, i.e., *k(r)ə 'winnowing basket,' has given way to *gə '3rd person possessive pronoun' and came to be written by the separate character 箕, created by combining the original 其 with the taxogram 竹 'bamboo.'
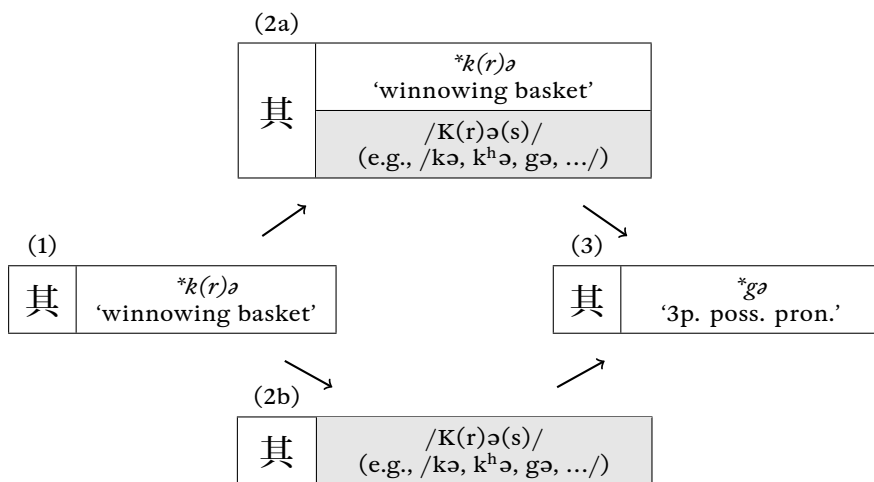
FIGURE 3. Example of a transition from morphogram to phonogram and back

For another example we may turn to the modern Japanese writing system. Before the orthography reform of 1946, the *hiragana* を was in common use as a phonogram for /o/ (originally /wo/, but the phonemic distinction between the two had long been lost). However, as part of the reform, it was decided to restrict the use of this graph to write /o/ only in the case of accusative *=o* (and replacing it with お in any other instance of /o/). By this deliberate decision, the original phonogram を was essentially turned into a morphogram, as has repeatedly been

noted in the literature (see, e.g., Kōno, 1977, p. 19; Tranter, 2013, p. 21; Matsumoto, 2017, p. 103; Handel, 2019, 208, n. 54).

A yet different type of semanticization of phonograms can be observed in the Classic Mayan writing system (Matsumoto, 2017). Here, we find originally mixed spellings of morphograms accompanied by phonograms acting as phonetic complements to be reanalyzed *en bloc* as morphograms. These morphograms are in turn supplied with additional phonetic complements with the same sound value as the original phonograms, which are interpreted as having undergone 'orthographic semantization.' Whereas this type of reanalyzed mixed spelling occurs system-internally in Classic Mayan, the same phenomenon can be observed across writing systems in the adaptation of mixed Akkadian and Sumerian spellings in Hittite cuneiform, in which complexes of morphograms together with phonetic complements are likewise borrowed and reanalyzed *en bloc* as a single polygraphic morphogram (ibid., p. 103).

One of the most intriguing cases of transitions to morphograms is that of so-called Aramaic heterograms in Middle Iranian languages.[12] In Sogdian, for instance, the word *γrīw* 'neck, body' could be written either phonographically or morphographically:[13] In the former case, the Sogdian pronunciation of the word in question is spelled out in the Aramaic-based Sogdian script, namely as <γr'yw> (cf. Figure 4; see the first word in line 6).[14] In the latter case of a morphographic notation, however, the word is written in the same script, but in a way that does not reflect its pronunciation in Sogdian at all. Instead, the 'heterogram' <CWRH> (see lines 2 and 3, near the end and beginning respectively) is based on the pronunciation of the word's translation equivalent in Aramaic, i.e., *ṣwr-h* 'his neck.' A hypothetical example for the sake of an analogy would be to borrow the spelling <corpus>—that is, originally a phonographic spelling of the Latin word *corpus* 'body'—and write this string of letters

---

12. The term 'heterogram' has a long history in the field of Middle Iranian studies (see already Junker, 1911, who posits the terminological pair of 'heterogram' versus 'eteogram'), but it has subsequently also been applied to comparable phenomena in other writing systems, including cuneiform-based systems such as Hittite, Palaic, and Luwian (Kudrinski and Yakubovich, 2016; Kudrinski, 2017). The use of sinograms to (also) write native morphemes in the Japanese writing system has similarly repeatedly been likened to the use of heterograms in Middle Iranian languages (e.g., Kōno, 1977, p. 20; Sproat, 2000, pp. 187–188, Sproat, 2016, p. 32; Lurie, 2011, p. 360, Lurie, 2012, p. 181). Note also the treatment of Japanese, Akkadian and Middle Iranian together in a chapter on "Words and Heterograms" in Daniels (2018, pp. 99–108).

13. The example is given here based on Yoshida (2001, p. 551), Yoshida (2016, section "Scripts, orthography, and basic phonology") and Yoshida (2013, pp. 158–163), the latter of which also provides an edition and translation into English of Pelliot sogdien 20.

14. Note that aleph <'> preceding yodh <y> serves as a long vowel marker, making the spelling a straightforward phonographic representation of *γrīw*.

in order to represent the English word *body* in an English-language text. One might also extend the analogy to include Latin-based abbreviations in English, such as <e.g.> (on which see further below; also cf. Rogers, 2005, p. 124).
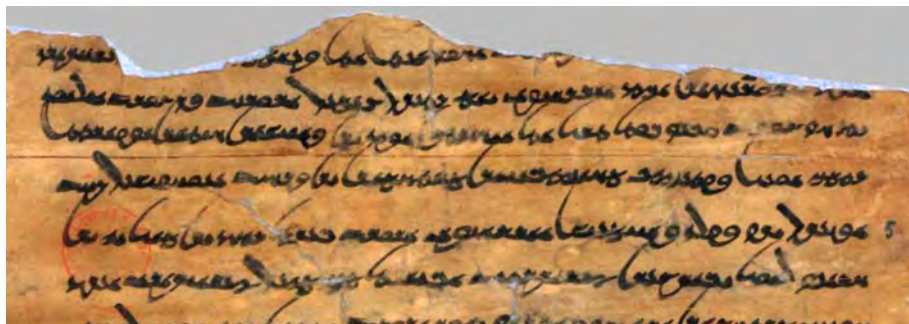

FIGURE 4. Specimen of a Sogdian text featuring heterograms[15]

In terms of typology, we are clearly dealing with a morphogram in Sogdian, as no reasonable phonographic mapping of <CWRH> onto *γrīw* is possible. Apart from isolated chance correspondences, Sogdian sounds and the constituent graphs of Aramaic-based heterograms simply do not match. In Aramaic on the other hand, the spellings underlying such heterograms allow for a phonographic mapping. We may note, however, that owing to the nature of the Aramaic writing system as an abjad, these spellings go beyond plain phonography: Spellings alone are not necessarily sufficient to arrive at the pronunciation of a given morpheme. Instead the reader requires morpheme-specific knowledge about the conventional correspondence of written and spoken forms. The spellings in Aramaic are thus already morphonographic in nature.[16]

The essentially non-phonographic nature of heterograms is underlined by the observation that the Aramaic spellings may contain certain anomalies, for instance letters in inverted order, the reduplication of letters, or the interchange of look-alike letters (see Shaked, 1993, pp. 76–77 for examples from Middle Persian). As morphonographic spellings in

---

15. Bibliothèque nationale de France, call no. Pelliot sogdien 20, lines 1–6. Viewable online at: https://gallica.bnf.fr/ark:/12148/btv1b8305804s.

16. Of interest in this context is the positioning of abjads on the continuum from 'pure phonography' to 'pure logography' as outlined by Unger (2004, p. 30): "Arabic and Hebrew, which usually omit vowel signs, have fewer such irregularities but require you to fill in a lot of phonological information on the basis of your knowledge of the structure of the language; hence, they are even less phonographic [than English and French]."

Aramaic, the exact identity of each letter may have been eminently important, but not so anymore after the string of graphs has been borrowed into the writing system of a different language, in which it is treated *en bloc* as a morphogram and corresponds to the translation equivalent of the underlying Aramaic expression.

Against this backdrop of heterograms in Middle Iranian languages, it is worthwhile to reconsider the abundance of abbreviations in (mor)phonographic and specifically alphabetic writing systems—which at least when borrowed into other languages again yield clear-cut morphograms. When abbreviations are formed within a writing system, on the other hand, traces of a phonographic mapping are still evident to varying degrees. Yet, owing to the fact that morpheme-specific knowledge is indispensable to get from spelling to pronunciation, the resulting spellings are morphonographic (if not already morphographic) in nature.

The typological status of abbreviations is not easy to determine, as they do not only involve incomplete (mor)phonographic mappings, but also feature non-(mor)phonographic elements. For instance, the letter <r> in the abbreviation <Mrs.> makes perfect sense in a diachronic perspective, as *missus* derives from *mistress*. Synchronically, however, it does not correspond to the phoneme /r/ anymore, which has fallen victim to consonant cluster simplification over the course of time. One might resort to calling <r> a silent or mute letter in this case, but the situation would be the same: Unlike <M> and <s>, <r> alone is not mapped onto any linguistic unit anymore. Original digraphs are likewise often retained only partially in abbreviations, thereby yielding otherwise unattested correspondences under a strictly phonographical interpretation. Consider, for instance, <bldg.> for *building*, in which the first half of the digraph <ng> /ŋ/ is lost, or even <smtg> for *something*, which in addition to the first half of <ng> /ŋ/ also omits the second half of the digraph <th> /θ/. Under normal circumstances, i.e., from the perspective of standard orthography, *<g> for /ŋ/ is just as invalid a correspondence as *<t> for /θ/ is.

Abbreviations may also involve elements that do not even relate to a phonographic mapping in historical terms. Examples such as <Mrs.> or <bldg.> contain a period <.> as a clearly non-phonographic element at the end. In contractions such as <int'l> for *international* or <cont'd> for *continued* an apostrophe <'> serves a similar non-phonographic function. Especially in pre-modern usage, a number of other abbreviation marks were used as well, including for instance overbars and tildes (for the latter see, e.g., the abbreviation for *deus* treated further below). Another phenomenon that has a long history but is also still observed today is the systematically employed iconic doubling of the final letter of pre-existing abbreviations to represent plurals, as in <exx.> for *examples* or <pp.> for *pages*. The same means is also employed for superlatives, as

in <*ff*> for *fortissimo* or <*pp*> for *pianissimo*. It goes without saying that the second instance of the doubled letters does not correspond to any phoneme at any point in time. At best, the repeated letter may be taken to function as a morphogram for a plural or superlative suffix. If we follow the lead of Gelb (1963, p. 16), we might even count as morphograms such abbreviations as <m> for *meter*, *mile* or *minute*—i.e., abbreviations that could also still be interpreted as incomplete (mor)phonographic mappings.[17]

Entirely clear-cut, on the other hand, is the typological status of abbreviations when borrowed from one writing system to another and eventually read out as the translation equivalent in the recipient language. Cases such as the Latin-based <e.g.> (*exempli gratia* 'for the sake of an example') or <i.e.> (*id est* 'that is') corresponding to *for instance* and *that is* in English have to be treated as morphograms similar to the aforementioned heterograms in Middle Iranian languages. Neither case involves a phonographic mapping between the spelling as found in the donor language, and the phonological form of the corresponding item in the recipient language.
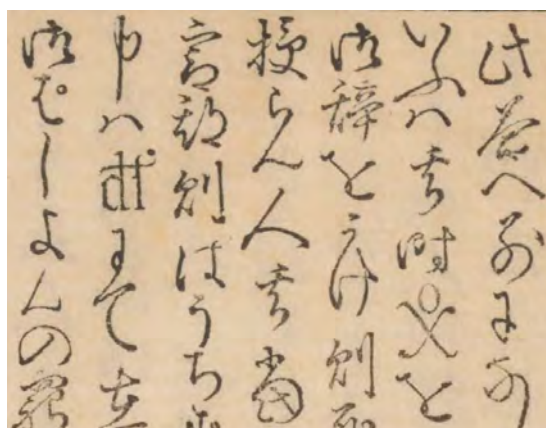
FIGURE 5. Roman-based abbreviations in the main text of *Guia do pecador*[18]

The treatment of abbreviations borrowed from other languages as morphograms is even more apparent in cases involving writing sys-

---

17. Or in Gelb's (1963, p. 16) own terminology: "Alphabetic signs" that "function as words." His list of examples further includes cases containing periods <.> as well as Latin-based abbreviations such as <e.g.>, which will be treated next.

18. *Guia do pecador* (1599), copy in the possession of the Bibliothèque nationale de France, call no. Japonais 312, vol. 2, f. 12r. Viewable online at: `https://gallica.bnf.fr/ark:/12148/btv1b10508361v/f37`.

tems based on different scripts. Figure 5 shows a passage from the *Guia do pecador* (1599), an adaptation in Japanese of Luis de Granada's (1504–1588) *Guía de pecadores*, as printed at the Jesuit Mission Press in Japan. Here as well as in several other contemporary Jesuit sources from Japan,[19] the four Latin-based (and, as far as the use of <x> for *Christ* is concerned, in turn partly Greek-based) abbreviations <dĩ̄> (for Japanese *deusu* < Latin *deus*), <J̃s̃> (*Jezusu* < Portuguese *Jesus*), <J̊x̊> (*Jezu Kirishito* < *Jesu C(h)risto*) and <x̊> (*Kirishito* < *C(h)risto*) are frequently met with (see Figure 6). Such abbreviations are clearly treated as one graphic as well as functional unit each, on par with the morphographically employed Chinese characters.
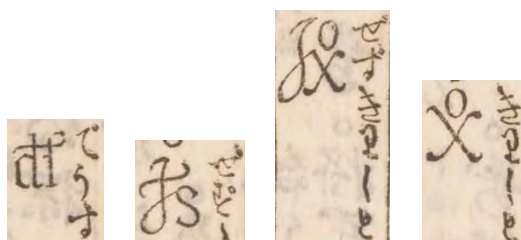

FIGURE 6. Roman-based abbreviations in *Guia do pecador*[20]

4.   Gray Areas and Indeterminable Cases

While it is common nowadays to address overall writing systems as being typologically mixed—or put differently, as featuring both a phonographic and a morphographic subsystem—it seems often to be taken for granted that specific graphs or strings of graphs can clearly and unmistakably be assigned either to the class of phonograms or to the class of morphograms. In fact, however, there are gray areas in which the typological status of a given graph (that is, is its use phonographic or morphographic in a specific context?) is disputable, if not entirely indeterminable.

The existence of such gray areas may be largely irrelevant for the trained reader, but it often clashes with the approach of modern transcriptions of pre-modern Japanese texts for instance, which usually imply

---

19. Some or all of these four abbreviations are also featured in other later prints produced by the Mission Press, namely *Doctrina Christam* (1600), *Doctrinæ Christianæ rudimenta* (1600), *Contemptus mundi* (1610) and *Fidesno quiŏ* (1611). Even before their first appearance in print they had already been used in manuscripts (see Popescu, 2004 for examples).

20. *Guia do pecador* (1599), copy in the possession of the Bibliothèque nationale de France, call no. Japonais 312, appendix to vol. 2, f. 9v. Viewable online at: https://gallica.bnf.fr/ark:/12148/btv1b10508361v/f178.

clear-cut two-way or even more fine-grained distinctions: either in *kana* vs. Chinese characters as phono- and morphograms respectively, at least by and large, or also in Romanizations, using for instance lower case for phonograms, and UPPER CASE or SMALL CAPS for morphograms.

In today's usage, there is a clear-cut visual distinction corresponding with a functional distinction most of the time. Therefore, even with an untrained eye it is easy to distinguish between み as a *kana* writing the syllable /mi/ as a phonogram, and 見 as a Chinese character writing the stem of the verb *mi.ru* 見る 'to see' as well as the beginning portion of the stems of its derivatives *mise.ru* 見せる 'to show' and *mie.ru* 見える 'to be visible, to look like' as a morphogram. In pre-modern times, however, the syllable /mi/ was alternatively written with a number of different phonograms (retrospectively known as *hentaigana* 変体仮名 'variant *kana*') including ⱬ, which etymographically speaking is simply a cursivized form of the above-mentioned character 見. Thus, when we look at cursively written texts—which was common both in manuscripts and prints up until the late 19th century—, there is at times no visual distinction between phono- and morphograms.

Consider the following set of examples taken from a 17th century print, more specifically a cookbook bearing the title *Ryōri monogatari* 料理 物語 (1647). Cursive ⱬ appears a number of times throughout the text, including clear-cut cases in which it serves as a phonogram and others in which its exact function is less obvious or even indeterminable.

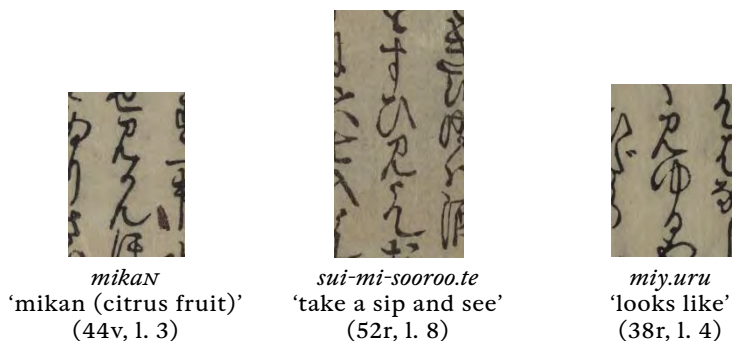| *mikaɴ* | *sui-mi-sooroo.te* | *miy.uru* |
| 'mikan (citrus fruit)' | 'take a sip and see' | 'looks like' |
| (44v, l. 3) | (52r, l. 8) | (38r, l. 4) |

FIGURE 7. Several instances of ⱬ in a 1647 print[21]

In the left-most example in Figure 7 the graph in question writes the first syllable of the word *mikaɴ* 'mikan (citrus fruit).' The form *mikaɴ* is a slightly reduced variant of earlier *mikkaɴ* 蜜柑, unmistakably a Sino-Japanese loanword having nothing to do with the above-mentioned na-

tive verbs for 'to see,' 'to show,' or 'to be visible'—or with 'seeing' in general for that matter.   This is thus an unambiguous instance of ス as a phonogram and accordingly it would typically be transcribed by the corresponding modern standard *kana*, i.e., み /mi/, to yield みかん for *mikaɴ*. The example on the right is quite different, as it involves the attributive form *miy.uru* of the verb *miy.u* '(here:) to look like,' the precursor of modern *mie.ru* referred to above.   In this case, ス can therefore be conceived of in two ways: again as a mere phonogram for /mi/, but also as a morphogram for the verb in question. In a modern transcription the result would likely be 見ゆる, opting for the latter interpretation, but purely phonographic み ゆる cannot be ruled out either.   The example in the middle may be taken to lie somewhere in between the other two cases: While *sui-mi-sooroo.te* 'take a sip and see (what the taste is like), try taking a sip' does involve the verb *mi.ru* as its second element, it is not used here in its visual sense of 'to see.' Instead, *mi.ru* as used in verbal compounds of the structure V+*mi.ru* 'try doing V' (corresponding to modern V+*Te mi.ru*) is commonly interpreted as an auxiliary verb. Even if the underlying full verbs are written sinographically on a regular basis, auxiliaries as their derivatives are typically written in *kana* in modern standard orthography. The involvement of the verb *mi.ru* may therefore suggest a transcription as すひ見候て in parallel to 見ゆ る, but a modern transcriber influenced by current orthographical practices might lean towards a phonographic interpretation of ス, yielding す ひみ候て instead.   In a modern transcription you are forced to make a decision in an either/or fashion, but the functional distinction is not necessarily as clear-cut in the original as such a transcription may suggest.

Similar difficulties are also common in Old Japanese, as one and the same graph was often used either as a phonogram or as a morphogram on different occasions, typically without any visual distinction.[22]   In modern editions and other scholarship on the relevant texts, Romanizations of Old Japanese often not only reflect a specific understanding of the language's phonology and, depending on the case, also provide a morphological analysis—they at times also indicate whether a given linguistic element in a text is written by means of phonograms or morphograms, or whether it is not reflected at all in writing.[23]   For phonograms a further distinction may be made, depending on the exact type

---

22. A well-known exception to this general lack of a visual distinction is found in the mode of inscription known as *senmyō-gaki* 宣命書 (lit. 'writing style of the edicts'), making use of half-size versus normal-size graphs, corresponding by and large to phonograms versus morphograms respectively.

23. This latter category of unwritten elements is often not distinguished from morphographically encoded elements in Romanizations. A notable exception is the scheme employed in the Oxford-NINJAL Corpus of Old Japanese (available online at https://oncoj.ninjal.ac.jp/): Here, unwritten elements are transcribed in lower case letters just as morphographically written elements are, but only the former are additionally marked by underlining.

of phonogram involved: so-called *ongana* 音仮名 (with sound values ultimately deriving from some variety of Chinese) or *kungana* 訓仮名 (with sound values deriving from Old Japanese morphemes associated with a given graph when used as a morphogram). While this may seem cumbersome at first, such precision in Romanizations is arguably well justified in the case of the 8th century poetic anthology *Man'yōshū* 万葉集 due to the diversity and complexity seen here in terms of the modes of inscription.

The intricacies involved in such approaches to Romanization are best illustrated by a concrete example. Below we quote poem no. 70 from book I of the *Man'yōshū* together with two transcriptions and the corresponding translations. The one given on the right is taken from a recent scholarly edition of the text (Vovin, 2017), the one on the left from an entry in Bentley's (2016) dictionary of Old Japanese phonograms.

TABLE 1. Two modern transcriptions of *Man'yōshū* I/70 in contrast

(1) 倭尔者	*YAMATO ni PA*	YAMATÖ-ni pa
(2) 鳴而歟來良武	*NAKITE KA kuramu*	NAK-Î-TE ka K-Uram-u
(3) 呼兒鳥	*ywobu KWODORI*	YÔᵐB-U kô-ⁿ-DÖRI
(4) 象乃²⁴中山	*KISA no NAKAYAMA*	KISA-NÖ NAKA YAMA
(5) 呼曽越奈流	*ywobi so kwoyu naru*	YÔᵐB-Î sö KÔY-U-nar-u

Are they coming / to Yamato as they call out? / I can hear the calling bird chicks / as they call out and fly over / the mountains of Kisa.

(Bentley, 2016, p. 105)

(3) Calling small bird, (2) would [it] come crying (1) to Yamatö? (5) They say that it is [now] calling and crossing over (4) Elephant mountain [in the] middle.

(Vovin, 2017, p. 159)

It is apparent at first sight that there are substantial differences between the respective Romanization schemes employed, in the degree and details of the morphological analysis, as well as in the interpretation and translation of the poem. These differences do not, however, concern us here. It is important to note though that while Vovin distinguishes between 'logograms' (i.e., morphograms) vs. phonograms only, transcribing them using upper case vs. lower case letters respectively, Bentley in fact has a tripartite division: 'Logograms' are given in small

---

24. Most modern editions (Nihon koten bungaku taikei, Shinpen Nihon koten bungaku zenshū among others) have 乃 as an *ongana*-type phonogram for /no/ here. This is also true for the text as quoted and transcribed in Bentley (2016, p. 105). Vovin (2017, p. 159) on the other hand follows Kinoshita (2001), who has 之 as a morphogram for *=no* 'attributive' rather than 乃. The difference in transcription between Vovin and Bentley does thus not derive from a difference in interpretation.

caps, while phonograms are written in lower case (*ongana*) or upper case letters (*kungana*), depending on the exact type.

Of special interest here are the three characters marked in gray, which are as follows together with the relevant morphemes they are associated with in Literary Chinese: *zhě* 者 'topicalizer,' *yú* 歟 'interrogative,' and *ér* 兒 'child.' In the poem quoted above they are employed to write the meaning- or function-wise equivalent Old Japanese morphemes *=pa* 'topicalizer,' *=ka* 'interrogative,' and *kwo* 'child' (which in Vovin's analysis, however, is interpreted as a prefix *kwo-* 'diminutive' deriving from the noun *kwo* 'child' etymologically and written as *kô* in his Romanization scheme). Now, Vovin's transcription uses lower case letters in all three cases, indicating an interpretation as phonograms. Bentley on the other hand only considers 歟 to act as a phonogram here (more specifically as a *kungana*), but interprets the other two graphs as 'logograms.'[25]

Even in the only case in which the two interpretations coincide, the exact reasoning behind them is unclear. Inventories of *hentaigana* typically list は /ha/ (from earlier /fa/ < /pa/) and 歟 /ka/,[26] but while these cursive forms of 者 and (to a much lesser extent) of 歟 are attested in *later* times, this is strictly speaking irrelevant for their status within the Old Japanese writing system. In his entry for the phonogram 歟 /ka/, Bentley (2016, p. 105) even notes that "while there are a large number of examples, they all seem to be transcribing the question particle *ka*." Indeed, 歟 is virtually limited to writing interrogative *=ka* in the *Man'yōshū*,[27] which in view of its Chinese model *yú* 歟 'interrogative' strongly suggests an interpretation as a morphogram. For a convincing argument in favor of an interpretation as a mere phonogram, we should at least expect the same graph to write the syllable /ka/ in various different contexts, regardless of the respective meaning of the morphemes involved. As long as that is not the case, the situation here with 歟 is no different from other cases of morphograms with similar Chinese models, whether in the poem quoted above or elsewhere.

---

25. In fact, the situation is even more complex than the comparison of this single poem suggests, as Vovin does interpret 者 as a 'logogram' for *=pa* on other occasions. See, e.g., poems I/2 and I/16 in the same volume (Vovin, 2017, pp. 21, 67).

26. See, e.g., Kana Study Group (1988, p. 14) or Ijichi (1986, p. 6) among various others.

27. Apart from I/70, 歟 for *=ka* is attested in III/331, IV/497, 511 as well as more than a dozen other cases in the anthology. The only apparent exception to this is found in poem XVII/3909, where *=moga* 'desiderative' is written as 毛歟. In the light of the fact that *=moga* has been proposed to etymologically derive from *=mo ar.an.u=ka* (see Rickmeyer, 1986, p. 210), which is convincing on phonological, morphosyntactic as well as semantic grounds, this apparent exception still involves *=ka*. Also cf. Ōno (1977, p. 336, etc.) who does not posit 歟 /ka/ as a *kungana* at all in the *Man'yōshū*.

The case of 者 is slightly different, as the graph is already attested as a phonogram for /pa/ in the Old Japanese corpus, albeit only as an exceedingly rare one. For the *Man'yōshū* itself Bentley (2016, p. 276) cites a single example (in poem XVI/3800)—and according to the detailed data provided by Ōno (1977, pp. 581, 586) this is indeed the only instance to be found in the entire anthology. In inventories of Old Japanese phonograms it is likewise not listed for any other of the received texts from that period (see, e.g., Omodaka, 1967, p. 899). In more casual contexts such as writing on wooden tablets (*mokkan* 木簡) 者 /pa/ appears to have been somewhat more widespread,[28] and this might be what formed the basis for the rapid increase in attestations (especially of the above-mentioned *hentaigana* ﾁ based on 者) in the centuries to come. In any case, clear-cut attestations of 者 /pa/ as a *kungana* are exceedingly few in number, while instances of 者 to write *=pa* 'topicalizer' and (etymologically or functionally) related morphemes abound. The fact that this use is well in line with its Literary Chinese model of *zhě* 者 'topicalizer' again suggests an interpretation as a morphogram in the vast majority of cases, including the one in poem I/70 quoted above. Similar observations apply to the case of 兒, the details of which we may however skip here.

In the end it thus seems most appropriate to regard all three graphs marked in gray as morphograms in the poem in question, but the point here is not to discuss right and wrong—what is far more important here is what has led to the disagreement between Bentley and Vovin (and our own view as outlined above), namely the inherent ambiguity in the Old Japanese writing system and the ample room for diverging interpretations it thereby provides.

By far not all functional morphemes in Old Japanese could as easily be written morphographically as was the case with *=pa* and *=ka* in the preceding example, for which obvious Chinese models suggested themselves. In a quite different fashion, certain Chinese characters such as 鴨—morphographically writing the word *kamo* 'duck' in the first place— were used to write homophonous functional morphemes, in this case the exclamatory particle combination *=ka=mo*. Consider the set of examples from the *Man'yōshū* belonging to this type in Table 2, all involving disyllabic words.[29]

These derived spellings for functional morphemes are typically classified as phonograms or more precisely as *kungana* (see Wenck, 1954,

---

28. See the Wooden Tablet Database of the Nara National Research Institute for Cultural Properties, e.g., entries `https://mokkanko.nabunken.go.jp/ja/6ACCNH18000104` (one of the many tablets featuring the Naniwazu poem, with 者奈 for *pana* 'blossoms') or `https://mokkanko.nabunken.go.jp/ja/6BFKBR43000001` (with 久者牟夜 for *kup.am.u=ya* 'shall I/we eat?').

29. The number of attestations of each usage in the *Man'yōshū* is taken from Yoshioka (2019, pp. 28–34).

TABLE 2. Typologically disputable spellings of functional morphemes

Graph	Original value	Attestations	Derived value	Attestations
鴨	*kamo* 'duck'	21	*=ka=mo* 'exclamation'	318
庭	*nipa* 'garden'	20	*=ni=pa* 'dative + topic'	41
谷	*tani* 'valley'	4	*=dani* 'even (as little as)'	67
管	*tutu* 'pipe'	0	*-tutu* 'iterative'	84

p. 51; Vovin, 2017, p. 9, among many others), which is however debatable: Disyllabic sound values such as /kamo/ or /nipa/ are too specific in terms of pronunciation to spell any substantial number of other morphemes or strings of morphemes than those given above, such as the particle combinations *=ka=mo* or *=ni=pa*. The phonographic use in such cases is thus *naturally* confined to a single morpheme or a single string of morphemes (compare this to the *deliberate* narrowing of the use of を for nothing but *=o* 'accusative' in the modern standard orthography, as discussed in section 3). It is precisely due to the limited productivity of such phonograms that a re-analysis as morphograms suggests itself. This is further supported by the fact that the above-mentioned characters are in fact much more often used in their derived values than in their original values, at least as far as the corpus of Old Japanese poetry is concerned. While strictly speaking irrelevant for the Old Japanese period, it is also worthwhile to note that the same association of, e.g., 鴨 with *=ka=mo* is still observed in manuscripts of later poetic anthologies, most prominently of the early 10th century *Kokin waka-shū* 古今和歌集.[30]

Our final example in this section pertains to certain renderings of proper nouns that go back to Old Japanese times but are still current today—and which likewise pose difficulties for distinguishing phonograms from morphograms. Consider the following toponym spellings: Awa (< Old Japanese Apa) 阿波, Izu (< Idu) 伊豆, Iga 伊賀, Ise 伊勢, Kaga 加賀, Mino (< Minwo) 美濃, Nara 奈良, Noto 能登, etc. All of these spellings consist of what used to be commonplace phonograms in Old Japanese, so that syllables in *any* word could be written using these graphs: 阿 for /a/, 波 for /pa/, etc. At the same time, they were conventionalized as official spellings from early on, many already in the 8th century. In other words, the first half of the name Apa, for example, came to be written by 阿 /a/—and therefore *not* by 安 /a/, another commonplace phonogram for the same sound value. Wherever the inventory of common-

---

30. For *=ka=mo* 鴨 see, e.g., poem II/121 in the Gen'ei 元永 manuscript, or poem IX/406 in the Sujigire 筋切 fragments of the *Kokin waka-shū*, both dating from the 12th century.

place phonograms provides more than one option for a given syllable, the morphonographic nature of these spellings becomes obvious: The choice between 阿 vs. 安 /a/, 勢 vs. 世 /se/, 賀 vs. 我 /ga/ etc. is clearly determined on a name- and thus morpheme-specific basis.

The typological status of these graphs later changed as a side-effect of the replacement, approximately in the 9th century, of full phonograms with simplified ones as in the modern *katakana* (ア /a/ < 阿, etc.) and *hiragana* (は /ha/ < 波, etc.). Even during and after this change, the toponym spellings remained unchanged—and in fact they remain unchanged up to the present day in these cases. Graphically speaking, they thus still preserve traits of the Old Japanese writing system, in which phonograms and morphograms were both clearly sinographic and not yet visually distinct. What does this mean for our interpretation of a spelling such as 阿波 for Awa today? As neither of the two graphs is in general use as a phonogram anymore, the only two options are to view the spelling as being morphonographic (i.e., still involving a phonographic mapping, but with a name-specific choice of phonograms) or as being *en bloc* already morphographic in nature. The decision between these two options essentially depends on whether we posit a phonographic subsystem in the modern Japanese writing system that is chiefly used for proper nouns (see section 5 for examples involving personal rather than place names) and relies on sinograms rather than *hiragana* or *katakana*. Without assuming such a phonographic subsystem, spellings such as those quoted above could only be interpreted as digraphic morphograms.

5.   Semantically Motivated Phonograms

In writing systems featuring both phonograms and morphograms with overlapping inventories of signs, as for instance in Chinese and Japanese (especially in its earliest stage), phonograms are not necessarily alone chosen with regard to the best possible fit in terms of pronunciation. Far from discarding potential meanings altogether, considerations of semantics may play—and *have* often played—a significant role as well. The phenomenon of semantically motivated phonograms is less often observed for practical writing in ordinary contexts. It instead seems to be particularly prevalent in phonographic representations of proper nouns or in ambitious modes of inscription as reflections of artistic expression, e.g., in poetry. The prerequisite for this is the open-ended nature of the phonographic subsystems in these cases, as in theory any morphogram associated with a morpheme that provides a sufficiently close match for a given pronunciation can be turned into a phonogram for the latter. Especially with laxer standards as to the precision of the phonetic match, there are thus typically at least a few candidates available for each sound value. At this point, the circumstances succinctly summarized by Han-

del (2019, p. 36) take effect: "Because a morpheme, by definition, has both phonological shape and semantic content, each Chinese character has, for users of the script, one or more associated pronunciations and meanings, namely those of the morpheme(s) that it normally writes." Each graph is therefore equipped with the potential of specific semantic allusions on top of having a certain sound value. Such cases of semantically motivated phonograms thus clearly depend on—and would be unthinkable without—the morphographic use of the same graphs in other contexts, but they must be distinguished from actual morphograms, as will become apparent from the examples discussed in this section.

Our first set of examples is again taken from sinographically written Old Japanese of the 8th c. In elaborate, playful modes of inscription as seen in the aforementioned poetic anthology *Man'yōshū*, some phonograms are clearly semantically motivated, as various scholars have pointed out (see Wenck, 1954; Ōno, 1957; Wittkamp, 2009 among many others). For instance, graphs that in other contexts are used as morphograms for certain words are at times also employed as phonograms to write a portion of precisely these words. Consider the first case given in Table 3 below: The character 反 is well attested as a morphogram for *kapyer.u* 'to return,' but it also occurs together with other phonograms to spell the same word, phonographically. In the latter case the character merely represents a single syllable of that word, namely /pye/. A comparison with the Middle Chinese sound value of the graph, i.e., *puan'*, further shows that 反 is not even a particularly good phonetic match for /pye/, but arguably the semantic match made up for the discrepancy in sound.[31] It is therefore hardly coincidental that 反 /pye/ and the other phonograms listed below show a skewed distribution and, depending on the case, either rarely or never occur to write the indicated syllables in any other words.

In other cases, the semantics do not match entirely, but instead special phonograms are used for allusions to related words, thus adding a layer of meaning. A case in point is the spelling 孤悲 (Middle Chinese *kɔ-pi*) for the verb form *kwopwi* 'longing' and etymologically related words.[32] These phonograms are again virtually limited to writing the syllables /kwopwi/ in the same small set of closely related words over and over again. It therefore does not only seem safe to assume that their choice is intentional, readers are even almost forced to recognize their semantic allusion to being 'alone and sad.' However, not all cases are as straightforward as this one—and there is but a fine line between

---

31. The (Early) Middle Chinese reconstructions provided here and in the following are taken from Pulleyblank (1991).

32. In the *Man'yōshū* the two graphs are attested as a spelling of *kwopwi* as a verb form (I/67, IV/560, IX/1778, etc.), of *kwopwi* 'longing' as a deverbal noun (III/325, XV/3652, XVII/3929, etc.), and also in the related adjective *kwopwisi* 'to be longing' (XVII/3957, 3978, 3987, etc.).

TABLE 3. Selection of semantically motivated phonograms in Old Japanese

Graph	Middle Chinese	Old Japanese	Attestations
反	*puan'* 'to return'	/pye/ in 可反流 etc. for *kapyer.u* 'to return'	XV/3706, 3747, etc.
草	*ʦʰaw'* 'grass'	/sa/ in 久草 for *kusa* 'grass'	XIV/3530
地	*diᵇ* 'earth'	/ti/ in 都地 for *tuti* 'earth'	V/812
馬	*maɨ'/mɛɪ'* 'horse'	/ma/ in 宇馬 for *uma* 'horse'	XIV/3537, 3538
梅	*məj* 'plum'	/me/ in 宇梅 for *ume* 'plum'	V/843, 849, etc.

TABLE 4. Toponym spellings involving ameliorative connotations

Toponym	Spelling	Middle Chinese
Nara	寧楽	*nɛjŋ* 'tranquil,' *lak* 'joyful'
Kuni	恭仁	*kuawŋ* 'reverence,' *ɲin* 'benevolence'
Yamato	養徳	*jɨaŋ'* 'to nurture,' *tək* 'virtue'

capturing allusions actually intended by the choice of phonograms and randomly reading allusions into spellings conceived as purely phonographic renderings void of a second layer of meaning.

As already mentioned, semantic connotations deriving from the morphographic use of characters are especially common when it comes to the spellings of proper nouns. This trend has a long history and can already be observed in what might be termed 'imperial toponyms' in 8th century Japan: Nara (710–740, 745–784) and Kuni (740–744) are the names of two capital cities, whereas Yamato is the name of the central province comprising the former of these capitals, and after which the early state in its entirety was also named. As Table 4 shows, such place names were sometimes written in an auspicious manner, valuing ameliorative connotations over ideal phonetic matches.

If we interpret the graphs in these spellings as morphograms, they would write words along the lines of 'tranquil and joyful,' 'reverence and benevolence,' and 'nurturing virtue.' It is important to note, however, that this is *not* what these names actually mean, and that no such morphemes as *na 'tranquil' etc. exist in Japanese. The graphs are therefore clearly not morphograms, but phonograms—even if we are dealing with rough approximations of the intended pronunciations at best, as a comparison with the Middle Chinese sound values once again shows. The

result is thus a deliberate compromise between ameliorative connotations on the one hand and imperfect but tolerable phonetic matches on the other. It is typical of such cases that most of the phonograms involved are of an *ad hoc* nature, and thus unproductive in other contexts: 寧 /na/, 恭 /ku/ and 養 /ya(ma)/, for instance, are not attested outside the toponyms quoted above.

The field of toponyms is also of interest in so far as it is here that we find the earliest reflection of an acute awareness of ameliorative and other connotations in both toponyms as such and their spellings. Thus, the notion of *kōji* 好字 'pleasant characters' and *kamei* 嘉名 'auspicious names' is already met with in 8th and 10th century sources respectively (cf. Osterkamp, 2008 for details).

Situated time-wise in between the 8th century and today are transcriptions from the context of the early Christian missionary activities in 16th and early 17th century Japan. Consider the following transcriptions of the name of Jesus Christ as used by Jesuit missionaries (Table 5). *Jezusu* (< Portuguese *Jesus*) is written in a way implying 'lord of the world, master,' and *Jezu Kirishito* (< *Jesu C(h)risto*) likewise in a way implying as it were 'lord of the world, teacher of noble reason, who brings us across (or rescues us).'

Table 5. Japanese transcriptions of the name of Jesus Christ, ca. 1600

Name	Spelling	Connotations
Jezusu	世主子[33]	'world, lord, master'
Jezu Kirishito	世主貴理師渡[34]	'world, lord, noble, reason, teacher, bring across'

In China, Jesuit missionaries came up with a different solution, but one that equally involves certain connotations: The transcription *Yēsū* 耶穌 yields 'father' and 'to resurrect' under a morphographic interpretation (cf. Kojima, 1993). Whether in China or Japan, the choice of phonograms in such cases is clearly everything but coincidental.

---

33. See, e.g., the 1585 letter (in Japanese with Italian translation) signed by the four ambassadors making up the so-called Tenshō embassy (Biblioteca Apostolica Vaticana, Borg.cin.536, line 1), or also the title page of some copies of Alessandro Valignano's *Catechismus Christianæ fidei* (Lisbon 1586), printed slightly later in the same context. At least the copies at the Liceu Passos Manuel, Lisbon, and at the Universidad de Salamanca (call no. BG/26698) carry the names of Jesus and Maria on their title page, written as 世主子 and 満理阿 respectively.

34. Seen, e.g., in Vigenère (1586/1587: CCCXXXVI; part of the additional pages that are present only in a small number of copies, e.g., Bibliothèque nationale de France, RES M-V-348), and again in Duret (1613; 1619, p. 921). Note also 讃多麻理阿 as a transcription of Sancta Maria on the same page.

So far, we have only addressed cases involving neutral or positive se-
mantics. However, the choice of phonograms may also be motivated by
pejorative or otherwise negative semantics. The various transcriptions
of the word *kirishitan* (< Portuguese *C(h)ristão*) as a designation of the
early Catholic Christians in Japan are illustrative of the possible range
of allusions (Table 6).

TABLE 6. Transcriptions of the word *kirishitan*, ca. 1600 and beyond

	Spelling(s)	Connotations
Fairly neutral	吉利支丹	
Negative	鬼利支端, 鬼利志端, 鬼利死炭[35]	'demon' (鬼), 'death' (死)
Positive	貴理師端, 貴理志端, 貴理志丹[36]	'noble' (貴), 'reason' (理), 'teacher' (師)

First, there are spellings that qualify as fairly neutral. The first one
given here is what can still be found in modern dictionaries, it is also
found in the titles of scholarly publications, and so on. In order to
show one's disdain for Christianity, for instance after the expulsion of
Christian missionaries from the country in the early 17th century, there
was a plethora of other ways of transcribing the same word. Some of
the attested variants involve phonograms implying—as in the examples
quoted above—'demon' or 'death' to write /ki/ and /si/ (*shi*). Christian
missionaries or converts on the other hand opted for totally different
spellings with positive connotations—similar to those we have already
seen above in the transcription of the name of Jesus Christ.

The preference of certain phonograms over others in the spellings
of names is, however, by far not limited to pre-modern times. Instead,
ameliorative connotations are still commonly met with in contemporary
Japan, notably for instance in the phonographic portions of spellings of
female personal names. Table 7 gives a selection of representative cases.

As before, it is important to stress that these are connotations implied
by the spellings, not the actual meanings of these names in etymological

---

35. For the first variant see, e.g., the preface to *Kenkon bensetsu* 乾坤弁説 (1656). The
latter two variants are found (together with a large number of other transcriptions
of interest) in *Kirishitan hakyaku ronden* 鬼利至端破却論伝 (I/1r and I/11v respectively),
dating from somewhat later in the second half of the 17th century.

36. For the most common variant, 貴理師端, see *Alphabetum japonicum et exemplare*
(Biblioteca Casanatense, Ms.2110; reproduced in Doi, 1963, see letter no. 24 on p. 284),
or also the 1620 letter addressed (in Japanese with Latin translation) by Christians
from Arima and other nearby places to Pope Paul V (Biblioteca Apostolica Vaticana,
Barb.or.152 (1); see line 5). The variant spellings 貴理志端 and 貴理志丹 are likewise
found in these two sources: see letter no. 26 in Doi (ibid., p. 286) and line 18 in the
1620 letter respectively.

TABLE 7. Spellings of female personal names and their connotations

Name	Spelling	Connotations
Emiko	恵美子	'blessed and beautiful'
Kaeko	佳永子	'auspicious and eternal'
Michiko	美智子	'beautiful and wise'
Mika	美香	'beautiful and fragrant'
Rie	理恵	'reasonable and blessed'

terms. The essentially phonographic nature of these spellings is already suggested by the fact that female first names up until the early 20th century predominantly made use of *hiragana* or *katakana* (Barešová, 2016, pp. 46–47, Barešová, 2017, p. 42), but is also further supported by the existence of many variant spellings: While the names remain the same in their spoken form, different spellings may imply different 'meanings.' Most notably, such tendencies in the choice of phonograms also apply to Western names current in Japan. A name such as Erika, for instance, is found written in a multitude of ways including, but not limited to, 愛理花 ('love, reason, flower'), 恵莉佳 ('blessed, jasmine, auspicious') or 瑛里香 ('crystal, village, fragrance'; cf. Barešová, 2016, pp. 210, 215, 217). The existence of entire guide books, not just for choosing a name as such, but also an appropriate written representation of that name, likewise shows a keen awareness of the connotations involved.

In the beginning of this section we have already noted that, in principle, any morphogram can be turned into a phonogram. Therefore, it comes as no surprise that semantically motivated phonograms in the case of sinograms are by no means limited to Japanese, as discussed so far in this section, but are likewise found, e.g., in the modern Chinese writing system. An interesting case without immediate parallels above is the existence of spellings for loanwords, which might be seen as being phonographic in nature, but at the same time lend themselves to a morphographic interpretation. Consider, for example, the spellings of *wéitāmìng* 維他命 'vitamin' and *tuōlājī* 拖拉機 'tractor' as discussed by French (1976, p. 114). While the spellings represent fairly acceptable approximations of the words' pronunciation in the donor language (or its first half in the case of 'tractor'), they might also evoke associations such as '(that which) maintain(s) someone's life' or 'drag-pull machine' respectively. It is self-evident that considerations of both sound and meaning are behind the coining of such spellings, which ultimately also shape the phonological form of the loanword as such. Needless to say, these are rather extreme cases for the involvement of semantic considerations. In examples such as the afore-mentioned *bāshì* 巴士 'bus,' which hardly makes any sense when interpreted as (among other possibili-

ties) 'to wish' plus 'scholar,' we can safely assume that the characters were chosen based on considerations of sound alone. We are therefore once more reminded of the fine line dividing graphs intended purely as phonograms from semantically motivated phonograms.

6.   Summary and Conclusions

Building upon an in-depth look at previous scholarship in the field of the typology of writing systems with a focus on the taxonomies proposed and respective terminology used, we have posited in section 1 two basic mapping types in writing systems, namely morphographic and phonographic mappings. Crucially, in our understanding of morphography as a mapping type between one or more morphemes and one or more graphs, morphemes are seen as linguistic units having *both*: form and function, sound and meaning. Phonographic mappings are further divided into two subtypes, depending on whether or not morpheme-specific knowledge is required from the reader, the writer or both (as is, by definition, also the case in morphographic mappings). We thus ultimately arrive at a tripartite division, with morphograms, morphonograms, and phonograms as the basic functional types of graphs or strings of graphs.

Transitions from morphograms to phonograms and vice versa as treated in sections 2 and 3 are well attested in the process of script transfer, but also within writing systems. The level of phonology can thus be demonstrated to be everything but irrelevant to morphography and morphograms. In order to explain, for instance, that phonograms are developed on the basis of morphograms on a regular basis, the latter must not be conceived of as graphs either "denot[ing] the meaning but not the pronunciation of a morpheme" (Daniels and Bright, 1996, p. xlii) or as "represent[ing] primarily the meaning (and sometimes secondarily the sound) of one word or morpheme" (Taylor and Taylor, 1983, p. 21). Instead, the label 'morphography' is to be taken at face value: Morphographic writing systems are not just "meaning-based systems" in contradistinction to "sound-based systems" (Cook, 2016, p. 6), but morpheme-based systems instead.

Transitions from morphograms to phonograms were crucial in shaping various writing systems throughout history, including but by far not limited to the Chinese and Japanese writing systems, from which the majority of examples in the preceding sections was taken. As we have seen in section 3, semanticizations of phonograms and thereby transitions to morphograms also occur regularly, even if on a smaller scale. We have observed this phenomenon, for instance, with so-called heterograms in Middle Iranian languages as well as with abbreviations, particularly when borrowed, e.g., from Latin to English. What these two cases have in common is that some sounds are omitted already in the donor writing system—whether in the Aramaic abjad or in the case of

Roman-based abbreviations. As incomplete phonographic spellings requiring morpheme-specific knowledge they were eventually borrowed *en bloc* into other writing systems as full-fledged morphograms.

While transitions may thus occur in both directions, the typological status of graphs or strings of graphs at a given time is not always clear-cut, as we have seen in section 4. A solution taking into account the respective productivity of graphs as phonograms seems possible at first, but is only really feasible for both extremes: If a phonogram occurs in the spelling of *one* specific morpheme or string of morphemes only an interpretation as a morphogram appears appropriate. In contrast to this, a phonogram that occurs in the spelling of *any* number of morphemes should be considered a phonogram. For cases in between these two extremes, however, the situation is less clear, leaving us with a large number of disputable or even indeterminable cases.

Our brief survey of a selection of semantically motivated phonograms in section 5 has shown that phonography is, despite what the term itself suggests, not necessarily always purely related to the level of phonology. Instead, the polyvalence of graphs being used as both phonograms and morphograms on different occasions may lead to semantic allusions based on their morphographic usage whenever they are used as phonograms. Certainly not all such allusions readers may 'identify' in a given spelling are intentional in the end, but for a substantial amount of cases it is safe to assume so. Among the questions to be explored in future research is the possibility of semantic allusions in phonographic writing systems *lacking* the above-mentioned polyvalence of graphs. At least in systems traditionally characterized as featuring a deep orthography—in other words: systems involving morphonograms on a regular basis, thus providing conventionalized links between specific spellings and morphemes—it is possible to achieve a similar effect by deviating from the conventional spelling of a given morpheme, replacing at least part of it with a spelling associated with another, (near-)homophonous morpheme. This may be illustrated by unconventional spellings along the lines of <eggceptional> and <eggcellent> (also <egg-cellent>, <EGGcellent> etc.) for *exceptional* and *excellent* in the context of egg recipes, Easter etc., or <amazeing>, <aMAZEing> or similar for *amazing* in the context of labyrinths. Here as with the other phenomena addressed, further comparative research is needed.

References

Barešová, Ivona (2016). *Japanese Given Names: A Window into Contemporary Japanese Society*. Olomouc: Palacký University Olomouc.
——— (2017). "Chrysanthemum, Pine and Crane—Female Names of Meiji Period Japan." In: *Studia Orientalia Slovaca* 16.2, pp. 39–67.

Baxter, William H. and Laurent Sagart (2014a). "Baxter-Sagart Old Chinese reconstruction, version 1.1." URL: https://ocbaxtersagart.lsait.lsa.umich.edu/BaxterSagartOCbyMandarinMC2014--09--20.pdf.

——— (2014b). *Old Chinese: A New Reconstruction*. Oxford: Oxford University Press.

Bentley, John R. (2016). *ABC Dictionary of Ancient Japanese Phonograms*. Honolulu: University of Hawai'i Press.

Boltz, William G. (1994). *The Origin and Early Development of the Chinese Writing System*. New Haven, CT: American Oriental Society.

Chao, Yuen Ren (1968). *Language and Symbolic Systems*. Cambridge: Cambridge University Press.

Cook, Vivian (2016). "Background to the English writing system." In: *The Routledge Handbook of the English Writing System*. Ed. by Vivian Cook and Des Ryan. London: Routledge, pp. 5–23.

Coulmas, Florian (1996). *The Blackwell Encyclopedia of Writing Systems*. Oxford: Blackwell.

——— (2003). *Writing Systems. An Introduction to their Linguistic Analysis*. Cambridge: Cambridge University Press.

Daniels, Peter T. (2018). *An Exploration of Writing*. Sheffield: Equinox.

Daniels, Peter T. and William Bright (1996). *The World's Writing System*. Oxford: Oxford University Press.

DeFrancis, John (1984). *The Chinese language: Fact and Fantasy*. Honolulu: University of Hawai'i Press.

——— (1989). *Visible Speech. The Diverse Oneness of Writing Systems*. Honolulu: University of Hawai'i Press.

Doi, Tadao [土井忠生] (1963). 吉利支丹文献考 *[Studies in Kirishitan Documents]*. 東京 [Tōkyō]: 三省堂 [Sanseidō].

Duret, Claude (1613). *Thresor de l'histoire des langues de cest univers. Contenant les Origines, Beautés, Perfections, Decadences, Mutations, Changemens, Conuersions & Ruines des langues*. Cologny: Matth. Berjon.

——— (1619). *Thresor de l'histoire des langues de cest univers. Contenant les Origines, Beautez, Perfections, Decadences, Mutations, Changements, Conuersions, & Ruines des Langues*. Yverdon: Imprimerie de la Societé Helvetiale Caldoresque.

French, M.A. (1976). "Observations on the Chinese script and the classification of writing systems." In: *Writing without Letters*. Ed. by W. Haas. Manchester: Manchester University Press, pp. 101–129.

Fukumori, Takahiro [福盛貴弘] and Jun Ikeda [池田潤] (2002). "文字の分類案: 一般文字学の構築を目指して [A Classification of Writing Systems: A Step toward General Graphology]." In: 一般言語学論叢 *[Journal of General Linguistics]* 4, pp. 35–58.

Galambos, Imre (2006). *Orthography of Early Chinese Writing: Evidence from Newly Excavated Manuscripts*. Budapest: Department of East Asian Studies, Eötvös Loránd University.

Gelb, Ignace J. (1963). *A Study of Writing*. Chicago: University of Chicago Press.

Gnanadesikan, Amalia E. (2009). *The Writing Revolution. Cuneiform to the Internet*. Chichester: Wiley-Blackwell.

———— (2017). "Towards a typology of phonemic scripts." In: *Writing Systems Research* 9.1, pp. 14–35.

Haas, William (1983). "Determining the Level of a Script." In: *Writing in Focus*. Ed. by Florian Coulmas and Konrad Ehlich. Berlin: Mouton, pp. 15–29.

Handel, Zev (2019). *Sinography. The Borrowing and Adaptation of the Chinese Script*. Leiden: Brill.

Hill, Archibald A. (1967). "The typology of writing systems." In: *Papers in Linguistics in Honor of Léon Dostert*. Ed. by William M. Austin. The Hague: Mouton, pp. 92–99.

Ijichi, Tetsuo [伊地知鐵男], ed. (1986). 増補改訂仮名変体集 *[A Collection of Kana Variants, Enlarged and Corrected]*. 東京 [Tōkyō]: 新典社 [Shintensha].

Joyce, Terry (2011). "The significance of the morphographic principle for the classification of writing systems." In: *Written Language & Literacy* 14.1, pp. 58–81.

———— (2016). "Writing systems and scripts." In: *Verbal Communication*. Ed. by Andrea Rocci and Louis de Saussure. Berlin: De Gruyter Mouton, pp. 287–308.

Junker, Heinrich J. (1911). *The Frahang i Pahlavīk. First Part: Prolegomena*. Heidelberg: Winter.

Kana Study Group [かな研究会] (1988). 実用変体がな *[Hentaigana for Practical Use]*. 東京 [Tōkyō]: 新典社 [Shintensha].

Kashima, Eiichi [鹿島英一] (1993). "日華両語における外来語の表記法 [On the spelling of loanwords in Japanese and Chinese]." In: 東北大学文学部日本語学科論集 *[Journal of the Department of Japanese, Tōhoku University]* 3, pp. 13–24.

Kinoshita, Masatoshi [木下正俊], ed. (2001). 萬葉集ＣＤ－ＲＯＭ版 *[Man'yōshū, CD-ROM Edition]*. 東京 [Tōkyō]: 塙書房 [Hanawa shobō].

Kojima, Yukie [小島幸枝] (1993). "「耶蘇」という宛字について [On the 'assigned characters' 耶蘇]." In: 獨協大学教養諸学研究 *[Dokkyō University Bulletin of Liberal Arts]* 27.2, pp. 85–92.

Kōno, Rokurō [河野六郎] (1977). "文字の本質 [On the nature of writing]." In: 文字 *[Writing]*. Vol. 8. 岩波講座日本語 [Iwanami Course on Japanese]. 東京 [Tōkyō]: 岩波書店 [Iwanami shoten], pp. 1–22.

Kudrinski, Maksim (2017). "Heterograms in Hittite, Palaic, and Luwian context." In: *Journal of Language Relationship* 15.4, pp. 238–249.

Kudrinski, Maksim and Ilya Yakubovich (2016). "Sumerograms and Akkadograms in Hittite: Ideograms, Logograms, Allograms, or Heterograms?" In: *Altorientalische Forschungen* 43.1–2, pp. 53–66.

Lurie, David B. (2011). *Realms of Literacy. Early Japan and the History of Writing*. Cambridge, MA and London: Harvard University Press.

Lurie, David B. (2012). "The development of writing in Japan." In: *The shape of script: How and why writing systems change*. Ed. by Stephen D. Houston. Santa Fe, NM: School for Advanced Research Press, pp. 159–185.

Matsumoto, Mallory E. (2017). "From sound to symbol: orthographic semantization in Maya hieroglyphic writing." In: *Writing Systems Research* 9.2, pp. 99–122.

Matsunaga, Sachiko (1996). "The Linguistic Nature of Kanji Reexamined: Do Kanji Represent Only Meanings?" In: *The Journal of the Association of Teachers of Japanese* 30.2, pp. 1–22.

Mora-Marín, David F. (2003). "The origin of Mayan syllabograms and orthographic conventions." In: *Written Language & Literacy* 6, pp. 193–238.

Omodaka, Hisataka [澤瀉久孝] (1967). 時代別国語大辞典上代編 *[Great Dictionary of the Japanese Language by Periods: Old Japanese]*. 東京 [Tōkyō]: 三省堂 [Sanseidō].

Ōno, Tōru [大野透] (1957). "義字的假名に就て–萬葉集を中心として [On semantically motivated phonograms, focusing on the *Man'yōshū*]." In: 国語国文 *[Japanese Language and Literature]* 26.9, pp. 43–56.

——— (1977). 續萬葉假名の研究 *[A Study of Old Japanese Phonograms, Continued]*. 東京 [Tōkyō]: 高山本店 [Takayama honten].

Osterkamp, Sven (2008). "Official Regulations and Unwritten Rules for Place Name Spellings in 8th to 10th-century Japan: A Conspectus of their Consequences and Side-effects." In: *Bochumer Jahrbuch zur Ostasienforschung* 31, pp. 213–244.

Osterkamp, Sven and Gordian Schreiber (forthcoming). "<Th>e Ubi-<qu>ity of Polygra<ph>y and its Significan<ce> for <th>e Typology of <Wr>iti<ng> Systems." In: *Written Language & Literacy*.

Popescu, Florin (2004). "「講義要綱」における合字本語について [On the ligatures for Western words in the Jesuit *Compendia*]." In: 京都大学國文學論叢 *[Kyōto University Review of Japanese Literature]* 12, pp. 1–23.

Pulleyblank, Edwin G. (1991). *Lexicon of Reconstructed Pronunciation in Early Middle Chinese, Late Middle Chinese, and Early Mandarin*. Vancouver: University of British Columbia Press.

Rickmeyer, Jens (1986). "Zur Negation im Japanischen." In: *Bochumer Jahrbuch zur Ostasienforschung* 9, pp. 197–216.

Rogers, Henry (2005). *Writing Systems. A Linguistic Approach*. Malden: Blackwell.

Sampson, Geoffrey (1985). *Writing Systems. A Linguistic Introduction*. London: Hutchinson.

——— (2015). *Writing Systems*. 2nd ed. Sheffield: Equinox.

Schmalz, Xenia et al. (2015). "Getting to the bottom of orthographic depth." In: *Psychonomic Bulletin & Review* 22, pp. 1614–1629.

Schreiber, Gordian (forthcoming). *Japanese Morphography: Deconstructing 'hentai kanbun'*. Leiden: Brill.

Shaked, Shaul (1993). "A Dictionary of Aramaic Ideograms in Pahlavi." In: *Journal of the American Oriental Society* 113.1, pp. 75–81.

Sproat, Richard (2000). *A Computational Theory of Writing Systems*. Cambridge: Cambridge University Press.

———— (2013). "A note on Unger's 'What linguistic units do Chinese characters represent?'" In: *Written Language & Literacy* 16.1, pp. 107–111.

———— (2016). "English among the world's writing systems." In: *The Routledge Handbook of the English Writing System*. Ed. by Vivian Cook and Des Ryan. London: Routledge, pp. 27–40.

Taylor, Insup and Martin M. Taylor (1983). *The Psychology of Reading*. New York: Academic Press.

Tranter, Nicolas (2013). "Logography and layering: A functional cross-linguistic analysis." In: *Written Language & Literacy* 16.1, pp. 1–31.

Unger, Marshall J. (2004). *Ideogram. Chinese Characters and the Myth of Disembodied Meaning*. Honolulu: University of Hawai'i Press.

———— (2011). "What linguistic units do Chinese characters represent?" In: *Written Language & Literacy* 14.2, pp. 293–302.

Vigenère, Blaise de (1586/1587). *Traicté des chiffres, ou secretes manieres d'escrire*. Paris: Abel L'angelier.

Vovin, Alexander (2017). *Man'yōshū, Book 1*. Leiden: Brill.

Wenck, Günther (1954). *Japanische Phonetik. 2. Die Phonetik der Manyōgana*. Wiesbaden: Harrassowitz.

Whittaker, Gordon (2011). "Writing Systems." In: *The Cambridge Encyclopedia of the Language Sciences*. Ed. by Patrick Colm Hogan. New York: Cambridge University Press, pp. 935–939.

Wittkamp, Robert F. (2009). "Schriftspiele mit Landschaft und Erinnerung: Zur Zeichenverwendung im Man'yōshū." In: *Oriens Extremus* 48, pp. 251–270.

Yoshida, Yutaka [吉田豊] (2001). "ソグド文字 [Sogdian script]." In: 世界文字辞典 *[Encyclopedia of the World's Writing Systems]*. Ed. by Rokurō Kōno [河野六郎], Eiichi Chino [千野栄一], and Tatsuo Nishida [西田龍雄]. 東京 [Tōkyō]: 三省堂 [Sanseidō], pp. 551–555.

———— (2013). "Buddhist Texts Produced by the Sogdians in China." In: *Buddhism Among the Iranian Peoples of Central Asia*. Ed. by Matteo de Chiara, Mauro Maggi, and Giulana Martini. Vol. 1. Multilingualism and History of Knowledge. Vienna: Austrian Academy of Sciences Press, pp. 155–179.

———— (2016). "Sogdian Language I. Description." In: *Encyclopædia Iranica*. Encyclopædia Iranica Foundation. URL: http://www.iranicaonline.org/articles/sogdian-language-01.

Yoshioka, Mayumi [吉岡真由美] (2019). "『萬葉集』における〈漢字〉の用法: 単音節・多音節の訓仮名字母について [On the usage of sinograms in the *Man'yōshū*: Characters used as monosyllabic or polysyllabic *kungana*]." In: 同志社日本語研究 *[Dōshisha Studies in Japanese Linguistics]* 22, pp. 25–37.

Zender, Marc Uwe (1999). "Diacritical Marks and Underspelling in the Classic Maya Script: Implications for Decipherment." MA thesis. University of Calgary.

The Interdependence
Between Speech and Writing

Towards a Greater Awareness

Stefano Presutti

Abstract. This paper aims to understand how and why new digital media could be useful resources for reaching a greater awareness of the complex relationship between written and oral language. The study analyses this relation during the diachronic evolutionary development of Western societies and its changing perception in Western thinking. Particularly, it examines some examples in the contemporary digitalized world. Using anthropological, historical-linguistic, and sociolinguistic points of view, it illustrates the changing interaction between these two manifestations of language over time. The findings show that the multimodality of new digital media blends the positive aspects of speech, such as the reality and truthfulness of the event, and the positive aspects of writing, such as the reliability and stability of a visual communication. Despite the perception that, in previous periods of time, speech and writing seemed in conflict with each other, today these two modalities of language are both autonomous and simultaneously strongly intertwined, and thus can be seen as two sides of the same coin.

1. Introduction

Written and oral language have always been intimately linked in human cultures which also use writing systems to communicate. Along the axes of space and time, the balance between these two modalities of language has constantly evolved according to individual and group needs. Therefore, the study of human languages should consider this relationship.

The written language learning process is often still considered long and "not natural" (Fayol, 2017; Bidaud and Megherbi, 2005), unlike the oral one. In Western societies, writing has been perceived as non-independent and secondary to oral since the Classical Age. That perception has been equally assumed by many contemporary linguists such as von Humboldt (1836), Saussure (1916), Bloomfield (1984), Hockett

Stefano Presutti   ⓘ 0000-0002-7700-5016
University of California Rome Center, Italy
E-mail: s.presutti@eapitaly.it

(1958), Martinet (2008), Ducrot and Todorov (1979). However, recent studies of psycholinguistics and cognitive linguistics have developed a very different thesis: during language acquisition in childhood, the learning process of the orthographic system does not mechanically reproduce the cognitive path already traced by the phonemic system learned in earlier years. Indeed, this learning process has a certain autonomy (Bonin, Pacton, and Fayol, 2001; Rapp, Benzing, and Caramazza, 1997; Rapp and Caramazza, 1997; Bonin, Fayol, and Peereman, 1998) and creates original procedures capable of modifying the oral cognitive structures (Ziegler, Ferrand, and Montant, 2004).

This paper is concerned with the relationships developed between speech and writing, with emphasis on Western European societies. Particularly, I have focused on their interdependence in the contemporary globalized world. Currently, their relationship is becoming increasingly more complex in the digital arena as it is challenged by intersections of technical resources and the multiple needs of individuals and language communities. This study has showcased examples of the ever-shifting dynamics of these two modalities through anthropological, historical-linguistic, and sociolinguistic lenses. The primary purpose of this paper was to understand how and why new digital media could be useful resources for reaching a greater awareness of the complex relationship between speech and writing.

The remainder of this paper is organized into six chapters. Following this introduction, I provide the main differences between spoken and written language and explain how they are differently used by people to communicate. In the third and fourth chapters, I delve into the perception of writing in Western societies. I focus on the different steps which led to the primacy of writing, even if it has generally been perceived as "secondary" to speech. As opposed to this general idea of writing, I investigate its real autonomy from speech and their interdependence through a historical perspective. In the fifth chapter, I focus particularly on the contemporary situation, in which new digital media upsets their relationship. I give three examples of their interdependence in the digital arena. This paper closes with a discussion of the findings and some future proposals in the sixth and final part.

2.   Relationships Between Speech and Writing

Speech and writing can be two modalities of the same language. They often play complementary roles capable of diversifying communication in language communities that use both. We, as human beings, can transmit meaning with our whole body through gestures, vocalisations, and movements. We can use all of our five senses to engage with the outside world, but in all cultures, verbal expression is the main language system of representation. Like speech, writing also constitutes a symbolic

system for representing human thoughts and feelings. It can also be directly linked to culture—or more cultures—from which it developed and was used over time.[1]

2.1.   Main Features

I describe herein what makes speech and writing two different modalities of language, beginning with five key points and a list of some specific characteristics.

(a) Firstly, writing revolutionized our relationship with time. Drawing graphic signs on resistant materials—which vary from culture to culture in a diatopic and diachronic way—creates the impression that a message can be deciphered without limits in time. Thus, it donates the illusion of being able to be permanently detached from it. On the contrary, spoken language is inevitably related to the time factor, since it is transmitted through sound. Indeed, it is impossible to stop or crystallize a sound naturally—without technologic tools—in time, just as it is impossible to block the movement of a material object by visually stopping its trajectory.

(b) Writing is durable and can be planned which counterbalances the ephemerality and spontaneity of speech. Sound can therefore be designated as "the most real and evanescent of human sensory objects" (Ong, 1967). Writing transforms speech into an object inscribed in space, thus making language more durable, but at the same time "less real and passive". From a sensory point of view, the spatialization of the "real" communicative event confirms the increasing supremacy of sight at the expense of hearing.

(c) For spoken language, hearing guides the other senses in communicative perception, whereas in the written context, sight constitutes the main receiver of communication. One of the main differences between sight and hearing is that the former allows the separation of the components of a sensory object, while the latter unifies them by seeking a whole harmony. Speech is more dependent on the context in which the communication happened. On one hand, sight is used in one direction at a time. On the other hand, sound comes simultaneously from all directions. We can immerse ourselves in the sound, but it is impossible to immerse ourselves in the same way in vision (cf. Ong, 1982).

---

1. If we agree with this assumption, we are not questioning the linguistic arbitrariness of sign theorized by Ferdinand de Saussure (1916). We are only assuming that also a graphic sign can never be considered neutral, because it was created and institutionalized in a precise environment, in one—or more than one—specific culture and language community. For further details, see Presutti (2019) and Cardona (2009).

(d) Writing transforms language communication into an event that is not necessarily collective. By reducing the impact of the time factor, it frees itself from the individual who produces it, as it were, while at the same time attenuating the scope of the interlocutor. Thus, the phenomenon of writing becomes an individual experience (Goody, 1977). We may, for example, read or study a text that we have written ourselves. Its timeless character therein helps to stimulate the creative process and encourages the recognition of individuality.

Another linked difference could be represented by the dichotomy between noise and silence[2]. In fact, spoken language is necessarily linked with noise and spatial presence of interlocutors, both in terms of production and reception, whereas writing and reading can be individual and silent experiences. In the first era of writing in Western societies, the text was very often declaimed aloud—with or without an audience. After that, as individual reading, both mental and silent, was gradually established, the acoustic component was almost completely lost.

(e) Writing revolutionized mental processes and human modalities related to knowledge. This modality of language froze the form and the content of the message. The fixation of the written text considerably diminished the characteristic oscillations of verbal communication, thus facilitating its institutionalization and creating linguistic models on which society can base itself in both present and future phases. The use of writing also considerably modified the relationship that human thought has with memory and knowledge. Indeed, a writing system makes it possible, for example, to write down useful information to be retained for the near future, leaving the human brain space and energy for other actions. Spelling archiving also leads to an unlimited increase in the amount of relevant information for both the individual and society as a whole. Writing therefore develops specific cognitive and social skills that are different from oral communication. Thus, the fields of external memory and rational (self-)controlled thinking—the ability to plan, to reason about abstract issues, to normalize, and to implement procedures—rise considerably.

In order to compare face-to-face dialogue and traditional writing on paper, I consider some features collected by Clark and Brennan (1991). These two conventional modalities of language show almost opposites characteristics (cf. Table 1). In fact, only the sequentiality feature describes both speech and writing. The other seven aspects of language are present in just one of two modes. Accordingly, copresence, visibility, audibility, cotemporality, and simultaneity are depicted in a traditional speech dialogue. On the contrary, reviewability and revisability can-

---

2. This dichotomy was suggested by the French linguist Gustave Guillaume, quoted by Boone and Joly (1994).

not be conformed with the spontaneity and ephemerality of traditional speech.

TABLE 1. Main features of speech and writing (Clark and Brennan, 1991)

	Speech Face-to-face	Writing Traditional
Copresence	+	−
Visibility	+	−
Audibility	+	−
Cotemporality	+	−
Simultaneity	+	−
Sequentiality	+	+
Reviewability	−	+
Revisability	−	+

3.   Perception of Writing in Western Societies

In this chapter, I describe how the perception of the relationship between these two modalities of language has undergone considerable changes during the diachronic development of the Western world.

3.1.   Historical Development

It is possible to highlight four main stages in which the perception of this relationship changed consistently: the origins—which include the ancient era and the Middle Ages—the modern era, the electronic era, and the digital era. In the first period, most of the people who lived in Western European countries were illiterates and the main goal of writing was largely to support oral speech. Written texts were read aloud and there were many oscillations with graphic signs. Consequently, the reader had to interpret what he or she was reading. In the modern era, the invention of movable-type printing in the fifteenth century gave an increasingly more prestigious role to written communication in European countries. This invention was useful for creating models of language and for solving the unpredictability of speech. This phase also marked the attempt to hide the strong link between the two modalities of language. The third period, the electronic era, began in the twentieth century. Globalization and the invention of technologies such as typewriters, televisions, radios, and computers, revolutionized the way we communicate with each other. Finally, in the past three decades, the process of change in the relationship between speech and writing has accelerated enormously with the use of the World Wide Web and new

digital media. In chapter five, I further describe how the interdependence between speech and writing is experiencing a new phase in this present period of time.

3.2.   Secondary Role and Primacy of Writing

I highlight now the changing perception of speech and writing in Western thinking.

Since the Classical Age, written communication has been perceived as non-independent and secondary to oral communication. In addition, the written language learning process is still today considered in many cases "long and not natural" (Fayol, 2017; Bidaud and Megherbi, 2005), unlike the oral one. Its secondary position in the Western philosophical conception has distant roots. In antiquity, Plato perceived writing as incomplete and cold in relation to speech. In *Phaedrus*, he described writing as a modality of language without the typical vitality of oral due to a lack of intonation, rhythm, or participation of the body. The Platonic consideration of the "coldness" and "distance" of writing—compared to the natural character of oral speech—continued in the modern era with distinguished intellectuals such as Hegel and Rousseau.[3]

The marginal role conferred on written language compared to speech seems even more impressive considering that modern linguistics, as an academic discipline, was born in the nineteenth century through the study of Indo-European and Semitic written languages. The comparative grammar of Neo-Grammarians such as Jones, Bopp, Verner—among others—was based on written forms of language from the beginning. At the time, however, these forms were only perceived as a meaning, a more or less faithful mirror to the spoken language. This secondary position did not induce a real need to study its autonomous nature.

The lack of interest in the written language as a linguistic object was again confirmed in the twentieth century. Illustrious linguists such as Saussure (1916), Bloomfield (1984), and Hockett (1958) considered writing as a mere secondary system, and therefore less relevant to a more in-depth study of language. Martinet (1967) believed that writing was a discipline distinct from linguistics, a "province" of orality. Ducrot and Todorov defined it as an artificial supplement, an unnecessary derivative of speech (1979). The linguist Roman Jakobson defined spelling elements as "symbols of symbols," and the written system as a successive system not completely independent of speech "because no speech community and none of its participants can acquire and manipulate the graphic pattern without possessing a phonemic system" (Jakobson and

---

3. For further details, see Guritanu (2016) and Presutti (2019).

Halle, 1956, pp. 16−17). The structuralism of the 1960s marked a re-
newed interest in writing patterns, but this movement marginalized it
as a linguistic object and included it only in correspondence with the
phonemic system.[4] Finally, the classification of the primacy of spoken
over written language, which has pervaded Western common thinking,
can be summarised as listed by Stubbs (1980):

- Historically, speech is an older communication than writing;
- Individually, speech is learnt before writing;
- Speech is innate and biological;
- Speech opposes conscious manipulation—it is more difficult to
  change accent from the one gained naturally;
- In societies, speech comes before writing;
- Writing is a more recent event;
- Speech is used more than writing;
- Speech is used with a higher range of communicative functions.

At the same time, for many centuries until the present one, the writ-
ten form has been considered a truthbearer, more reliable, and a symbol
of order and discipline. Writing has become one of the most valued cog-
nitive habits of modern education, as it proffers the mindsets of objectiv-
ity, analysis, and criticism. The term *literacy*—in the sense of the ability
to read and write—also became associated with learnedness in general,
such as with "visual literacy," "musical literacy," and so on. The seman-
tic extension also covered the suffix *-graphy*, used in terms far from the
action of writing such as "choreography," "scenography," etc. (Derrida,
1967; Cardona, 2009).

Writing has been considered as the decisive turning point for differ-
entiating, through time and space, which groups of people were more or
less evolved than others. Human cultures without writing systems are
called *pre-literates*. This term is used as a reference point for a system of
signs that do not yet exist in order to designate groups anachronistically.
Furthermore, this term emphasizes the Western alphabet-centric aspect
that the "letter" represents and defines any human writing system.

Along the time axis, writing played a crucial role in the attempt to
hierarchize peoples "with a history" and peoples "preceding history,"
thus strongly linking the Western concept of *history* to the use of graphic
systems to support human memory. Along the spatial axis, writing
has been thought to distinguish so-called "evolved" peoples from prim-
itive or "less evolved" peoples (Presutti, 2019; Canut, 2007; Mbodj-
Pouye, 2013). Derrida (1967) highlighted another paradox: he crit-
icised the anthropologist Lévi-Strauss who associated—in his famous

---

4. Moreover, research was oriented mainly from an alphabetic point of view, an
approach not applicable to linguistic systems that do not use the alphabet (cf. Car-
dona, 2009).

masterpiece *Tristes Tropiques*—Western alphabetic writing with a colonialist instrument that deteriorated the purity of the language of colonized people (Lévi-Strauss, 1993). This case presented the existence of a double dichotomy that opposed "people with/without writing" and "primitive/non-primitive people," again referring to Rousseau's myth of the *noble savage*.[5] This allowed him to consider the passage from speech to writing as an instantaneous crossing of a discontinuous line: a passage from an oral language culture—"pure" and far from writing—to a language with a graphic representation used as a new cultural accessory considered to be a technique of oppression.

The ability to read and write has been used to distinguish upper class and wealthy people, men and civilised white European societies, from lower class and not wealthy people—women and children, dialect speakers, foreigners, and colonised language communities. The opposition between writing and speech has also been used to differentiate a language from a dialect. In this way, through writing, a language could assert itself as a noble or prestigious language (cf. Guritanu, 2016; Calvet, 2002), whereas dialects were thought to be transmitted primarily through speech and therein lacked the same virtues. Several dichotomies such as complexity/simplicity, wealth/poverty, writing/orality were then established in order to institute a hierarchy among the so-called "historical" European languages and other less standard spoken languages, such as dialects and slang, or pidgin and creole languages still used in many former European colonies in Africa, Latin America, Asia and Oceania (cf. Canut, 2007).

The use of writing generates a large number of consequential factors that enable the linguistic system to establish a more stable and symbiotic relationship with the cultural identity of a group of individuals. It seems that only a solid system of graphic elements, subject to precise spelling rules, allows the language to be codified through the elaboration of dictionaries and grammars, to be institutionalized by a local political government, to be used in the creation of literary and scientific works, and to be taught in schools (Calvet and Calvet, 2013; Canut, 2007; Berruto, 1987).

These considerations allow us to better understand the main causes that led to the predilection of writing for orality in modern Western societies. However, writing has not always been perceived as prestigious or superior to orality, not even as a truthbearer. As Baron wrote:

> When writing was a new and uncommon practice, it was letters on a page, not face-to-face speech, that sparked distrust. When few people could read, and fewer still could write, trusting writing—if trust came at all—required an enormous leap of faith. Plato's objections aside, writing was still an unproven

---

5. For further details of the myth of *noble savage*, see Erringson (2001).

gimmick, and people might have reasoned that at least with the spoken word, they knew who they were talking to, friend, foe, or total stranger. Friends could be trusted. With enemies, you knew where you stood. Strangers had to prove themselves. But words scrawled on a piece of paper, or a sheepskin, or a lump of clay, those were always strangers, always worthy of suspicion. (Baron, 2009, p. 5)

A deeper exploration into the relationship between orality and writing in the Western world reveals the significant variations it has undergone. In Europe, as in China and the Middle East, the first phases that marked the relationship between the written and the oral were characterized by a different sensory organization. Indeed, in ancient societies, most of the population did not have access to texts. Thus the oral—and hearing—retained a privileged function compared to sight. In the classical age, but also later in the Middle Ages, individuals tended to give more credibility to what was read, rather than to what was seen (Ong, 1967). The written word was pronounced aloud and its spelling was characterized by strong fluctuations due to the importance given to each reader's personal interpretation. In the societies of the European Renaissance, writing had, above all, a function of reference to oral culture. Texts maintained the stylistic pattern of oral culture for many centuries.

The first major event that brought about a significant change in the sensory perspective—with the shift from auditory to visual dominance—and completely changed the relationship to graphic forms was the European spread of movable type printing in the fifteenth century. The printing revolution made the "materialization of the word" possible, distancing the text from its author by giving it a kind of coldness and rigidity, and herein authority and prestige. The previous manuscript-based culture was still producer-oriented. The writing of the copyists involved long and costly work, which implied the use of abbreviations and synthetic forms to reduce the effort of production—which did not always favor the understanding of the text. Conversely, the printing revolution almost completely eliminated the obstacles of written production and greater attention was paid to the consumer-reader. Visual character had also become of major importance: the visibility of graphic forms in the page space had improved significantly and fluctuations had decreased considerably (cf. Presutti, 2019). The typographical transformation of the word into a kind of "product-claim" has profoundly changed the Western vision of (and access to) knowledge. Silent reading contributed to the emergence of a new meaning of the "private sphere" among individuals, as has the introduction of a new meaning of the private ownership of words.

The printed text gave the written language an illusory dimension of completeness and an autonomy from the outside world and from the author himself. This contributed to increasing the perception of prestige conferred on text and writing among the groups that used the written

language. Individuals began to trust the printed word, which was then considered a finished product and therefore both closed and complete. The birth and development of modern Western science were also closely linked to the growing predilection for written culture during the period of the European Renaissance. In addition, members of high society began to consider writing a "truthbearer" manifestation of language. This idea was sometimes excessive because it risked obscuring the fundamental importance of its interrelation with orality.[6]

4.   Autonomy of Writing and the Interdependence with Speech

In this chapter, I further discuss the widespread perception of the "dependence" and "secondary nature" of writing that was shown previously, as well as the description of their relationship as a dichotomy.

Even if writing has a primacy role in contemporary society's communication, the research on written language has encountered many obstacles. Firstly, the phonocentric approach in linguistics greatly delayed the study of writing as an autonomous entity in its own right rather than oral dependent (cf. Berg, 2016). This delay affected not only linguistic research but also that of other social science disciplines. In fact, at least until the middle of the twentieth century, written language was the exclusive domain of linguists, whereas anthropologists were supposed to deal exclusively with "primitive" peoples. As this ethnocentric and early evolutionist term suggests, the populations studied in anthropological research at that time did not have this graphical-cultural invention—otherwise, they could never have been classified as people with "less advanced cultures"—and thus could not have been studied by ethno-anthropologists.

Writing can be defined as the human use of a graphic sign system with a symbolic value. A graphic sign itself cannot yet be considered as a form of writing since it must be included in a larger system of graphic oppositions (Cardona, 2009). The minimum unit of writing is the grapheme, which is preferred to the alphabetic-centric term letter, through which a set of signs forms a graphematic system (Hořejší, 1971).[7] It seems impossible to

---

6. From the sixteenth to the nineteenth century, attempts were made in Europe to establish complete control of the spoken language through writing. As previously mentioned, one of the most representative examples concerns the early linguistic studies of the Neo-Grammarian period of the nineteenth century, when the phonemes of the Indo-European and Semitic languages were exclusively studied and compared in relation to corresponding graphemes.

7. Hořejší wished to go beyond the distinction between grapheme and phoneme and proposed a unit having these two correspondences: the *graphophoneme*. As he wrote, "In our opinion, the two kinds of 'one-way' correspondences should be replaced by a single mutual or 'two-way' correspondence, and the units *phoneme* and *grapheme*

establish a parallelism between the phonemic unit and the spelling unit since the former does not constitute a sign, whereas the grapheme does have a signified and a signifier. The relationship between the grapheme and the phoneme is accurately summarized in the scheme elaborated by Rosiello (1966) and reported in Fig. 1.
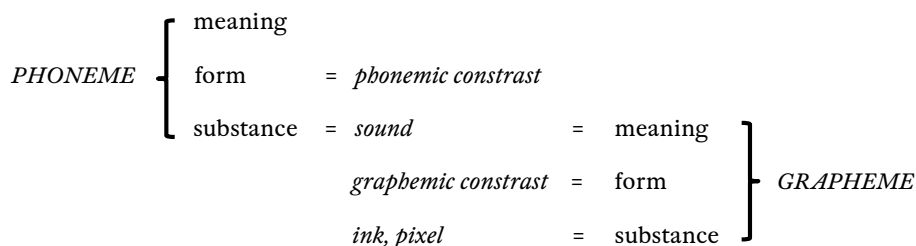
$$
PHONEME \left\{
\begin{array}{lll}
\text{meaning} & & \\
\text{form} & = & \textit{phonemic constrast} \\
\text{substance} & = & \textit{sound} \\
\end{array}
\right.
$$

sound	=	meaning	
graphemic constrast	=	form	GRAPHEME
ink, pixel	=	substance	

FIGURE 1. Relationship between grapheme and phoneme in a language with an alphabetical system (Rosiello, 1966)

A phoneme communicates with a grapheme solely through its meaning. Instead, the form and substance of the writing minimal unit keep a complete autonomy from the phonological one.

One of the first researchers who defined the minimum unit of writing was Josef Vachek, one of the Prague School linguists. In 1939, he took over the research of the Russian Agenor Artymovič on the autonomy of writing from spoken language. Vachek insisted both on their independent nature and on their coexistence within the same language (Ineichen, 1971) while demonstrating that they differ in their linguistic function. The functionalist approach repeatedly developed by the Czechoslovak linguist can be summarised as follows:

> The spoken norm of language is a system of phonically manifestable language elements whose function is to react to a given stimulus (which, as a rule, is an urgent one) in a dynamic way, i.e., in a ready and immediate manner, duly expressing not only the purely communicative but also the emotional aspect of the approach of the reacting language user. The written norm of language is a system of graphically manifestable language elements whose function is to react to a given stimulus (which, as a rule, is not an urgent one) in a static way, i.e., in a preservable and easily surveyable manner, concentrating particularly on the purely communicative aspect of the approach of the reacting language user. (Vachek, 1973, pp. 15–16)

In 1944, the Danish linguist Hans J. Uldall considered them to be "only two realizations out of an infinite number of possible systems, of

---

by units each containing the pair of a phoneme or group of phonemes and a grapheme that correspond to each other. We propose to name such units *graphophonemes*". (Hořejší, 1971, p. 189)

which no one can be said to be more fundamental than any other" (1944, p. 16). Speech and writing simply coexist and they are mutually non-congruent, expressing the same language, simply transmitted by two different substances such as pulmonary airflow on one side and ink on the other. Lev Vygotskij (1962) added that written language, as a linguistic function in its own right, differs from spoken language not only in its structure but also in the way it functions. A few years later, the classification developed by Ernst Pulgram (1951) on the structural characteristics of the phoneme and grapheme also showed that the only common element between them is that both are conventional sign systems, one of them having as meaning concepts and the other simple sounds.

The differences between spoken and written language emphasized by the aforementioned linguists clearly distance themselves from the common Saussurian view—supported by most linguists in recent decades as mentioned before—that writing is simply language made visible. Unfortunately, in the following years, Vachek and Pulgram were unable to strengthen and expand their theses on the autonomy of written language. Their intuition thus fell partly into oblivion, but in recent years it has been taken up again in neuropsychological research, has definitively opposed the dominant conception according to which written production postulates the existence of compulsory phonological mediation (Geschwind, 1969; Luria, 1970). In fact, more recent studies in neuropsychology have demonstrated a relative autonomy of writing in relation to speech and by examining the cognitive processes involved in the production of these two types of communication (Bonin, Fayol, and Peereman, 1998; Bonin, Pacton, and Fayol, 2001; Rapp, Benzing, and Caramazza, 1997; Rapp and Caramazza, 1997). These recent studies of psycholinguistics found that writing is not cognitively secondary to speech: during a mother tongue learning process, the writing system does not mechanically reproduce the cognitive path already traced by the phonemic system learned in earlier years. Thus, the writing system acquisition has a certain autonomy and creates original procedures capable of modifying oral cognitive structures. To summarize, the common conception of the secondary of the writing system with respect to the phonemic system and of non-autonomy seems unreliable, even erroneous. Indeed, this view can only be taken into consideration to describe the process of learning the mother tongue at the beginning of a child's life (Ineichen, 1971)[8] but is not appropriate for the second language acquisition, a process during which learners often receive oral and written input at the same time.

---

8. Individuals from all human cultures learn to speak in the early stages of their growth, whereas in order to write they must wait for a considerably more advanced stage of mental development.

Furthermore, their relationship should no longer be thought of as a dichotomy, but rather as Halliday (1985), Chafe and Danielewicz (1987), and other more recent linguists suggested: as two modalities of the same language, as two poles of an intertwined multi-dimensional continuum (cf. Koch and Oesterreicher, 2012).

In 1985, Halliday noticed that with the technology of the twentieth and twenty-first centuries, there is no longer value in obsessively looking for a dichotomy between speech and writing, and it is illogical to put one manifestation of language before another. Conversely, they should be considered as manifestations of the language system itself. As Koch and Oesterreicher (ibid.) pointed out, the relationship between the phonic and graphic code can be defined as a dichotomy, whereas speech and writing are two concepts which stand in a continuum of infinite language possibilities, depending on several parameters such as social relationship, number, and space-time position of the partners, theme, socio-cultural context, etc.[9]

5. New Digital Media for a Greater Balance

The previous chapters have deepened the characteristics of the two modalities of language, as well as how their relationship has been studied and perceived so far. I now proceed to discuss the main effects of new digital media on language. In recent years, the relationship between speech and writing has changed considerably due to the use of technological tools. They have revitalized the reliability of spoken language and they improve some shortcomings of writing such as the excessive distance with the interlocutor and the lack of simultaneity in a dialogue. Additionally, they allow for a new balance to be found in their relationship. Distinctly, there are at least three substantial changes that new digital media is bringing to the continuum between speech and writing (reported in Fig. 2). The first one is the possibility to record an event as it occurs. This authorises the viewer to repeat an accurately reproduced scene as many times as desired. In this way, it is possible to avoid all imperfections and uncertainties that can often characterize the verbal communication. A second change is the dramatic increase in the number of active readers and writers. This is because new technologies are increasingly more user-friendly and affordable. As a result, they entice people to learn not just to write but also to become writers themselves. A third change is the possibility to talk to multitudes of people with perfect acoustic conditions. In the past, communication was limited to smaller audiences and delivered in spaces such as squares or enclosed theatres. Conversely, today individuals can talk, be heard,

---

9. For further details, see Koch and Oesterreicher (2012).

and be watched by anyone they are connected with on the World Wide Web. Moreover, new technology vastly improves the quality of sound through the use of microphones, speakers or loudspeakers, which gives the human voice the possibility to avoid the uncertainty of weather conditions.
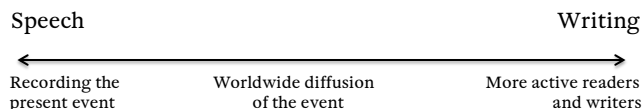
Speech   Writing

Recording the   Worldwide diffusion   More active readers
present event   of the event   and writers

FIGURE 2. Three changes brought by new digital media today

I herein return to the language features collected by Clark and Brennan (cf. section 2.2). By virtue of new technologies, a more balanced set of characteristics can be found in both modalities of language, which reduces the gap between them when only using traditional face-to-face oral conversation or traditional writing on paper (cf. Table 2).

Now, a verbal communication can be reviewed and revised in recorded audio and corrected by artificial intelligence. In addition, writing tools gain copresence, visibility, audibility, cotemporality, and quasi-simultaneity when used in video chat platforms such as Skype or Zoom, or with virtual assistants such as voice-guided navigation, and voice translation as with Google Translate.

TABLE 2. Main features of speech and writing with traditional communication and new digital media (NDMedia)

	Speech		Writing	
	Face-to-face	NDMedia	Traditional	NDMedia
Copresence	+		−	+
Visibility	+		−	+
Audibility	+		−	+
Cotemporality	+		−	+
Simultaneity	+		−	+
Sequentiality	+		−	+
Reviewability	−	+	+	
Revisability	−	+	+	

I present three examples in which an original interdependence between speech and writing is evident as a result of new technologies in the digital arena.

The first multimodal example concerns instant messaging (IM) in apps like WhatsApp or Viber. With these software, it is possible to

use quasi-synchronous typed written messages as well as recorded voice messages. Thus, in chat conversations of everyday life, speech and writing are strongly intertwined. In fact, users can participate in a dialogue comprised of spoken communication only, written communication only, or both (cf. Fig. 3).
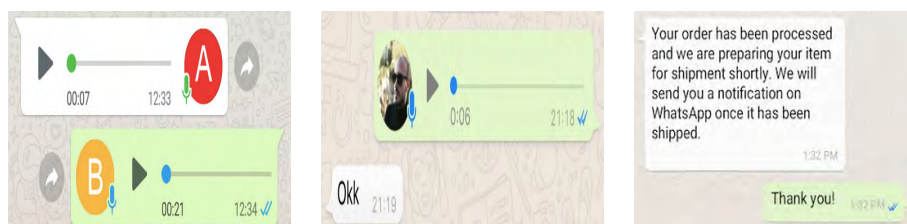
FIGURE 3. Speech and writing on IM

The second example concerns videoconference communication in platforms like Skype, Google Meet, or Zoom (cf. Fig. 4). During a video call, users can talk or write something on paper or on a whiteboard, akin to a physical meeting or class lesson. In addition, they can simultaneously download and upload spoken and written messages in the video chat. Thus, in this rather commonplace digital media, the space in which it is possible to communicate has been doubled to comprise a three-dimensional space, where two or more interlocutors exist, and a web chat space.
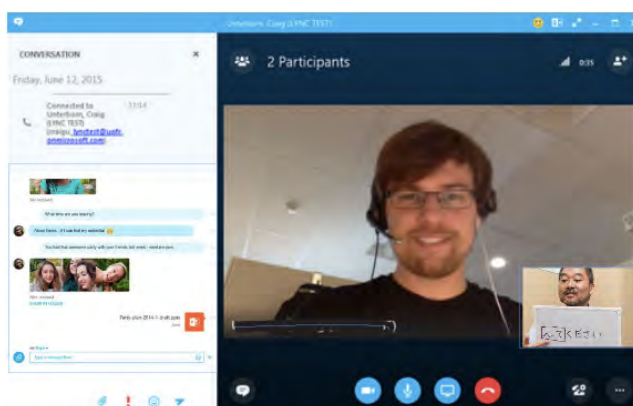
FIGURE 4. Speech and writing on video chat

The third and final example details the interdependence in pre-recorded videos. The multimodality of using subtitles during a pre-recorded video, such as a movie, highlights the immense and positive change currently underway by virtue of new media. This example was already present in the past decades, before the digital era. However, today as never before, subtitles are used in pre-recorded videos downloaded and watched daily by millions of web-users on platforms like YouTube.

The interdependence between speech and writing is involved in the entire process of publishing a pre-recorded video. As shown in Fig. 5, this intertwined relationship is exhibited, for example, during the writing process of a screenplay (a), during the actors' rehearsals (b), and also during the video projection with the addition of subtitles (c).

(a)   (b)   (c)

FIGURE 5. Speech and writing on pre-recorded video

To summarise, these three examples showcase how the multimodality of new digital media thoroughly blends the positive aspects of speech, such as the reality and truthfulness of the event, and the positive aspects of writing, such as the reliability and stability of a visual communication.

6.   Conclusion

This paper has presented some insights into the relationship between speech and writing over time in Western societies and its perception in Western thinking. This study has shown how complex this relationship is, and yet how much it deserves our full attention at the same time. Because the relationship has changed in the contemporary moment, so too has the way of studying it. Moreover, the digital arena of a globalized world is creating new dynamics, further emphasizing their interdependence. For this reason, new digital media could be useful supports

to help reach a greater awareness of the complex relationship between them. Despite the perceived conflicts between speech and writing in previous periods of time, today these two modalities of language can be considered both autonomous and simultaneously strongly intertwined, as two sides of the same coin.

This paper focused solely on the Western World. It would be beneficial to continue this research by deepening the relationship between speech and writing in non-Western societies, particularly in language communities that use writing systems different from the alphabetical one. Additionally, future studies could contribute to the creation of learning paths used in educational programs in order to bring students toward a greater awareness of the interdependence between speech and writing. To this end, the world's youngest citizens, most involved in the digital revolution, could learn how to manage the complex relationship between these two modalities of human language more effectively. In doing so, they could develop an elevated degree of linguistic flexibility as suitable as possible for the most diverse solutions in the contemporary world.

References

Baron, Dennis (2009). *A Better Pencil: Readers, Writers, and the Digital Revolution*. Oxford: Oxford University Press.

Berg, Kristian (2016). "Graphemic Analysis and the Spoken Language Bias." In: *Frontiers in Psychology* 7, p. 388. DOI: 10.3389/fpsyg.2016.00388.

Berruto, Gaetano (1987). *Sociolinguistica dell'italiano contemporaneo*. Roma: Carocci.

Bidaud, Eric and Hakima Megherbi (2005). "De l'oral à l'écrit." In: *La lettre de l'enfance et de l'adolescence* 61.3, pp. 19–24.

Bloomfield, Leonard (1984). *Language*. Chicago: University of Chicago Press.

Bonin, Patrick, Michel Fayol, and Ronald Peereman (1998). "Masked form priming in writing words from pictures: Evidence for direct retrieval of orthographic codes." In: *Acta Psychologica* 99.3, pp. 311–328.

Bonin, Patrick, Sébastien Pacton, and Michel Fayol (2001). "La production verbale écrite: évidences en faveur d'une (relative) autonomie de l'écrit." In: *Psychologie française* 46, pp. 77–88.

Boone, Annie and André Joly (1994). *Dictionnaire terminologique de la systématique du langage*. Paris: L'Harmattan.

Calvet, Louis-Jean (2002). *Le marché aux langues. Essai de politologie linguistique sur la mondialisation*. Paris: Plon.

Calvet, Louis-Jean and Alain Calvet (2013). *Les confettis de Babel: diversité linguistique et politiques des langues*. Le français, langue partenaire. Paris: Écriture.

Canut, Cécile (2007). *Une langue sans qualité*. Limoges: Lambert-Lucas.

Cardona, Giorgio R. (2009). *Antropologia della scrittura*. Novara: UTET De Agostini.

Chafe, Wallace and Jane Danielewicz (1987). "Properties of spoken and written language." In: *Comprehending oral and written language*. Ed. by Rosalind Horowitz and S. Jay Samuels. Brill, pp. 83–113.

Clark, Herbert H. and Susan E. Brennan (1991). "Grounding in Communication." In: *Perspectives on Socially Shared Cognition*. Ed. by Lauren B. Resnick, M. Levine John, and Stephanie D. Teasley. Washington, DC: American Psychological Association, pp. 127–149.

Derrida, Jacques (1967). *De la grammatologie*. Paris: Les Éditions de Minuit.

Ducrot, Oswald and Tzvetan Todorov (1979). *Dictionnaire encyclopédique des sciences du langage d'Oswald Ducrot et Tzvetan Todorov*. Paris: Éditions du Seuil.

Ellingson, Ter (2001). *The myth of the Noble Savage*. Berkeley: University of California Press.

Fayol, Michel (2017). *L'acquisition de l'écrit*. Vol. 3970. Que sais-je? Paris: Seuil.

Geschwind, Norma (1969). "Problems in the anatomical understanding of aphasia." In: *Contributions of clinical neuropsychology*. Ed. by A. L. Benton. Chicago: University of Chicago Press.

Goody, Jack (1977). *The domestication of the Savage mind*. Cambridge: Cambridge University Press.

Guritanu, Elena (2016). "Types d'écriture et apprentissage." PhD thesis. Sorbonne Paris Cité.

Halliday, Michael Alexander Kirkwood (1985). *Spoken and written language*. Oxford: Oxford University Press.

Hockett, C. F. (1958). "A Course in Modern Linguistics." In: *Language Learning* 8.3, pp. 73–75.

Hořejší, Vladimír (1971). "Formes parlées, formes écrites et systèmes orthographiques des langues." In: *FoL. Acta Societatis Linguisticae Europaeae* 1/2, pp. 185–193.

Humboldt, Wilhelm von (1836). *Über die Verschiedenheit des menschlichen Sprachbaues und ihren Einfluss auf die geistige Entwicklung des Menschengeschlechts*. Berlin: Königliche Akademie der Wissenschaften.

Ineichen, Gustav (1971). "La notion de graphème." In: Actes du XIIIe congrès international de linguistique et philologie romanes. Vol. I. Québec: Presses de l'Université Laval, pp. 149–154.

Jakobson, Roman and Morris Halle (1956). *Fundamentals of language*. The Hague: Mouton.

Koch, Peter and Wulf Oesterreicher (2012). In: *Communicative Spaces*. Bern: Peter Lang.

Lévi-Strauss, Claude (1993). *Tristes tropiques*. Paris: Terre Humaine Plon.

Luria, Alexander R. (1970). *Traumatic aphasia: Its syndromes, psychology and treatment. Trans. M. Critchley*. Vol. 5. Janua Linguarum. Oxford, England: De Gruyter Mouton.

Mbodj-Pouye, Aïssatou (2013). *Le fil de l'écrit. Une anthropologie de l'alphabétisation au Mali*. Sociétés, Espaces, Temps. Lyon: ENS Éditions.

Ong, Walter J. (1967). *Presence of the Word. Some Prolegomena for Cultural and Religious History*. New Haven: Yale University Press.

——— (1982). *Orality and literacy: the technologizing of the word*. New accents. London: Routledge.

Presutti, Stefano (2019). "L'interdépendance entre oralité et écriture: le cas de la consonne latérale palatale dans l'acquisition phonologique de l'italien langue étrangère." PhD thesis. Université Aix-Marseille.

Pulgram, Ernst (1951). "Phoneme and Grapheme: a Parallel." In: *Word* 7, pp. 15–20.

Rapp, Brenda, Lisa Benzing, and Alfonso Caramazza (1997). "The autonomy of lexical orthography." In: *Cognitive Neuropsychology* 14.1, pp. 71–104.

Rapp, Brenda and Alfonso Caramazza (1997). "The modality-specific organization of grammatical categories: Evidence from impaired spoken and written sentence production." In: *Brain and Language* 56.2, pp. 248–286.

Rosiello, Luigi (1966). "Grafematica, fonematica e critica testuale." In: *Lingua e stile* 1, pp. 63–78.

Saussure, Ferdinand de (1916). *Cours de linguistique générale*. Ed. by Charles Bally and Albert Sechehaye. Paris: Payot.

Stubbs, Michael (1980). *Language and Literacy: The Sociolinguistics of Reading and Writing*. London: Routledge.

Uldall, Hans Jørgen (1944). "Speech and writing." In: *Acta linguistica* IV, pp. 11–16.

Vachek, Josef (1973). *Written language: general problems and problems of English*. The Hague: Mouton.

Vygotskij, Lev Semënovič (1962). *Thought and language*. Cambridge, US: MIT Press.

Ziegler, Johannes C., Ludovic Ferrand, and Marie Montant (2004). "Visual phonology: The effects of orthographic consistency on different auditory word recognition tasks." In: *Memory & Cognition* 32.5, pp. 732–741.

S₁: The Native Script Effect

Amalia E. Gnanadesikan

Abstract. This paper claims that the script that a person learns first qualifies as a native script (S_1) in a manner analogous to a native language (L_1). The cognitive pre-eminence of the S_1 results in a *native script effect*, which accounts for various findings in the synchronic study of second-language acquisition and in the diachronic study of script adoption. The native script effect is argued to be an important factor in the historical preference shown for the adoption of pre-existing scripts over the invention of new ones. The claim that S_1 is like L_1 runs counter to the assumptions of linguists of the structuralist and generative traditions, who are agreed in the belief that writing is not language. Language is considered to be cognitively special, the result of a special grammar-learning module. However, writing may be more like primary language than previously believed, and the specialness of language may in fact cause other systems (such as writing) to be analyzed grammatically and entrained into language, with the native script effect being one notable result.

1. Introduction

The fundamental claim of this paper is that literate people have a native script in a way analogous to the way in which they have a native language. That is, the human brain processes a script that is learned early and well in ways that are cognitively similar to how it processes language, with the result that the relationship and interaction between such a first script or scripts (S_1) and a script or scripts learned later (S_2) is similar to the relationship and interaction between a first language or languages (L_1) and language(s) learned later in life (L_2). Furthermore, there are both synchronic and diachronic consequences of the special status of the S1, collectively called the *native script effect*.

If this claim is correct, then the knowledge (implicit and/or explicit) that a literate person acquires of how a script behaves is analogous to the knowledge that speakers have of language. This implies that scripts have grammar, which in turn implies that writing is more like language than

Amalia E. Gnanadesikan   0000-0003-4371-9288
478 Blackshire Rd, Severna Park, MD 21146, USA
E-mail: amalia.gnanadesikan@gmail.com

many linguists have been taught to believe. Yet it is obvious that primary (i.e., spoken or signed) language has a special cognitive and evolutionary status in humankind. Writing does not have that status, but appears to piggyback on primary language to become another modality of language both historically (phylogenetically) and in the acquisition of literacy in the individual (ontogenetically).

To explore this topic, this paper proceeds as follows. Section 2 presents definitions—particularly of the term *script*—which will be essential to the rest of the paper. Section 3 briefly outlines the traditional view of the distinction between writing and language in the structuralist and generative traditions, by which writing is not language and a first script therefore could not have a native status akin to that of a native language. Section 4 considers a number of anecdotal and experiential lines of evidence that suggest that native scripts do in fact exist. Section 5 briefly presents results in the existing literature that argue that the differences and interactions between a first script and later-learned scripts are analogous to those between a first language and later-learned languages. Section 6 applies the concept of the native script effect to the history of writing systems, arguing that the cognitive effect of S_1 accounts for the relative rarity of script invention and radical adaptation when previously unwritten languages come to be written. Section 7 returns to the differences and similarities between primary language and writing, conceding that primary language has a special cognitive status but arguing that the specialness of language in the human brain leads to other complex systems, such as writing, becoming entrained in the linguistic system, with the result that writing becomes language. Section 8 concludes with suggestions for the application of the concept of the native script in policy, pedagogy, and linguistic theory.

2.   Definitions

Before proceeding with the central argument, a few definitions are called for. By *script* I mean a somewhat abstract "set of graphic signs with prototypical forms and prototypical linguistic functions" (Weingarten, 2011, p. 16). A *writing system*, by contrast, is the combination of a specific instantiation of a script with the orthographic rules of a specific language. This use of *script* is in contrast with definitions in which *script* is either synonymous with *writing system*, and thus composed of the combination of a signary and an orthography (e.g., Daniels and Bright, 1996, pp. xliv–xlv), or is merely the collection of signs (the signary) used in a writing system (e.g., Daniels, 2018, p. 155). By the definition used here, the script used in any given written language is *more* than just the signary (since it includes some information about the linguistic function of the signs) but *less* than the writing system (since it does not include all the details of a language-specific orthography). Thus English, Italian, and German all

use the Roman script, but they do not share a single writing system. Similarly, Hindi, Marathi, and Nepali all use the Devanagari script, but again they do not share precisely the same writing system.

It is important for work of the present sort to use a term that allows for the existence of a conceptual entity that is shared across languages. Using the fine-grained level of individual writing system, there is no way to tease apart the process of learning a second language (in a literate context) from that of learning a second writing system: every instance of second language learning in a literate context is an instance of second writing-system learning. However, if we look at the level of script, then it becomes clear that learning some second languages requires learning a new script while learning others doesn't. The two processes can be differentiated.

Looking just at the level of the signary is also the wrong level. For example, the writing systems of English, German, and Italian, or of Hindi, Marathi, and Nepali, share much more than the same basic set of signs. They share important typological features and have many shared or similar values in their linguistic interpretation. Thus, for example, English, German, and Italian use alphabetic letters that write both consonants and vowels, while Hindi, Marathi, and Nepali all use an unwritten "inherent" vowel. In English, German, and Italian, <A>, <E>, <I>, <O> and <U> stand for vowels, and <B> stands for a labial consonant. In Hindi, Marathi, and Nepali, <आ>, <इ>, <उ>, and <ए> stand for vowels, while <ब> stands for a labial consonant. By considering the level of script, we are considering not only a set of largely shared symbols but significant shared ways in how those symbols are used.

In order to study how a learner processes a truly new way of writing, therefore, we must look largely at the level of script. An L$_2$ may or may not share L$_1$'s script. Granted, when people learn to read and write they learn these skills within the context of a particular writing system, not merely at the abstract level of script. In this sense a writing system is analogous to a dialect (or language variety) in that each person learns a specific dialect of a language, while the dialects together comprise a more abstract entity known as a language. Similarly, in becoming literate a person learns a specific writing system, and many writing systems may share the same script.

It is also worth noting that there is no claim being made here that monolingualism and monoliteracy are the only options for L$_1$ and S$_1$, or are even normative. In this paper any set of scripts learned well at roughly the same time in childhood are considered collectively as S$_1$, just as any set of languages learned well in early childhood are considered L$_1$.[1]

---

1. I leave aside for now the question of how first-script literacy that is gained in adulthood might differ from that acquired in childhood. If the analogy with primary

3.   Traditional Assumptions About Language and Writing

Linguists of the American structuralist and generative schools have traditionally held dogmatically to the belief that, as Leonard Bloomfield famously put it, "Writing is not language, but merely a way of recording language by means of visible marks" (Bloomfield, 1933, p. 21). The same attitude was recorded rather colorfully by Fred Householder when he listed first among "the propositions intuitively felt to be basic by friend and enemy alike" among Bloomfieldian linguists the proposition that "Language is basically speech, and writing is of no theoretical interest" (Householder, 1969, p. 886). This attitude was inherited by the generative school of linguistics and has continued into the twenty-first century, resulting in a dampening effect on efforts to apply linguistic analysis to writing systems. James Myers, for example, describes having abstracts rejected at linguistics conferences with dismissive comments such as, "This paper does not deal with linguistic matters" (Myers, 2019, p. x). I have myself been told after giving a talk on writing systems to a linguistics department that "this is not interesting," on the grounds that writing, not being language, is not about the fundamental character of the human brain.

   Indeed, there are important differences between spoken or signed language—which I will collectively call *primary language*—and writing. These differences can be found laid out in any typical introductory linguistics textbook in the generative tradition. For example:

> Speaking and writing are different in both origin and practice. Our ability to use language is as old as humankind, and reflects biological and cognitive modification that has occurred in the evolutionary history of our species. *Writing*… is a comparatively recent cultural development, having occurred within the past five thousand years and only in certain parts of the world. The contrast between speech and writing comes into sharper focus when we consider that spoken language is acquired without specific formal instruction, whereas writing must be taught and learned through deliberate effort. There are entire groups of people in the world today, as well as individuals in every literate society, who are unable to write. While spoken language comes naturally to human beings, writing does not. (Dobrovolsky and O'Grady, 1997, p. 553, emphasis in original)

One reason that writing and primary language are considered to be fundamentally different is that primary language is considered to be

---

language holds in this respect, there will be significant differences between the two, since failure to learn a primary language in childhood leaves a person with a permanent language deficit (Pinker, 1994). While the initial acquisition of literacy in adulthood is possible, the acquisition of fluent reading is difficult for adults and relapse into illiteracy is common (Abadzi, 1994). Thus the analogy with primary language may indeed hold. However, the effects of age on first literacy acquisition are not yet well understood (ibid.).

special, cognitively speaking, and thus necessarily distinct from other human behaviors, including writing. As mentioned in the quote above, primary language is found everywhere that humans are found. It is therefore claimed (with good reason) that language has a special cognitive place in the human mind—and only in the human mind. Noam Chomsky has long championed

> the Cartesian view that man alone is more than mere automatism, and that it is the possession of true language that is the primary indicator of this... (Chomsky, 1964, p. 8)

Or, as Chomsky has more recently put it,

> There is no serious reason today to challenge the Cartesian view that the ability to use linguistic signs to express freely-formed thoughts marks 'the true distinction between man and animal' or machine... (Chomsky, 2000, p. 3)

In the generative framework, the human faculty for language is considered to arise from a "language acquisition device" (Chomsky, 1965, pp. 32–33). This faculty for language has been termed a "language instinct," which is active during the critical period (mostly strongly from birth to the age of six or so, and phasing out by puberty), during which L$_1$ learning takes place automatically and implicitly, without explicit instruction (Pinker, 1994).

By this view, language is cognitively special, but it is specifically the native language that expresses the full range of this cognitive distinctiveness. Thus L$_1$ and L$_2$ learning are fundamentally different. L$_1$ learning, assuming it occurs during the critical period (as might fail to happen to a deaf child of hearing parents, or a child raised under circumstances of unusual social deprivation) is fast, automatic, implicit, and more or less perfect. L$_2$ learning, by contrast, is slow, difficult, and error-ridden, and it leaves the learner with a permanent foreign accent. Furthermore, properties of the L$_1$ will influence a person's ability to perceive and/or learn features of L$_2$, resulting in both positive and negative transfer from L$_1$ to L$_2$ (Ringbom, 1987). In other words, features of the L$_2$ that are similar to L$_1$ will be learned easily (positive transfer), while features of L$_1$ may persist in a learner's use of L$_2$ even when they are not appropriate to that language (negative transfer).

If language is indeed cognitively special and writing is indeed not language, then the relationship between a first-learned script and a later-learned script should not resemble the relationship between L$_1$ and L$_2$. The following sections set out to examine to what extent the difference between S$_1$ and S$_2$ does in fact resemble the difference between L$_1$ and L$_2$. If the differences between the two pairs are similar, that suggests that S$_1$ and L$_1$ may be more similar than the structuralist/generative view would allow. And while that does not undermine

the claim that language has a special cognitive status, it suggests that the special cognitive status of language spills over onto writing in the development of literacy. This point will be returned to in Section 7.

4.   Impressionistic Evidence for a Native Script

Evidence for the phenomenon of native scripts comes from a number of sources, some admittedly impressionistic and others more rigorous. I begin with the impressionistic. While the interpretations of these impressions may be subjective, I suspect that many adult learners of second scripts will be able to relate to them.

First, fluency in a new script comes frustratingly slowly. An example from personal experience is shown in Figure 1. The non-Roman script on the left is Thaana, the script in which the Maldivian language, Dhivehi, is written (Gnanadesikan, 2012). The Roman-script text on the right is the same text in the official Romanization of Thaana. My personal experience shows that an adult can learn the Thaana script with a day's concentrated effort but that fluency (in the script *as distinct from* the language) takes years. This means, for example, that as an S_2 reader I must *choose* to read a text in Thaana rather than having the reading happen automatically just because my eye landed on it. It makes the text on the right substantially more appealing to me, drawing my eye even against my will. It means, further, that skimming Thaana is difficult to impossible for me, and that I can't read Thaana text upside down, although I have observed S_1 readers do so easily. It means that I cannot automatically (and even involuntarily) pick my own name out of a text as I can with a Roman-script text (as in the transliteration at right), even with some variation in the spelling. Automaticity and fluency do develop over time, but very slowly.

އެކުވެރި އަމާލިއާއަށް.
ޙާލު ކިހިނެހްތޯއެވެ؟
އަޅުގަނޑާއި އާއިލާގެ އެންމެން ވެސް ރަނގަޅެވެ.
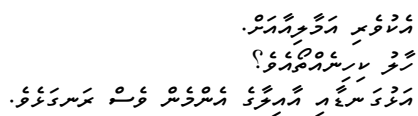
Ekuveri Amaaliaa-ah.
Haalu kihinehthoa-eve?
Alhugan'daai aailaage emmen ves ran'galheve.

FIGURE 1. A short Dhivehi text in the author's S_2 (left) and S_1 (right). (The text reads, 'Dear Amalia. How are you? I and everyone in the family are fine.')

Another example in shown in Figure 2. In this example, in which a short Chinese text is presented for the learning reader in Hànzì (characters) and Pīnyīn (Romanization), the eye of an S_1 Roman-script reader will be drawn to the Pīnyīn, just as it is to the Romanization in Figure 1, despite the fact that the Hànzì characters are larger. The additional point in this example is that the characters, being morphographic,

contain more information than the Pīnyīn does. Each Hànzì character uniquely identifies a morpheme, while each Pīnyīn syllable could in principle refer to any of several homophonous morphemes (although in context the ambiguities are largely resolved, at least for fluent speakers). Thus both 有 'have' and 友 'friend' are <yǒu> in Pinyin, for example. If one does not know all of the characters, resorting to the Pīnyīn is expected. What can be frustrating to S₂ readers, however, is that even when they *do* know each character, the Pīnyīn will still ineluctably draw the eye, depriving them of authentic S₂ reading practice.

Pīnyīn	Wǒ	yǒu	yī	zhǐ	xiǎo	hēi	māo.
Hànzì	我	有	一	只	小	黑	猫。

Pīnyīn	Tā	de	míng	zì	jiào	wū	lóng.
Hànzì	她	的	名	字	叫	乌	龙。

Pīnyīn	Tā	kàn	qǐ	lái	jiù	xiàng	yī
Hànzì	她	看	起	来	就	像	一

Pīnyīn	zhǐ	xiǎo	hēi	bào.
Hànzì	只	小	黑	豹。

FIGURE 2. A short Chinese text in Hànzì and Pīnyīn. The eye of a Roman S₁ reader will be drawn to the Pīnyīn, despite the Hànzì being larger and more informative. Example courtesy of Gitanjali Gnanadesikan. (The text reads, 'I have a black kitten. Her name is Oolong [Black Dragon]. She looks just like a small black panther.')

Another line of evidence comes from the reactions of S₁ readers to instances of script mimicry. *Script mimicry* is the use of graphs from one script (or graphs that look like they come from a particular script) as graphs in another script.[2] A simple example is Devanagari ॐल, spied on a yoga T-shirt. The message intended for Roman-script readers who are not readers of Devanagari is <om>, the sacred syllable of South Asian religions. A reader of Devanagari, however, will read this as <ṭʰal>, its actual value in Devanagari. A more extensive case is shown in Figure 3. While this text is written in English in Roman script, it mimics Japanese

---

2. Alessandrini (1979) uses the term *exotype* to refer to a typeface that, while writing Roman script, is clearly influenced in its letter forms by another script. The font in Figure 3 is an exotype. The term *script mimicry* is related but encompasses a wider range of cases, including ones that use only actual graphs from another script (as in the Devanagari ॐल above), ones that operate between two non-Roman scripts, and ones that occur in handwriting.

katakana and kanji, with the result that while an S_1 reader of Roman script can read it after a moment or two's adjustment, an S_1 reader of Japanese—according to anecdotal evidence—will often fail to be able to read it (Raymond Larabie, personal communication). The S_1 exerts too strong a pull to allow for easy decoding as Roman script.

AS WE PASSED DOWN QUEEN
STREET TOWARD CITY HALL,
WE WERE STOPPED SO MANY
TIMES BY TOTAL STRANGERS,
ASKING ANXIOUSLY ABOUT
OUR CUTE LITTLE ROBOT PAL。

FIGURE 3.   Script mimicry by Roman script of Japanese katakana and kanji in Electroharmonix font.   Example from `https://typodermicfonts.com/electroharmonix/`, used with permission of Raymond Larabie, the font's designer.

Yet another line of evidence comes from the length of time it takes to learn a language that is written in S_2. Programs of study and measures of success in learning vary greatly, making comparisons difficult in second-language learning. However, a certain degree of standardization can be assumed by considering the courses offered by the US Foreign Service Institute (FSI), since the types of use to which the languages are put and the level of proficiency desired for those uses will be comparable across languages. According to FSI's website[3], languages offered there are divided into four levels of difficulty for (English-speaking) American learners. The languages are tabulated in Table 1.

As shown in Table 1, there are no languages at difficulty level 1 or 2 which have a non-Roman script. In other words, in this sample, rapid language learning (in 36 weeks or less) for S_1 readers of English never involves learning a new script. At level 3, where adequate language proficiency may be achieved after 44 weeks, 28 of the 48 languages use a non-Roman script. In calculating this figure, it was noted that five of the level 3 languages are written in more than one script. In the absence of access to the FSI curricula for these languages, the script that is associated with the language's use as an official national language or its

---

3. Department of State, "Foreign Language Training: Foreign Service Institute," `https://www.state.gov/foreign-language-training/`.

TABLE 1. Difficulty level and length of time allotted for English speakers to learn non-English languages at the US Foreign Service Institute. (Language counts and difficulty level tabulated from `https://www.state.gov/foreign-language-training/`.)

Difficulty Level	Total Languages	Non-Roman Script
1 (24−30 weeks)	9	0
2 (36 weeks)	5	0
3 (44 weeks)	48	28
4 (88 weeks)	5	5

likely use for diplomatic purposes was counted.[4] At level 4, that of the "super-hard languages" requiring 88 weeks of training, none of the five languages uses the Roman script.

Granted, there is a clear confound here with the degree of relationship between the language itself and English. It is no surprise to find Dutch in level 1, for example. And in fact, all of the level 1 languages (Dutch, Danish, French, Italian, Norwegian, Portuguese, Romanian, Spanish, and Swedish) are Germanic or Romance languages. However, level 2 includes Swahili (a Bantu language) and Malay and Indonesian (Austronesian languages) beside German and Haitian Creole (a French-based creole). While Swahili, Malay, and Indonesian bear little resemblance to English, they are at least written in the Roman alphabet, sparing the learner the effort of acquiring an S$_2$.

A final line of suggestive evidence comes from the history of the Cherokee syllabary, famously invented in the early nineteenth century by Sequoyah. When the Cherokee syllabary was first disseminated in the 1820s, "Cherokee children who took up to four years to read and write English reportedly learned the syllabary in a few days and put it to use"; yet by the early 2000s the syllabary was "considered by many native speakers to be an extremely difficult writing system to learn and use" (Bender, 2002, p. 28). Evidently, a significant change in perceived difficulty took place between the early years of the syllabary's use and the present century. The most plausible cause of this difference was the introduction of universal English-language education. Nowadays Roman script is S$_1$ for Cherokee children. Not only does this mean that the Cherokee script is, by contrast, S$_2$, but some of the same sorts of confusion as those caused by deliberate script mimicry are at play, since many

---

4. For example, Azerbaijani (or Azeri) is written in the Roman script in Azerbaijan and in Perso-Arabic script in Iran. Since Azerbaijani is the national language of Azerbaijan, an independent nation to which a US diplomatic mission is posted, but is not the official language of Iran, Azerbaijani is considered for the purposes of Table 1 to be written in Roman script.

Cherokee signs resemble Roman letters. For example, Cherokee <W> is /la/ and <D> is /a/.

5.   Synchronic Consequences of a Native Script

Once the possibility of a native script is allowed, a number of results in the existing literature can be interpreted as consequences for the special status of S_1 and its primacy over S_2, analogous to the primacy of L_1 over L_2. L_1 learning is characterized as fast, implicit, and complete, while L_2 learning is slow, often mediated by explicit instruction, and incomplete (leaving an accent, and affected by both positive and negative transfer from L_1). The relationship between S_1 and S_2 is surprisingly similar. This section lists briefly a few works that make this point.

First, acquisition of adequate fluency in S_2 is painfully slow, as already mentioned to in Section 4. As Elliott (2012) puts it, "Inefficient decoding can quickly lead to frustration and diminishing motivation, in turn resulting in less reading practice/time on task" (ibid., p. 66). Elliott suggests that learners may need practice with simplified texts, as authentic texts may well be too difficult.

Secondly, there is evidence for an analog to a foreign accent in handwriting. Certain hand motions are more or less characteristic of one script as compared to another, particularly if the two scripts run in opposite direction. Machine learning experiments have succeeded at distinguishing between S_1 and S_2 writers of Arabic script with 100% accuracy at the document level (Farooq, Lorigo, and Govindaraju, 2006), and between S_1 and S_2 writers of Roman-script English (where the S_2 writers have various scripts native to India as S_1) with up to 97.67% accuracy (Ramaiah, Utkarsh, and Venu, 2012).[5] Furthermore, efforts to identify the specific accent (i.e., the specific S_1, Chinese Hànzì or Devanagari) of S_2 writers of English with machine learning have achieved up to 89.19% accuracy (Ramaiah, Arti, and Venu, 2013).

Thirdly, scripts are sensitive to transfer from S_1 to S_2. An extensive body of research reviewed by Bassetti (2013) shows that literacy skills transfer to a new writing system, but that such a new writing system is more easily learned if the new writing system is typologically similar

---

5. A potential confound that the authors do not discuss is that Roman script as written in different parts of the world (in this case India and the United States) may have different regional "accents," separately from any effect of whether they are a person's first or second script. Thus even an S_1 writer of Roman script schooled India may write detectably differently than an S_1 writer of Roman script schooled in the United States. However, this possibility does not negate the existence of accent in handwriting; it merely adds to the kinds of accents that one should expect. As such it strengthens the analogy with spoken accents, which may be either regional or foreign.

to the previously learned one, allowing positive transfer.[6] As in primary language learning, where bilingualism is an advantage in learning a third (or subsequent) language, biliteracy is an advantage in learning a third writing system. Negative transfer occurs when readers read a word incorrectly, assigning values that would be correct in their native writing system. While the examples Bassetti cites occur within a script (e.g., English speakers reading Spanish <v> as /v/ rather than /b/), my own experience with learning Thaana (shown above in Figure 1) included frustratingly many misreadings of ﬡ as /v/ rather than the correct /k/.

An S_2 may be read with different neural processing patterns depending on the S_1, showing that the transfer from S_1 to S_2 happens at a neurological level. For example, Kim, Liu, and Cao (2017) found that Chinese S_1 and Korean S_1 readers showed different brain activation when reading English, the Korean S_1 readers showing more activation in the right inferior frontal gyrus than the Chinese S_1 readers. This was attributed to the fact that the Korean writing system encodes phonemes but the Chinese writing system does not. Chinese S_1 readers showed more activation in the left middle frontal gyrus, an area which is particularly active in S_1 Chinese reading.

Despite the commonalities between S_1 and L_1 described in the preceding few paragraphs, the obvious failure of the parallel between S_1 and L_1 is that S_1 is explicitly taught, as mentioned in Section 3. Children are taught to read and write but learn to speak and understand their L_1 automatically, without explicit instruction. Nevertheless, there is evidence that some learning of a writing system is implicit. For example, Pacton, Perruchet, Fayol, and Cleeremans (2001) report on an experiment in which children learning to read and write in French showed sensitivity to aspects of French orthography that they are never taught. Specifically, they learned implicitly that French vowel letters are never doubled and that only certain consonant letters are.

Additional evidence for implicit learning comes from Tsai and Nunes (2003), who present evidence that children learning Chinese Hànzì (characters) in Taiwan, where character structure is not explicitly taught, nevertheless internalize the schemas of character composition and become increasingly adept at judging whether a novel character conforms to the schemas between five and nine years of age.

To summarize this section, not only does S_2 involve greater difficulty, a foreign "accent," and other types of transfer from S_1, but the S_1 is to

---

6. Bassetti (2013) discusses biliteracy at the level of the writing system (more specific than that of script), so I have used that wording here. Any difference of script implies a difference of writing system. Not all differences of writing system involve a difference of script, but just as one speaks only a specific variety of one's native language as L_1, the S_1 will be instantiated in a specific writing system, so that similar but weaker S_1 effects should be expected across writing systems that share a script. See Section 6 for more on within-script S_1 effects.

some extent learned implicitly, strengthening the analogy with L_1. Admittedly, it could be argued that the difficulties associated with switching from S_1 to S_2 are merely the same sorts of difficulties associated with overcoming any ingrained habit, such as driving on the right-hand or the left-hand side of the road. However, the same argument could then be made for primary language being simply a habit, since the difficulties of switching from L_1 to L_2 are analogous to those of switching from S_1 to S_2. The similarities in the relationship between S_1 and S_2 to the relationship between L_1 and L_2 suggests that script and primary language are in the same boat, whether because of the operation of a special language instinct or merely habit.

6.   Diachronic Consequences of a Native Script

This section turns to the diachronic consequences of literate people having a native script, an application not made elsewhere in the literature, to my knowledge. I claim here that the native script effect is the answer to a question that is not often asked but deserves to be, namely, why are there so few scripts in the world? This is not a question about the number of languages that are written as compared to the number of languages that are not written. Rather, it is a question about why so many languages share a script, despite large differences in their phonological and morphological characteristics that would suggest that different scripts would be more appropriate for them. While some scripts (such as Thaana) are indeed confined to a single language, other scripts have come to be used for many languages. In fact, a few blockbuster scripts, such as Roman, Cyrillic, and Arabic, dominate the world. Why is this the case? Why is innovation so rare in the history of script design?[7]

When a language first comes to be written, there are in theory three ways in which the pairing of a language and script could come about. The first, the independent invention of writing, characterized the first scripts of their respective cultural spheres (such as Sumerian cuneiform or the oldest Chinese writing). In such a case people who have no prior knowledge of writing invent a way to write. The second way, script invention by stimulus diffusion, starts from the background knowledge that writing exists but is not beholden to a prior script for its design features. A famous example of this type is the Cherokee syllabary mentioned in Section 4, since Sequoyah was aware of the existence of writing but was not literate before he invented the Cherokee syllabary. The

---

7. I have elsewhere commented on such lack of innovation in the history of writing by calling the alphabet "a monument to … hidebound conservatism" (Gnanadesikan, 2009, p. 143).

third way, script adoption, is the use of a pre-existing script for the newly written language.

In practice, the first type (creation *de novo*) no longer occurs, since some knowledge of the existence of writing has spread to every, or virtually every, part of the globe. Also in practice, there is something of a spectrum between the second and third types. In other words, there is a spectrum between the invention of a completely new script and the wholesale adoption of a pre-existing script, with some scripts becoming substantially adapted in the transfer to a new language. For example, the Roman alphabet arose from the Greek alphabet and is very similar to it but different enough to qualify as a different script. Nevertheless, the question remains: Why is the end of the spectrum nearer to outright adoption as common as it is? Why don't large typological differences between languages more often lead to large differences in script?

Examples of scripts being borrowed more or less wholesale abound. A few examples (taken from Gnanadesikan, 2009) will suffice here. Chinese characters (Hànzì) were historically adopted to write Vietnamese, Korean, and Japanese, none of which are Sino-Tibetan languages, and two of which (Korean and Japanese) are morphologically synthetic as opposed to Chinese, which is morphologically analytic. The Aramaic script spread from Syria to Manchuria over the course of about two and a half millennia. In the process it spread from Semitic languages to Indo-European languages to Turkic, Mongolic, and finally Tungus languages. The letter forms were quite different by the time they came to be used for Manchu—and the direction of writing had rotated by ninety degrees—but at each step along the way the changes were relatively minor. More recently, the Cyrillic alphabet has come to be used for many minority languages of Russia and the former Soviet Union. Cyrillic as used for the Slavic language Russian has 33 letters (of which 21 are consonants), yet it has been adapted to write the Northwest Caucasian languages Abkhaz and Karbardian, each with about 50 consonants. Similarly, the Roman alphabet, with 21 consonants and 5 vowels, has come to be used for languages as diverse as Vietnamese, an Austroasiatic language with 11 vowels and 6 tones, and Xhosa, a Bantu language with 12 clicks and 43 other consonants (Baker, 1997). Simple metrics of the fit of the script to the phonology of the languages would surely suggest that these sorts of script adoptions would be dispreferred.

While in some cases extra letters or diacritics may be added, as in Vietnamese, in many cases digraphs (and even trigraphs) are called on to stretch the script to fit the language, as in Xhosa. Going so far as to alter the inventory of letters is rare, however. Baker notes that "Strong objections to the very idea of using special characters in orthography design are sometimes held by otherwise rational people, and seem to stem from a deep-rooted conviction that the Roman alphabet is somehow inviolable" (ibid., p. 137).

A similar pattern of preference for an existing writing system can be seen not just in the choice of script as a whole but also within a script in the choice of specific orthographies. Grenoble and Whaley (2006) discuss several cases where orthography designs for minority languages have failed or succeeded depending on how similar they were to the orthographies of the majority languages with which the speakers of the minority languages were familiar. Thus two orthographies designed for Coreguaje (a Tucanoan language) failed because they were not enough like Spanish. An orthography modeled after French designed for Athapaskan languages failed because most of the speakers were familiar with English orthography. On the other hand, the orthography for Zapotec (an Oto-Manguean language), based on Spanish orthography, has succeeded despite a poor match with the Zapotec phonology, since Spanish is the language of education in the Zapotec area.

There are many reasons for the spread of a script. The Arabic script, for example, spread along with Islam as the script of the Holy Qurʾān (Kaye, 1996). However, the existence of a native script effect suggests that at least some of the reason for the frequency of script spread as compared to the rarity of script invention lies in cognitive factors.

The situation is shown schematically in Figure 4. If a native speaker of an unwritten language (that person's L_1) receives an education, it will be in the regional written language of education (that person's L_2). The speaker therefore learns to read in the script of the L_2. The upshot of this situation is that *the speaker's S_1 is the script associated with the speaker's L_2*. This kind of situation is extremely common historically, from the days of Akkadian students learning Sumerian cuneiform to minority children learning majority languages across the world today.
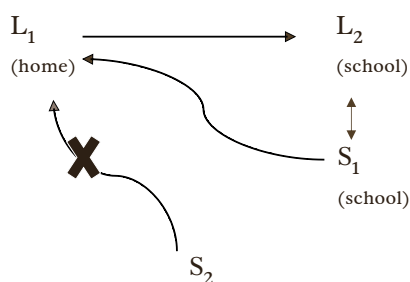
FIGURE 4. A schematic showing how the script of a language learned for educational purposes becomes S_1 and will therefore tend to be adopted for a previously unwritten L_1.

Once S_1 is established as the native script, if the speakers of L_1 want to write their language, there will be a strong predilection for using S_1

(L$_2$'s script). While a different script might be invented or adopted, it will be at a cognitive disadvantage, since it will be competing with S$_1$.

The natural consequence, therefore, of literate people having a native script is that existing scripts spread. The trend is as old as the adaptation of cuneiform to write Akkadian in the third millennium BCE. And the more powerful a script is, the more it will continue to spread. Educators, missionaries, and policy makers who are not native speakers of the L$_1$ of Figure 4 but are often native readers of S$_1$ also play a role, since they too are cognitively biased in favor of their S$_1$. Their role in the history of script adoption is perhaps more expected, however, as yet another case of domination and/or imperialism by cultural elites. My claim here, however, is that cognitive factors influence all players—including the speakers of the previously unwritten language themselves—toward the adoption of a previously existing, commonly known script, and against script invention. While the invention of new scripts by previously literate individuals for their native languages does happen, as in the case of King Sejong's invention of Han'gŭl for Korean (Kim, 2005) or the invention of Thaana for Dhivehi (Gnanadesikan, 2012), it is relatively rare.[8]

7.   Is Writing Language?

If there really is a native script effect similar to the native language effect, then writing and primary language have significant properties in common, which implies writing cannot be merely dismissed as irrelevant to language, as Bloomfield so famously did. But then what actually is the relationship between the two? Is writing language or not?

While many of the special properties of a native language are also found in a native script (including even some implicit learning), it is also clear that writing and primary language are different in important neurocognitive respects. As mentioned earlier in Section 3, primary language is a universal of human societies, while writing is a later and spottily adopted invention. Additionally, different types of writing systems are processed differently in the brain, a fact that allows for the detection

---

8. I suspect that these cases are examples of the *biliterate advantage* (Bassetti, 2013), by which readers who already know two writing systems are advantaged in learning (or in this case, designing) a third. King Sejong knew Hànzì script and is believed by some to have been inspired by 'Phags pa (Ledyard, 1966). Whether or not he knew 'Phags pa specifically, he would have been well positioned to learn other scripts, as his school for diplomats offered classes in several foreign languages (Ledyard, 1997). The inventor of Thaana clearly knew both Arabic script and an older indigenous writing system, as features of both are incorporated in the design of Thaana (Gnanadesikan, 2012).

of neurological transfer from S_1 to S_2 of the type documented by Kim, Liu, and Cao (2017) and discussed in Section 5.

What we have, then, is a system that acts very much like primary language in some ways but is clearly distinct from it in certain other important ways. How essential are these differences?

Primary language, whether spoken or signed, is believed to be unique because it uses an inborn, implicitly acting grammar-learning module. It is a rule-based (grammatical) system. Yet writing, though not inborn, can also be described as a grammatical system. Myers (2019), for example, analyzes the Chinese script as having a grammar—that is, as following rules of wellformedness—both in its formal properties and in users' processing of it. On another tack altogether, the stroke order of writing letters in both English and Hebrew has been successfully modelled using Optimality Theory, a theoretical paradigm developed for and primarily used to model phonological grammar (Ellenblum, 2019).

One way to resolve the tension between the similarities and dissimilarities between primary language and writing—between the innateness of only primary language on the one hand and the grammar-based properties of both primary language and writing on the other—is suggested by James Myers when he states that "Once this flexible neural system [of language/grammar] evolved, it may have become as trigger-happy as our face-processing system (which detects 'faces' anywhere, even in clouds), automatically switching on whenever it encounters any sufficiently complex communication challenge" (Myers, 2019, p. 22). In other words, the grammar-building language instinct is so strong that it entrains other communicative systems into its orbit. If this is so, then it is no surprise that scripts show grammatical properties and other similarities to primary language.

The view that emerges here is that language is indeed cognitively special but that this specialness lies not so much in being unique but in being overpowering. That is, the language module(s) of the brain will process as language—as grammatically constituted—as many systems as it can. For a literate individual, that includes writing.

The upshot is that while writing does not start out as language, it *becomes* language. This is true both phylogenetically (in the origins of writing) and ontogenetically (in the acquisition of writing by an individual). Historically, writing was not invented to be language. It was not even invented to *record* language but rather to record certain types of information. "[E]arly writing did not reflect spoken language, nor was it invented to do so." (Woods, 2010, p. 20). The world's earliest writing systems, in Egypt and Mesopotamia, took half a millennium or so before they "achieved a relatively full notation of language, including its grammar" (Baines, 2004, p. 150). Yet today the recording of language is considered by many scholars of writing systems to be essential to the

definition of writing (e.g., Gelb, 1963, p. 13; Rogers, 2005, p. 2; Daniels, 2018, p. 157).

Similarly, in the life of the individual it is the primary (spoken or signed) language that is learned with the full drive of the language instinct. The written language requires some explicit instruction. But, as noted above, children learning to read also learn aspects of their writing system implicitly, suggesting that they are applying their grammatical system to entrain language.

The question of whether writing is language may not be answerable with a simple yes or no. My claim here is that writing *becomes* language.

8.   Conclusions and Applications

This paper has argued that a literate person's first script has a special cognitive status—including pre-eminence over later-learned scripts—that is analogous to the special status of a native language. In other words, a literate person has a native script. Other scripts learned later in life suffer the same sorts of disadvantages as second languages: learners find them hard to process, use them with an accent, and experience transfer from their S_1.

This paper applies the concept of a native script to the historical preference for adopting existing scripts and the comparative rarity of newly invented scripts. Native speakers of an unwritten language who are educated in a written language will have the script of that non-native written language as their S_1. Thus educated speakers of the language, educators, and policy makers will all tend to agree in the identity of, and their preference for, their S_1. This preference for S_1 means that an established script spreads, even more so than the language with which it is originally associated. The result is a world with many written language but remarkably few different scripts.[9]

The various synchronic consequences of the native script effect are worth considering. These effects occur in the areas of pedagogy and policy. In pedagogy, the question arises of when Romanization should be used in second-language instruction (Elliott, 2012). In Figures 1 and 2 above, the Romanization was a distraction, reducing S_2 input for the learner. On the other hand, if all L_2 input must be filtered through a slowly and painfully read S_2, language learning as a whole will be slowed

---

9. A partial exception is the linguistic area of South Asia, where many different scripts are used and "there is... a widespread feeling that a self-respecting language should have its own unique script to confirm its status as a language" (Masica, 1996, p. 774). Even though this feeling has led to the invention of a number of scripts for previously unwritten languages, even in South Asia many minority languages are written in the script of the official state language.

and perhaps even abandoned. The best way to use Romanization and when to withdraw it is a question that merits further research.

In orthographic policy, the choice of a script—and of a specific orthography within a script—for a newly written language is likely to involve the native script effect on the part of literate speakers in the community, educators from outside the community, and sometimes even professional linguists. The examples cited earlier from Grenoble and Whaley (2006) and Baker (1997) show this. While the prior existence of a native script for some members of a community does not necessarily imply that that script should be chosen (or not chosen), it may be useful to be aware of the native script effect as one factor influencing speakers' preferences.

There are also consequences to linguistic theory in the native script effect. On the one hand, if scripts have grammar and behave like language, becoming entrained by the brain into the grammatical system, then the study of writing is a more legitimate undertaking for linguists than previously believed by members of the structuralist and generative schools. And the tools and models of linguistics (such as Optimality Theory, as in Ellenblum, 2019) can be appropriately used to study writing.

On the other hand, one implication of the native script effect is that linguists themselves are influenced by their native scripts. This has consequences for linguistic theory, especially phonological theory. For example, the concept of the phoneme developed in the context of alphabetic writing, while the phonological existence of the syllable was slower to gain acceptance in modern linguistics (though well established in other contexts). Famously, Chomsky and Halle's *Sound Pattern of English* (1968) does not contain the word *syllable* (the term *syllabic* is used, but is a feature of vowels). The insight that one's script influences one's view of phonology is not new. The influence of alphabetic writing on phonological theory is noted by Aronoff (1992), who describes "segmentalism" in linguistics, and even more strongly by Faber (1992), who argues that phonemes are no more than epiphenomena of alphabetic literacy. More recently, Port and Leary (2005) have argued that phonological theory has made a fundamental error in positing that the phonological system acts on symbolic, graph-like entities.

In evaluating such claims in light of the native script effect, it is on the one hand possible that Western phonologists have been fooled by their native script into creating a phonological theory that resembles their script. On the other hand, it is also reasonable to suppose that typological features, such as phoneme-sized units, that survive in writing systems (having been successfully grammaticalized by the language system) can be expected to have analogs in primary language, even if such units are not the only valid levels of analysis. A more thoughtful aware-

ness of how writing and primary language interact will be to the benefit of the study of both.

References

Abadzi, Helen (1994). *What We Know About Acquisition of Adult Literacy: Is There Hope?* Washington DC: World Bank.

Alessandrini, Jean (1979). "Une nouvelle classification typographique: Codex 1980." In: *Communication et langage* 43, pp. 35–56.

Aronoff, Mark (1992). "Segmentalism in Linguistics: The Alphabetic Basis of Phonological Theory." In: *The Linguistics of Literacy*. Ed. by P. Downing, S.D. Lima, and M. Noonan. Amsterdam: Benjamins, pp. 71–82.

Baines, John (2004). "The Earliest Egyptian Writing: Development, Context, Purpose." In: *The First Writing: Script Invention as History and Process*. Ed. by Stephen D. Houston. Cambridge: Cambridge University Press, pp. 150–189.

Baker, Philip (1997). "Developing Ways of Writing Vernaculars: Problems and Solutions in a Historical Perspective." In: *Vernacular Literacy: A Re-Evaluation*. Ed. by Andrée Tabouret-Keller et al. Oxford: Clarendon Press, pp. 93–141.

Bassetti, Benedetta (2013). "Bilingualism and Writing Systems." In: *The Handbook of Bilingualism and Multilingualism*. Ed. by Tej K. Bhatia and William C. Ritchie. Malden, MA: Wiley-Blackwell, pp. 649–670.

Bender, Margaret (2002). *Signs of Cherokee Culture: Sequoyah's Syllabary in Eastern Cherokee Life*. Chapel Hill, NC: University of North Carolina Press.

Bloomfield, Leonard (1933). *Language*. New York: Holt, Rinehart.

Chomsky, Noam (1964). *Current Issues in Linguistic Theory*. The Hague: Mouton.

———— (1965). *Aspects of the Theory of Syntax*. Cambridge, MA: MIT Press.

———— (2000). *New Horizons in the Study of Language and Mind*. Cambridge: Cambridge University Press.

Chomsky, Noam and Morris Halle (1968). *The Sound Pattern of English*. New York: Harper & Row.

Daniels, Peter T. (2018). *An Exploration of Writing*. Sheffield: Equinox.

Daniels, Peter T. and William Bright (1996). "Abbreviations, Conventions, and Definitions." In: *The World's Writing Systems*. Ed. by Peter T. Daniels and William Bright. New York: Oxford University Press, pp. xxxix–xlv.

Dobrovolsky, Michael and William O'Grady (1997). "Writing and Language." In: *Contemporary Linguistics: An Introduction*. Ed. by William O'Grady, Michael Dobrovolsky, and Mark Aronoff. New York: St. Martin's, pp. 553–586.

Ellenblum, Gali (2019). "Cognitive and Computational Modeling of Handwriting." PhD thesis. John Hopkins University.

Elliott, Christine (2012). "Second Language Writing System Word Recognition (with a Focus on Lao)." In: *Journal of the National Council of Less Commonly Taught Languages* 11, pp. 53–73.

Faber, Alice (1992). "Phonemic Segmentation as Epiphenomenon." In: *The Linguistics of Literacy*. Ed. by Pamela Downing, Susan D. Lima, and Michael Noonan. Amsterdam: Benjamins, pp. 111–134.

Farooq, Faisal, Liana Lorigo, and Venu Govindaraju (2006). "On the Accent in Handwriting of Individuals." In: *Tenth International Workshop on Frontiers in Handwriting Recognition*. Ed. by Guy Lorette. La Baule, France: Suvisoft.

Gelb, Ignace J. (1963). *A Study of Writing*. 2nd ed. Chicago: University of Chicago Press.

Gnanadesikan, Amalia E. (2009). *The Writing Revolution: Cuneiform to the Internet*. Malden, MA: Wiley-Blackwell.

——— (2012). "Maldivian Thaana, Japanese Kana, and the Representation of Moras in Writing." In: *Writing Systems Research* 4, pp. 91–102.

Grenoble, Lenore A. and Lindsay J. Whaley (2006). *Saving Languages: An introduction to Language Revitalization*. Cambridge: Cambridge University Press.

Householder, Fred W. (1969). "Review of Language and its Structure: Some Fundamental Linguistic Concepts by Ronald W. Langacker." In: *Language* 45.4, pp. 886–897.

Kaye, Alan S. (1996). "Adaptations of Arabic script." In: *The World's Writing Systems*. Ed. by Peter T. Daniels and William Bright. New York: Oxford University Press, pp. 743–762.

Kim, Jeongsu (2005). "The History and Future of Hangeul: Korea's Indigenous Script." In: trans. by Ross King. Folkestone (Kent): Global Oriental.

Kim, Say Young, Li Liu, and Fan Cao (2017). "How Does First Language (L1) Influence Second Language (L2) Reading in the Brain? Evidence from Korean-English and Chinese-English Bilinguals." In: *Brain & Language* 171, pp. 1–13.

Ledyard, Gari K. (1966). "The Korean Language Reform of 1446: The Origin, Background, and Early History of the Korean Alphabet." PhD thesis. University of California, Berkeley.

——— (1997). "The International Linguistic Background of the Correct Sounds for the Instruction of the People." In: *The Korean Alphabet: Its History and Structure*. Ed. by Young-Key Kim-Renaud. Honolulu: University of Hawai'i Press, pp. 31–87.

Masica, Colin (1996). "South Asia: Coexistence of Scripts." In: *The World's Writing Systems*. Ed. by Peter T. Daniels and William Bright. New York: Oxford University Press, pp. 773–776.

Myers, James (2019). *The Grammar of Chinese Characters: Productive Knowledge of Formal Patterns in an Orthographic System*. New York: Routledge.

Pacton, Sébastien et al. (2001). "Implicit Learning Out of the Lab: The Case of Orthographic Regularities." In: *Journal of Experimental Psychology: General* 130.3, pp. 401–426.

Pinker, Steven (1994). *The Language Instinct*. New York: Harper Collins.

Port, Robert F. and Adam P. Leary (2005). "Against Formal Phonology." In: *Language* 81.4, pp. 927–964.

Ramaiah, Chetan, Shivram Arti, and Govindaraju Venu (2013). "A Bayesian Framework for Modeling Accents in Handwriting." In: *12th International Conference on Document Analysis and Recognition*, pp. 917–921.

Ramaiah, Chetan, Porwal Utkarsh, and Govindaraju Venu (2012). "Accent Detection in Handwriting based on Writing Styles." In: *10th IAPR International Workshop on Document Analysis Studies*, pp. 312–316.

Ringbom, Håkan (1987). *The Role of the First Language in Foreign Language Learning*. Clevedon: Multilingual Matters.

Rogers, Henry (2005). *Writing Systems: A Linguistic Approach*. Malden, MA: Blackwell.

Tsai, Kuan-Chun and Terezinha Nunes (2003). "The Role of Character Schema in Learning Novel Chinese Characters." In: *Reading Development in Chinese Children*. Ed. by Catherine-McBride-Chang and Hsuan-Chih Chen. Westport, CT: Praeger, pp. 109–125.

Weingarten, Rüdiger (2011). "Comparative graphematics." In: *Written Language & Literacy* 14.1, pp. 12–38.

Woods, Christopher (2010). "Visible Language: The Earliest Writing Systems." In: *Visible Language: Inventions of Writing in the Ancient Middle East and Beyond*. Ed. by Christopher Woods, Emily Teeter, and Geoff Emberling. Chicago: Oriental Institute, pp. 15–25.

On Being a Grapholinguist

Dimitrios Meletis

Abstract. In this essay, I discuss the challenges of (engaging in) grapholinguistics, a young field that focuses on writing, a topic mostly marginalized within 'mainstream' linguistics to this day. Issues that are raised include the lack of writing-related classes in linguistic study programs, institutionalization (e.g., departments or chairs for grapholinguistics), and pertinent publication and presentation outlets. Furthermore, the essay highlights problems caused by the interdisciplinarity of grapholinguistics, including linguistic, theoretical, methodological, and terminological boundaries that must be crossed. These issues are partially addressed through a personal lens, i.e. my own 'journey' in the field thus far. This allows me to speak from (some) experience not only about the risks of focusing on a topic at the periphery of many disciplines and some of the setbacks this entails but also about my motivation behind proposing a (sketch of a) theory of writing in my PhD thesis that—based on linguistic Naturalness Theory—aims to offer a unified descriptive and explanatory framework for studying writing systems and writing in general. It also gives me a chance to argue that writing, which can be studied with many of the concepts firmly established in other fields of linguistics (as well as additional writing-specific concepts), is central to every language that is spoken, signed and written in literate language communities and should therefore be an integral rather than an optional part of linguistic theories and paradigms in general. Essentially, this essay highlights why doing research in grapholinguistics should be embraced rather than justified.

The *Grapholinguistics in the 21st Century* conference was a chance for many people from different disciplines[1] to get together and present their writing-related research—research whose breadth is showcased by the contributions in the present proceedings. Interestingly, despite the encouraging vibrance of such conferences (to which one can also count the workshops of the *Association of Written Language and Literacy*), even well into the 21st century, the perception of a coherent discipline dealing with all

Dimitrios Meletis   🔗 0000-0002-8889-6459
Schönberggasse 9, 8001 Zurich, Switzerland
E-mail: dimitrios.meletis@outlook.com

1. According to the conference website (https://grafematik2020.sciencesconf.org/, December 7th, 2020), these were computer science and information technology, linguistics, communication, pedagogy, psychology, history, and the social sciences.

questions pertaining to writing, i.e., a 'grapholinguistics' (or grammatology, or graphonomy, or whatever one prefers to call it, really),[2] is everything but widespread. And this is not only a terminological problem—yes, researchers invested in writing (often unproductively) disagree on how to call such a discipline (in English[3]) and the concepts studied by it and spend a lot of time arguing about labels (cf. a note on terminology below)—but, more importantly, an issue deeply rooted in the history of linguistics and the (mis)treatment of writing as an object of research. It is also a problem caused by the unwillingness to move beyond one's own disciplinary boundaries and outside of one's comfort zone. In this essay, I will reflect on the discipline and its slow but steady emancipation, partially through the lens of my personal journey in it.[4]

My personal interest in writing was already strong when I started my studies in linguistics in 2010. Soon, however, I had to realize that writing was not covered in the classes I took (at the University of Graz, Austria), and sadly (but unsurprisingly), there also existed no classes specifically dedicated to the topic of writing. Yet, my interest persisted, and as soon as I had mastered the basics of linguistics, I insisted on working on writing-related questions, having to do so under the pretext of other disciplines so that my professors would tolerate it. As a result, the first thesis that I wrote was psycholinguistic in nature—but it focused on the comma. The second thesis likewise incorporated a psycholinguistic perspective, if only partially—it dealt primarily with the formal and material aspects of writing, something that, according

---

2. As I argue elsewhere (cf. Meletis, 2020a), the term *grapholinguistics* highlights that, following the narrow definition of writing—in which it is defined exclusively as a system relating to language (and not ideas, referents, etc.)—writing is always tied to language, which is of course the subject at the center of linguistics. Notably, this does not change no matter from which perspective (or discipline) one studies writing and thus does not contradict the field's interdisciplinarity. Also, the term is similar to terms such as *sociolinguistics* and *psycholinguistics* that also designate interdisciplinary fields with questions of language at their core. However, unlike them, grapholinguistics does not merge only two disciplines (like psycholinguistics, which is at the interface of psychology and linguistics, for example) but the *grapho-* is meant to include all disciplines interested in writing. Lastly, German *Grapholinguistik* was given as a synonym of *Schriftlinguistik* by the term's founder, Dieter Nerius (cf. Nerius, 1988, p. 1), which *grapholinguistics* acknowledges.

3. In German, there is no terminological debate: the term *Schriftlinguistik* (see below) has been adopted and is, at this point, well-established.

4. I am well aware that it is wholly uncommon—especially for a young and little-established researcher—to write an essay reflecting on a discipline (and a personal one on top of that). But when Yannis Haralambous, organizer of the conference and editor of these proceedings, invited me to do so, I still agreed because it is a chance to share my views on a topic that is, evidently, of personal importance to me. Of course, all views here are my own, and (however general they are phrased) they are based on my own experience in the field; I do not mean to speak for others.

to the structuralist-oriented branch of German research on writing, is treated by a field called *graphetics* (a term in part analogous to *phonetics*).[5] After that, at least in my department, I was already known as 'that writing guy' (word does get around quickly if your interests are 'nontraditional'). Unsurprisingly, for my PhD thesis, arguably the first big project in which one can (or better *must*) show academic independence, I had to go all the way (see below). All of this was, of course, only possible because my supervisors had a certain openness to (or even curiosity for) topics that were new and foreign to them and trusted that I knew what I was doing. The flip side of the coin is that as soon as they saw potential in me and believed I could advance to an academic career, they warned me about the risk or even aimlessness of devoting myself to a topic that (from their point of view) stands at the very periphery of linguistics, far removed from what is considered mainstream. As you are reading this, you already know how I decided.

Funnily, even if the predominant lack of writing-related classes in linguistics programs implies it, it is not as if linguistics has ignored writing completely. In 1952, with Gelb's *A Study of Writing*, an important and influential book was published on the topic. In 1988, in the German-language area, the term *Schriftlinguistik* was first used (cf. Nerius and Augst, 1988). In 2002, a successful textbook on said Schriftlinguistik was released that has since been (re)incarnated in five editions (the latest being Dürscheid, 2016). In the late 1990's, with the workshops of the *Association of Written Language and Literacy*, a writing-related conference series emerged and the first journal explicitly dedicated to writing was founded—*Written Language and Literacy*. In 2018, Peter T. Daniels, widely considered the most important scholar invested in historical and typological aspects of writing, published a book encompassing decades of his research. In 2019, an open-access book series was conceived that is explicitly devoted to grapholinguistics, *Grapholinguistics and Its Applications*. And in 2020, a chair for Schriftlinguistik was advertised at the University of Hamburg.

By only looking at this very selective list of highlights in the history of grapholinguistics, it is undeniable that there have been (and still are) many (ongoing) positive developments. Within the exclusive club of 'grapholinguists' (or whatever one might call them/us), that is. This exclusivity gets palpable when you attend a general linguistics conference, where it may happen that you're treated as if you were an alien—by linguists who, of course, all know what a phoneme or a morpheme is (as do you), since that is uncontroversially considered required knowledge among linguists, but often have no idea about even the basic concepts of writing, which is again a symptom of the general lack of writing-related classes in the curricula of linguistic programs and the low status it oc-

---

5. A modified version of this thesis was published as a book, Meletis (2015).

cupies in linguistics in general. Concerning said status, it certainly does not help that one of the few journals specifically devoted to writing, *Writing Systems Research*, was ceased in 2020 (see below for other journals). In a note in the final issue, the publisher states as a reason "difficult decisions about where and how [publishers, editors, and authors] focus their attention" and thanks "the readers and authors from across the world, for your support and commitment to the Journal's vision of creating a community around shared interests in writing systems" (Routledge and Francis, 2019, p. 239). Well, a community that now has lost an important outlet for publishing its research. Let me explain why this is by no means a trivial loss, again with a personal example.

For one paper that I wrote, I intentionally attempted to find a journal that was *not* specifically focused on writing since I believe once in a while it is important to underline in the context of general linguistic journals that writing is a phenomenon that people are studying (and thereby show that it is worthy of linguistic study). I will not name the journals here, but the paper was rejected three times. The first two times, the editors had not read the paper and had not sent it out to reviewers. In the first of those cases, the editor asked me whether I had even familiarized myself with the content the journal publishes (I had) and explained to me that, even though this is a journal about reading and writing, and structural, i.e., descriptive works on writing systems had been published there before, my research did not fit the journal. The editor of the second journal, a fairly young open access journal, responded almost immediately that my paper sounded very interesting but that it unfortunately would not fit the journal. Honestly, it does get a bit frustrating when you are rejected not on the grounds of poor quality of your work but because of what you chose to work on. At the third journal, finally, the editors did read my paper, and according to the editor who then sent me the rejection, they had discussed my paper and came to the conclusion that it is interesting and good but does not fit the journal—it would rather be a good fit for a handbook (well, show me a handbook and I'll gladly submit it there). I was on the verge of giving up when the fourth journal (fortunately also a general linguistics journal) sent my paper out to reviewers. A few months later I was sent two of the most positive reviews I have ever received, and soon after, my paper was published. This leads me back to what I said before: that *Writing Systems Research* was ceased is not trivial. We *need* journals for (purely) grapholinguistic research. I want to complement this with an example that additionally highlights the relevance of grapholinguistic conferences: as James Myers, whose illuminating and innovative work on the Chinese writing system was published in Myers (2019) and, in my opinion, is an invaluable contribution to grapholinguistics, noted anecdotally at *Grapholinguistics in the 21st Century*, a paper in which he aimed to present his writing-related research was rejected at a linguistics conference. The first negative review

(which is available to read on Myers' website),[6] whose overall evaluation was "strong reject," states, among other things, that "[t]here is no parallel between orthographies, created by man and to be learnt/taught explicitly, on the one hand, and human language, which is precisely acquired by any child without explicit learning/teaching" (cf. also Daniels, 1991 for a similar view from—arguably—*within* grapholinguistics). Personally, I would give a 'strong reject' to this incredibly reductive and simplistic view. The second review, whose overall evaluation is "reject," plainly reads: "This paper does not deal with linguistic matters, it only discusses graphic and orthographic points." It is a slap in the face that general linguists' horizons can be so utterly limited and that writing so often is not considered a 'linguistic matter'. This is why we *need* grapholinguistic journals and conferences. However, at the same time—however frustrating the process may be—it is also paramount that research on writing becomes more visible also in outlets that are reserved for general linguistics and the fields that are uncontroversially believed to be a part of it. Writing is no marginal phenomenon, certainly not in our everyday lives but also not in many scientific disciplines, no matter how one puts it. Why, then, is studying it marginalized so much?

A further issue that an emerging grapholinguistics faces is that the diverse backgrounds brought to the table by different researchers are not always seen as a strength but instead lead to fragmentation and often unfruitful debates within the 'discipline'. No one would deny that writing is a complex phenomenon and as such can be comprehensively treated only by a combination of multiple disciplines. In this vein, it is paramount to keep in mind that even though one (understandably) often thinks one's own perspective is the most relevant one, other perspectives also have a *raison d'être*. Also, different perspectives usually do not exclude let alone negate one another. When a scholar carries out psycholinguistic research on writing, this does not mean that sociolinguistic research on writing is not also important. In turn, when one works on sociolinguistic questions, this does not mean descriptive structural questions are irrelevant. I have experienced this first-hand: much of my work, starting with my description of the materiality-oriented field of graphetics and moving on to attempts at defining comparative concepts such as *grapheme* and *allography*, can undeniably be interpreted as being influenced by the structuralist paradigm (although I would not call myself a structuralist). This has been criticized by sociolinguists despite the fact that nowhere in my work do I state that sociolinguistic research is unimportant or unnecessary (because I don't, in fact, believe that it is unimportant). One can strive to descriptively systematize structural concepts and terminology that concern writing and still believe that,

---

6. Both reviews can be found at `http://personal.ccu.edu.tw/~lngmyers/CharFormBorrowing_Reviews.txt` (October 21st, 2020).

since writing is at its core a cultural technique and a way of communicating, scribal practices of users in literate communities are of course a form of social action and of the utmost importance. In other words, the first of those questions does in no way devalue the second. Indeed, both of them are indispensable and should be *combined* (sometimes unthinkable for scholars deeply rooted in a particular paradigm) rather than secluded from one another. Of course, through our academic socialization, we all have come to position ourselves in specific paradigms within our respective disciplines. But when we all study the same phenomenon, we need to make sure the walls of these paradigms and disciplines are permeable.

Conferences like *Grapholinguistics in the 21st Century* offer opportunities to gather and share with each other respective expertises and perspectives on writing. The question, now, is whether one wants to stop at being in awe for such different perspectives (usually displayed by expressing gratefulness to presenters right after they've finished presenting, e.g., by saying "Thank you for this interesting talk, I've never thought about it that way/I've never even considered this/this was completely new to me") or rather wants to incorporate them into their own research—either through collaboration or through going the extra mile and immersing oneself in them. This is not to say that either of those alternatives is the 'right' one. But it is almost trivial to state that an interdisciplinary grapholinguistics can benefit more when we cease to (only) do 'our own thing'. This, of course, is much easier said than done. A challenge one must face in this vein is breaking through language barriers. A literal language barrier is constituted by the fact that valuable research on writing has been published in countless languages, including German, Russian, French, Italian, Japanese, Korean, and many more. In the past, this has led to unproductive discourses due to a lack of reception of non-English literature[7] (of which I myself am guilty, with the exception of German-language literature, which as an L1 reader of German I did of course consider). A metaphorical language barrier is erected by specific methods and terminology that are used in different disciplines. As concerns the future of grapholinguistics, researchers can contribute to improving this situation. Firstly, by publishing important findings (also) in English. I want to emphasize that this does *not* mean one should cease to publish in one's own language (as the dominance of English as an academic *lingua franca* is indeed to be scrutinized); yet, if one wants ideas to be adopted more globally (or even noticed in the first place), at least key points need to be made available and dis-

---

7. This leads to situations like Peter T. Daniels' rejection of a structural graphem(at)ics (Daniels, 1991), which, however, had been firmly and uncontroversially established in the German-language grapholinguistic realm (cf., for example, Günther, 1988).

persed in English so that other scholars become aware of the original work in whatever language it was published (cf. for terminological discrepancies when publishing in English below). The second problem, unfortunately, is not as easily solved given that we cannot simply start to—put very crassly, apologies—'dumb down' research in order to make it more easily comprehensible to scholars foreign to our discipline. At least not if we strive to publish it in (conservative) outlets that are positioned firmly in the centers of respective disciplines, which of course in this day and age is vital for our careers. But then there's *Written Language and Literacy*, for example, or *Scripta*, or *Visible Language*—journals that are openly interdisciplinary and that publish research that may require less specialist knowledge in a given area. Research that speaks to a broader audience.

As I mentioned above, if one is not already tenured (and maybe even then), devoting oneself to grapholinguistics entails a few risks. One of them is that by wanting to be part of many clubs, you're not really part of any one of them. With one exception (see above), there are no grapholinguistic chairs (that I know of) and it is unlikely that this will drastically change in the near future. When it comes to job profiles, thus, no matter whether you are originally a linguist, psychologist, anthropologist, computer scientist, etc., when applying for academic positions, grapholinguistic research is not 'worth' the same as research tackling mainstream questions at the center of these disciplines. It is sometimes seen as icing on the cake—a special interest or even a 'hobby' (cf. Meletis, 2020a). It is none of those things. It is the study of one of if not *the* most important inventions and technologies of humankind that has implications for a myriad of fields. However, as long as this lack of institutionalization exists (which starts with the above-mentioned lack of writing-related classes), scholars who engage only or predominantly in grapholinguistics (such as yours truly) will remain exceptions (who will likely struggle to find suitable positions in academia).[8]

When looking at the last few paragraphs, it appears that musing about grapholinguistics tends to turn pessimistic fairly quickly, which raises the question: why even be(come) a grapholinguist? Well, let's start with the most important (if of course subjective) point: it is an in-

---

8. At this point, I have to admit that when I was asked for career advice once (I was very surprised that someone would come to me for that), I suggested the person embrace their interest for writing *but* make sure their research is also firmly rooted in another field—such as psycholinguistics—and labeled primarily as such—i.e., psycholinguistic research—in order to ensure that the person has better chances of getting a job down the road. So I am guilty of acting in a way that contradicts most of what I state in this essay. But while I myself 'took the risk' of concentrating on the subject of writing and may not get a job at some point for this very reason, I did not want to be responsible for someone else not succeeding—even if that means there will never be many people who 'just' or primarily do grapholinguistics.

credibly fascinating field. Ironically, some of the reasons for this were already named above—but as challenges of grapholinguistics: it is an utterly interdisciplinary and, technically, still nascent field. The former results in the fact that there are countless questions one can ask about writing from many different (combinations of) perspectives, and the latter means that many of those questions have actually not yet been studied. Grapholinguistics, to a large degree, is uncharted territory. For scholars who see research as a discovery process (probably most of them), this is a very attractive quality. Don't get me wrong: many aspects of writing have of course already been illuminated, including large portions of its history, many facets of its processing (i.e., reading and writing, although research to this day remains largely alphabeto-centric, cf. Share, 2014), and even the structure of many major and some minor writing systems (cf., for example, the many chapters in Daniels and Bright, 1996 or Günther and Ludwig, 1994). What is missing in this impressive accumulation of research, however, is a guiding thread, which one could argue is the substantial equivalent (and simultaneously symptom) of the lack of institutionalization and the fact that everyone is doing 'their own thing'. A guiding thread would need to address questions such as: how is the history of writing connected to how humans process written words? How is processing affected by the structure of writing systems? Questions like these require the establishment of links between different disciplines (linguistics, psychology, sociology, cognitive sciences, computer sciences, etc.) and the consideration of diverse types of data. However, even within a single of the listed areas, links are often scarce: when linguistic descriptions of individual writing systems stand side by side and are not put into a larger context, for example, we are wasting the potential that these otherwise invaluable descriptions may have for comparison and the establishment of a unified conceptual and terminological framework that is, for this very reason, still lacking (cf. Meletis, 2019 for the specific example of the concept of *grapheme*). Since new research should be informed by past research and not everyone who works on a specific question has the time to excessively search for everything that has been said about a topic from different perspectives, what we also require but largely lack thus far is, at a meta-level, a historiography of grapholinguistics—which is also a fascinating area and one that I aim to attend to in the future.

Turning to existing grapholinguistic research to discover commonalities and systematize them in order to arrive at the above-mentioned guiding thread is in itself certainly not a 'flashy' endeavor. It is definitely not as innovative as carrying out your own research (and data collection) to answer your own (new) exciting questions. However, it is undeniably necessary in establishing a firm theoretical ground for grapholinguistics. Thus, not only innovation but also systematization is vital to the advancement of grapholinguistics (and any field, for that

matter). And it should be emphasized that when it is successful, systematization can actually enable innovation. Which leads back to my own grapholinguistic 'journey': At one point—arguably also due to my affinity for theory—I realized my biggest goal would be to systematize some of what was already there, i.e., to take a step back and see the bigger picture, to connect dots that were yet unconnected. Years ago, I had stumbled across the many compelling reviews semiotician W. C. Watt had written about important works on writing. In one of them (Watt, 1998) he assessed that there was no 'theory of writing' yet. In other words, he, too, observed that much great work had been done to study writing from many angles, but the fact that scholars from diverse disciplines did not seem to actively notice research from disciplines other than their own held back the development of what Watt termed a theory of writing—a theory that does not exist to this day. A central quote in Watt's (1998, p. 118) review further specifies what kind of theory he envisioned, "a theory that would explain […] why each […] writing system is the way it is, instead of some other way, and why all […] writing systems have in common what they have in common." This quote obviously shifts the perspective from description—*how* writing systems are structured—to the additional and more elaborate perspective of explanation—*why* they are structured that way. This desideratum of an explanatory theory of writing became one of the driving forces behind my PhD thesis.

The second driving force was my encounter with an—at least nowadays—little-known linguistic theory, Naturalness Theory, which is actually a collection of subtheories, the main ones of which deal with phonology and morphology. As mentioned above, during my studies, I seized every opportunity to work on writing-related topics, so my thinking had already been tuned to 'what could/does this mean for writing?' when I encountered Naturalness Theory. And indeed, this theory appeared to offer so much of what was needed for a prospective theory of writing: it describes structures *and* asks how they affect processing while also considering sociocommunicative needs and practices. Also, what was immediately attractive was the explicit distinction of a universal level, a typological level, and a system-dependent level of analysis. Grapholinguistic research has been carried out predominantly at the system-specific level, partially also at the typological level (which, however, is not to be reduced to the assumption of writing system typologies, which have been proposed quite productively, cf. Joyce and Borgwaldt, 2011). The universal level, by contrast, has remained largely unstudied. All of these facets of Naturalness Theory, of course, do not sound unique to linguists, as they are characteristic of the functionalist paradigm (the most prominent approaches of which are, nowadays, usage-based approaches). Furthermore, what has been frequently scrutinized when it comes to the naturalist paradigm is the eponymous notion of 'naturalness' itself. On the surface, because of its evaluative na-

ture as an everyday term, it appears to be a potentially controversial concept, but in fact it is roughly the opposite of 'markedness' (as established in markedness theories) and, in usage-based terms, simply means 'easy to process for users'. Thus, searching for what is 'natural' in writing—which is important for the discovery of universals of writing—does not contradict the fact that writing is, of course, an artifact, a *cultural* technique that differs in fundamental respects from language *per se*. It is rather a search for natural features *in* or *about* the cultural and artificial—features that were presumably introduced by prolonged use by humans (and their physiology, cognition, etc.).

In short, being familiarized with Naturalness Theory was the second piece of the puzzle that led me to the topic of my PhD thesis. Interestingly, two scholars (cf. Munske, 1994, Baroni, 2011) had already attempted to (partially) transfer naturalist concepts to writing. It was my goal to take this further. The first challenge in doing so, however, was that the original linguistic branches given the naturalist treatment—phonology and morphology—were already well-described when Natural Phonology (cf., exemplarily, Donegan and Stampe, 2009) and Natural Morphology (cf., exemplarily, Dressler, Mayerthaler, Panagl, and Wurzel, 1987), the respective main subbranches of Naturalness Theory, were conceived. The same cannot be said for grapholinguistics. What I have commented on at great length in various publications is that there is no unified descriptive—terminological as well as conceptual—framework for describing diverse writing systems. Such a framework would allow comparisons, but it appears that up until a while ago, scholars of writing adhered to a particularist view (cf. Meletis accepted) and thus believed the diversity of writing systems made the definition of grapholinguistic concepts (such as grapheme, allography, graphotactics) unfeasible.[9] A general shift in perspective that could help in this respect is the one from narrow descriptive categories to looser comparative concepts (cf. Haspelmath, 2010). Graphemes of different writing systems, for example, have to share several core features which are thus inherent to the definition of the grapheme. When the grapheme is conceived of as a comparative concept, now, the details that go beyond these core features are not set in stone. This means, for example, that the obvious fact that Chinese and English graphemes differ in some respects ceases to be a counterargument against the feasibility of defin-

---

9. Indeed, when considering major works on writing systems such as Coulmas (2003), Rogers (2005), Gnanadesikan (2009), Sampson (2015), or Daniels (2018), it becomes obvious that they all juxtapose different systems (mostly by treating them in dedicated chapters). Thus, an individual, system-specific perspective clearly dominates, sometimes with contrastive undertones (i.e., alphabets differ from abjads in these respects: …), whereas a comparative perspective is seldom adopted. Comparison, however, is needed for the definition of grapholinguistic concepts such as *grapheme*.

ing a grapheme in the first place. The same can be argued for other grapholinguistic concepts. Being a theoretician at heart and seeking order, it is those descriptive comparative concepts that I first turned to before turning to explanation, which was my main goal. These concepts are in many ways preliminary and likely error-prone because at this stage, they have not incorporated all diverse types of writing systems. My personal aim was to at least take into account major representatives of each type of writing system (following Daniels' 2017 typology), which inevitably leaves many more marginal systems and exceptions unaccounted for. (Which—if you feel addressed at this point—is where you could step in.)

Explanation, then, is of course the even trickier part. According to Naturalness Theory (and many other functional theories), explanations can be attained with the help of external, extralinguistic evidence. In the case of writing, the various forms in which this evidence manifests itself are manifold and come from the most diverse fields, which is of course a challenge for a person who is most often only trained in one field (see above). Indeed, explaining why writing systems are the way they are— as Watt envisioned—is an incredibly ambitious endeavor. What is a prerequisite for it to be successful is knowing *how* one could go about in finding it out. Which is why, with my published PhD thesis *The Nature of Writing: A Theory of Grapholinguistics* (Meletis, 2020a), I am not offering a full-fledged theory of writing but a sketch of a theory of writing, a roadmap of steps necessary to arrive at a theory of writing and, in the process, I actually attempt to take some of those steps myself. This sketch will need to be extended, revised, and, most importantly, filled in with data from writing systems that have not yet been included, as mentioned above.

The basis for explanation is also the very core of usage-based approaches to linguistics: the structure of language and the use of language (and its users) interact. Accordingly, a truly comprehensive theory must consist of a descriptive part and an explanatory part. Considering both structure and use also accounts for the fact that grapholinguistics is interdisciplinary. Structure is mainly attended to by linguistics (or, more generally, semiotics), different facets of use—among them processing and communication—are studied by psycholinguistics and sociolinguistics, among other fields. In short, a theory of writing has to treat writing *simultaneously* as a graphic (i.e., visual and/or tactile) semiotic system that relates to language, a form of data transmission that needs to be processed, a medium of communication, and a cultural technique. Of course, writing can also be studied from only one of those perspectives at a given time, but arguably, a theory of writing must be capable of accounting for all of its functions and 'identities', which leads to an assumption of four intricately interacting 'supercategories' of criteria (which I have termed 'fits', cf. Meletis, 2018; 2020a) that are of system-

atic, semiotic/descriptive, psycholinguistic, and sociolinguistic nature. These supercategories are generally useful in treating individual writing systems or comparing them with one another—but already from an explanatory rather than a purely descriptive perspective.

What I want to emphasize here without reiterating everything that is stated in my thesis is: a theory of writing does not need to be constructed from scratch. And Naturalness Theory is of course not the only theory that can be used as a basic framework for a theory of writing—indeed, a mixture of different theories might actually be the best solution. Transferring concepts from an existing linguistic theory to the study of writing is in a way innovative in that the fewest linguistic theories explicitly treat writing. In a nutshell, the dominant linguistic paradigms largely ignore writing, to this day. This means that grapholinguistics is not just considered 'niche' because the object of writing is seen as marginal but also because major theories have not even attempted to include it, which is a shame since writing can be studied with many of the useful tools that have been established in linguistics. For this reason it is not understandable (to me) that linguists often appear to know so little about writing or simply do not care about it: writing, in so many respects, is just like language—only in a microcosm (cf. Meletis, 2020a). This goes against the detrimental misconception (which was cited above) that there are no parallels between language and writing because the former is acquired naturally while the latter is taught. Indeed, the similarities between language and writing are actually unsurprising given that writing, as one of three modalities of language (the others being spoken language and sign(ed) language), *is* language.[10] Also, languages are semiotic systems, as are writing systems. A crucial difference between them is that writing is a much more manageable phenomenon than language. Reasons for this include that there are fewer types of writing systems than language types and, of course, fewer writing systems in total than languages of the world. The history of writing is also much shorter than the history of language, its development much more reconstructable, since writing is not fleeting like speech and we have records of it that go back thousands of years. All of this makes writing an attractive object of research. And given that the majority of linguistic research relies on writing (cf. the *written language bias*, Linell, 1982), it is hypocritical for linguist(ic)s to continue excluding it. I want to go even further to show how fundamentally writing affects us (its users) as well as language: in my next grapholinguistic/sociolinguistic research project, I will investigate how the structure of different writing systems (such as Norwegian, Japanese, German) as well as specific sociolinguistic embeddings/circumstances

---

10. Take the concept of allography: its different types that are found in the world's writing systems behave exactly like allophony and allomorphy (cf. Meletis, 2020b), and no one would deny that phonology and morphology are parts of language.

of literacy and scribal practices influence categories of normativity that help users evaluate as (in)correct, (in)appropriate, etc. not only writing but language in general. In a nutshell: whether there is an orthographic relativity to linguistic normativity (cf., for a similar question, the interesting-looking new book by Hye Pae, cf. Pae, 2020). What is clear already at this point—and few people would dispute this—is that in literate cultures, writing has been a game-changer. It is naïve to believe that comprehensive linguistic theories can afford to ignore it (cf., in this context, for the extreme psycholinguistic/cognitive position that units of language such as the phoneme, word, and sentence, are constituted by writing, Davidson, 2019).

While there used to be no grapholinguistic community (at least on a global scale, as there did exist local communities such as several writing-related groups in Germany in the 1980's), I am happy to observe that this has changed, and an international community is slowly starting to form itself—not least because of conferences like *Grapholinguistics in the 21st Century* or the workshops of the *Association of Written Language and Literacy*. Since we are few (at least in comparison with communities in other linguistic subfields)—and this may sound overly emotive—we must stick together, also to exude some unity and coherence to outsiders of the field. Thus, I am urging everyone who is interested in writing from any given perspective or discipline to feel included in this community, regardless of whether one agrees with the label or not. In the end, it does not matter whether we call this endeavor 'grapholinguistics'—it is our shared interest in writing that counts, and everyone who studies writing brings something to the table that potentially enriches the field. However, in order to work together, as outlined above, we must (be willing to) cross linguistic, theoretical, and methodological boundaries. Diversity is a strength, not an obstacle. And I am hoping for or—phrased more positively—looking forward to witnessing (and also participating in) many cross-disciplinary collaborations in the future.

A final note on terminology and openness: I am not saying we should not engage in fruitful discussions about certain terms—provided these discussions also bear on the conceptual level of the terms and are not purely terminological. Thus, it is justified to discuss whether there is such a thing as a grapheme while it is unproductive to fight (at least extensively) over how to call it when both arguing parties actually agree on the concept behind it. Since grapholinguistics subsumes so many fields, perspectives, and academic cultures and traditions, it is inevitable that some terms may not be accepted by everyone right from the start. But what I want to argue for here is that one should still be open to them. Let me provide two examples: the term *graphetics*, I was told, because of the *-etics* and the emics/etics dichotomy it connotes, will be dismissed by sociolinguists who believe that the material and formal appearance of writing also has functions (which of course it does), and it will be rejected to

such a degree that—and I was told this by someone standing at the threshold of grapholinguistics and sociolinguistics—sociolinguists will not read a book when it lists *graphetics* as a subject in its table of contents. This, however, would preclude them from finding out that the term may be defined in a manner that includes functional aspects and accounts for all sorts of questions that pertain to the materiality of writing, not just formal and structural ones (as the term admittedly suggests). This is what I mean by 'openness', or the lack of it, to be precise. However, being open also means being willing to rethink or abandon certain terms when other perspectives or suggestions come along—such as when a term is proposed that is demonstrably terminologically more inclusive than *graphetics*.

A second example of this concerns the term *orthography*. In anglophone literature, it is largely used in a descriptive sense, sometimes as a synonym of writing system. I have argued in some places (e.g., Meletis, 2018; 2020a) that *orthography* should not be used in this descriptive sense as it more fittingly denotes the prescriptive regulation of a writing system (and, thus, only part of a writing system, which means the two terms are not synonymous), cf. Greek ὀρϑός *orthós* 'right, true (*also*: straight, erect)'. This is admittedly a hard pill to swallow for people who have become accustomed to using *orthography* descriptively (a perspective for which other traditions have used terms like German *Graphematik*, Italian *grafematica*, or French *graphématique*, which in English is of course *graphematics*). I've been told repeatedly that this distinction between orthography and graphematics is Germano-centric as it only pertains to German with its external orthographic regulator (the *Council for German Orthography*) that curtails the theoretically possible variants provided by the graphematics of the writing system. Indeed, the perspective I am coming from is germanophone, and in German, the distinction between *Graphematik* and *Orthographie* has a long tradition. This conceptual distinction, however, is by no means only useful or even necessary for German. There are external orthographic regulations also for the writing systems of Spanish, Norwegian, Dutch, French, Italian, Korean, etc. Thus, it is actually the other way around: insisting that orthography is a descriptive term is Anglo-centric. English is an 'outlier' writing system not only when it comes to reading research (cf. Share, 2008) but also when it comes to the self-regulating nature of its prevalent norms. What I want to say is: no one wants to devalue or delegitimize these past uses of *orthography*. Going forward, however, in the sense of a more inclusive and comparative study of writing that brings together different scholarly traditions (such as the Anglo-American and German traditions), it can be good to rethink certain practices, and the use of terminology— again, if it entails conceptual consequences as well—is a part of that.[11]

---

11. Another example is the use of *logography* instead of *morphography*, often justified by the claim that one should not abandon established terms.

And again: scholars interested in writing should of course engage in discussions and it is self-evident that they will not always agree on everything. But it is important to ensure discussions have useful outcomes and are not driven by vanity and lead to stagnation or fragmentation. I have revised terms that I had coined myself (such as 'graphic word' in Meletis, 2015) because I later found they were actually not fitting. Research is never a done deal, especially so in a still-emerging field like grapholinguistics—which occasionally means it is necessary to revise opinions but also makes the field all the more exciting.

At the end of this essay, I want to cite Baroni's (2016, p. 291) plea: "Most linguists, when dealing with graphemics, written language, writing systems and orthography, feel the need to justify themselves. It is about time to change this attitude and to stop feeling guilty about treating graphemics as part of linguistics." In my opinion, there is no better way of putting it. Personally, I have stopped justifying my interest in writing. Thus, this essay is not to be read as a justification, but a reckoning of sorts, outlining why one shouldn't (have to) justify. You should try it too, it feels good. At the end of the day, it's very simple: writing is a fascinating and important subject and deserves to be studied for its own sake—which is why I am happy to be a grapholinguist.

References

Baroni, Antonio (2011). "Alphabetic vs. non-alphabetic writing: linguistic fit and natural tendencies." In: *Rivista di Linguistica* 23.2, pp. 127–159.

———— (2016). "Constraint interaction and writing systems typology." In: *Dossiers d'HEL, SHESL* 9, pp. 290–303.

Coulmas, Florian (2003). *Writing systems: an introduction to their linguistic analysis*. Cambridge Textbooks in Linguistics. Cambridge: Cambridge University Press.

Daniels, Peter T. (1991). "Is a structural graphemics possible?" In: *LACUS Forum* 18, pp. 528–537.

———— (2017). "Writing systems." In: *The handbook of linguistics*. Ed. by Mark Aronoff and Janie Rees-Miller. Oxford: Wiley-Blackwell, pp. 75–94.

———— (2018). *An exploration of writing*. Bristol: Equinox.

Daniels, Peter T. and William Bright (1996). *The world's writing systems*. Oxford: Oxford University Press.

Davidson, Andrew (2019). "Writing: the re-construction of language." In: *Language Sciences* 72, pp. 134–149.

Donegan, Patricia and David Stampe (2009). "Hypotheses of Natural Phonology." In: *Poznań Studies in Contemporary Linguistics* 45.1, pp. 1–31.

Dressler, Wolfgang U. et al. (1987). *Leitmotifs in Natural Morphology*. Vol. 10. Studies in Language Companion Series. Amsterdam, Philadelphia: John Benjamins.

Dürscheid, Christa (2016). *Einführung in die Schriftlinguistik*. 5th ed. Göttingen: Vandenhoeck & Ruprecht.

Gelb, Ignace J. (1952). *A Study of Writing*. Chicago: University of Chicago Press.

Gnanadesikan, Amalia E. (2009). *The Writing Revolution. Cuneiform to the Internet*. Malden, MA: Wiley-Blackwell.

Günther, Hartmut (1988). *Schriftliche Sprache: Strukturen geschriebener Wörter und ihre Verarbeitung beim Lesen*. Vol. 40. Konzepte der Sprach- und Literaturwissenschaft. Berlin, Boston: De Gruyter.

Günther, Hartmut and Otto Ludwig, eds. (1994). *Schrift und Schriftlichkeit/ Writing and its use*. Vol. 10.1, 10.2. Handbooks of Linguistics and Communication Science. Berlin, Boston: De Gruyter.

Haspelmath, Martin (2010). "Comparative concepts and descriptive categories in crosslinguistic studies." In: *Language* 86.3, pp. 663–687.

Joyce, Terry and Susanne R. Borgwaldt (2011). "Typology of writing systems: special issue introduction." In: *Written Language & Literacy* 14.1, pp. 1–11.

Linell, Per (1982). *The written language bias in linguistics*. Linköping: University of Linköping.

Meletis, Dimitrios (2015). *Graphetik: Form und Materialität von Schrift*. Glückstadt: Verlag Werner Hülsbusch.

——— (2018). "What is natural in writing? Prolegomena to a Natural Grapholinguistics." In: *Written Language & Literacy* 21.1, pp. 52–88.

——— (2019). "The grapheme as a universal basic unit of writing." In: *Writing Systems Research* 11.1, pp. 26–49.

——— (2020a). *The Nature of Writing. A Theory of Grapholinguistics*. Vol. 3. Grapholinguistics and Its Applications. Brest: Fluxus Editions.

——— (2020b). "Types of allography." In: *Open Linguistics* 6, pp. 249–266.

——— (accepted). "Universality and diversity in writing systems." In: *LACUS Forum* 46.

Munske, Horst H. (1994). "Ist eine "natürliche" Graphematik möglich?" In: *Probleme der Graphie*. Ed. by Otmar Werner. Vol. 57. Script Oralia. Tübingen: Gunter Narr, pp. 9–24.

Myers, James (2019). *The grammar of Chinese characters: productive knowledge of formal patterns in an orthographic system*. London: Routledge.

Nerius, Dieter (1988). "Einleitung." In: *Probleme der geschriebenen Sprache. Beiträge zur Schriftlinguistik auf dem XIV. internationalen Linguistenkongreß 1987 in Berlin*. Ed. by Dieter Nerius and Gerhard Augst. Vol. 173. Linguistische Studien. Berlin: Akademie der Wissenschaften der DDR, pp. 1–3.

Nerius, Dieter and Gerhard Augst, eds. (1988). *Probleme der geschriebenen Sprache. Beiträge zur Schriftlinguistik auf dem XIV. internationalen Linguisten-kongreß 1987 in Berlin*. Vol. 173. Linguistische Studien. Berlin: Akademie der Wissenschaften der DDR.

Pae, Hye K. (2020). *Script Effects as the Hidden Drive of the Mind, Cognition, and Culture*. Vol. 21. Literacy Studies. Cham: Springer.

Rogers, Henry (2005). *Writing systems: a linguistic approach*. Oxford: Wiley-Blackwell.

Routledge, Taylor and Francis (2019). "Note from the publisher." In: *Writing Systems Research* 11.2, p. 239.

Sampson, Geoffrey (2015). *Writing systems: a linguistic introduction*. 2nd ed. Bristol: Equinox.

Share, David L. (2008). "On the Anglocentricities of current reading research and practice: the perils of over-reliance on an "outlier" orthography." In: *Psychological Bulletin* 134.4, pp. 584–616.

———— (2014). "Alphabetism in reading science." In: *Frontiers in Psychology* 5.752.

Watt, W.C. (1998). "The old-fashioned way." In: *Semiotica* 122.1–2, pp. 99–138.

Comparative Perspectives
on the Study of Script Transfer,
and the Origin of the Runic Script

Corinna Salomon

Abstract. The paper discusses a series of cases of script transfer with regard to the role played by script inventors in an effort to determine whether a premise held by certain scholars in runology, viz. that scripts are always created by individuals, is warrantable.

1.   Preliminary Remarks

When setting out to research the derivation of the Runic script, the scholar soon finds that—even considering the appeal that is particular to questions about first beginnings and origins—the amount of literature dedicated to this problem exceeds expectations. Making this observation is in fact a commonplace of runology, serving as introduction to numerous studies concerned with the issue.

> Die frage nach dem alter und dem ursprung der runen ist so oft aufgeworfen und auf so viele verschiedene weisen beantwortet worden, daſs man fast versucht sein könnte zu sagen, daſs alle möglichen, denkbaren und undenkbaren ansichten zu worte gekommen sind. [...] Es ist eine sehr groſse literatur, die hier vorliegt; aber die qualität steht leider im umgekehrten verhältnis zur quantität.[1]

This paper represents a slightly reworked section of my doctoral thesis *Raetic and runes. On the North Italic theory of the origin of the Runic script* (University of Vienna 2018).

Corinna Salomon   ![ORCID] 0000-0001-7257-6496
Institut für Sprachwissenschaft, Universität Wien,
Sensengasse 3a, 1090 Wien, Austria
E-mail: corinna.salomon@univie.ac.at

1. "The question of the age and the origin of the runes has been asked so often and answered in so many different ways that one might almost be tempted to say that all possible, plausible and absurd views have been heard. [...] It is a very large literature that exists here; but unfortunately the quality stands in inverse relationship to the quantity."

The above quote is a representative example—the fact that it dates from 1887, being a passage in Ludvig Wimmer's *Die Runenschrift* (p. 11), which is widely considered to mark the beginning of modern Runic studies, should serve to convey an idea of the present state of affairs.

Curiously, the topic's popularity is due not so much to the pull of the challenge to find a plausible explanation at all, but to the abundance of possible solutions which suggest themselves. The difficulty lies not in constructing a (more or less) convincing argument, but, faced with a host of such, in comparing, assessing, and ultimately choosing that path through the thicket which one considers least fraught with obstacles— for, after all, few models yet have been conclusively disproved, and none was so compelling that somebody else did not prefer another (Williams, 1996, p. 121; Williams, 1997, p. 190). Arguments are adduced from all relevant fields—linguistics, archaeology, ancient history, grammatology, and their various subfields. Much hinges on the weighting of the different aspects, as the starting point often determines the result (Heizmann, 2010, p. 18); comparing and weighing the models against each other becomes an almost hopeless endeavour (Barnes, 1994, p. 12f)

To a certain extent, the possibility of a piece of data being assessed differently, its being considered relevant to the issue or not, is rooted in the methods proper to the humanities. Still, there are some recurring points in the discussion of the Runic origin-question which may be either cleared up or at least shown to involve matters which are not sufficiently well understood currently to be used to build theories on. For example, alphabet history or, generally, script history is regularly, yet usually somewhat vaguely referred to in the literature. There are a number of claims and premises which relate to historical and comparative grammatology—concerning for example the likelihood of source eclecticism in the development of new scripts, the validity of the argumentum ex silentio with regard to evidence gaps, or the role of orthographic features such as writing direction in script transfer—which have been employed as arguments in the discussion of Runic derivation, and I believe that something can be gained—if not in terms of concrete results, then at least methodologically—from a comparative investigation of these issues, to determine whether such claims are justified, whether they must be refuted, or whether their argumentative value is in fact nil. Systematic comparative studies of script transfer would benefit not only runology and other epigraphic/palaeographic fields which could profit from substantiated comparative and typological data, but also the study of historical grammatology per se.

This paper, like the presentation on which it is based, represents a small and selective contribution to one of these very large and general issues of script history: how do new scripts come into being? Specifically: do new scripts "develop" or are they "created"? Do they emerge through gradual diffusion, or are they the work of purposeful inven-

tors? The question is at the same time fundamental and elusive, and the answer (either of the two, or a more differentiated one) may seem obvious to many scholars. Still, unargued statements about how script is thought to be transferred to a new writing community is found in the—not only runological—literature, whereas I have not come across an explicit discussion of the matter, which I think the topic warrants. This paper cannot, of course, serve as a comprehensive study, but is intended as a stimulus for future research.

2.   Runic Derivation

2.1.   The Search for the Model

For general orientation, a short summary of the issues involved in the quest for the model of the Runic script is in order. The older fuþark, the oldest rune row as shown standardised in tab. 1, was used by speakers of Germanic languages between the 2nd and 8th century AD. It is an alphabetic script, and similarities to the Mediterranean alphabets are immediately evident, e.g., ◊—iota, ∫—sigma, ß—beta, ⌐—lambda. Upon closer inspection, however, many of the individual letter shapes and grapheme-phoneme correspondences are quite surprising insofar as they find no clear models in the south, e.g., ᛗ /e/, ᚹ /w/, ◊ /ŋ/. Runic equivalents of alphabetaria show that the order of the row is entirely different—hence the term *fuþark* instead of *alphabet*. The letter names given in tab. 1, though fully transmitted only in later mediaeval sources, can be quite reliably shown to go back to at least the 4th century—unlike the Mediterranean letter names, let alone the simple syllabic letter designations of Latin, the names of the runes are lexically meaningful in the language which the letters denote.

TABLE 1.   The normalised letter forms of the older futhark together with their transliteration, (supposed) phonetic values, and the (sometimes only tentatively) reconstructed Proto-Germanic rune names (following Düwel, 2008, p. 198f)

ᚠ	**f**	*f*	**fehu*	ᚺ	**h**	*h, x*	**haglaz*	ᛏ	**t**	*t*	**tīwaz*
ᚢ	**u**	*u, ū*	**ūruz*	ᚾ	**n**	*n*	**naudiz*	ß	**b**	*b, ƀ*	**berkanan*
ᚦ	**þ**	*þ, ð*	**þurisaz*	ᛁ	**i**	*i, ī*	**īsaz*	ᛗ	**e**	*e, ē*	**ehwaz*
ᚨ	**a**	*a, ā*	**ansuz*	◊	**j**	*i̯*	**jēran*	ᛗ	**m**	*m*	**mannaz*
ᚱ	**r**	*r*	**raidō*	∫	**ï**	*ī̯*	**īwaz*	⌐	**l**	*l*	**laguz*
ᚲ	**k**	*k*	**kaunan?*	ᚲ	**p**	*p*	**perþō?*	◊	**ŋ**	*ŋ*	**ingwaz*
ᚷ	**g**	*g, g*	**gebō*	ᛉ	**ʀ**	*z/r*	**algiz*	ᛞ	**d**	*d, đ*	**dagaz*
ᚹ	**w**	*u̯*	**wunjō?*	∫	**s**	*s*	**sōwilō*	ᛟ	**o**	*o, ō*	**ōþalan*

Runic inscriptions appear somewhat abruptly on portable items in the second half of the 2nd century AD in southern Scandinavia (southern Norway, Denmark and northernmost Germany), seemingly well beyond the limits of literate Europe at the time. The earliest inscriptions are very short; where they are understandable, they encode the personal names of owners, writers and manufacturers (and sometimes, fancifully, also weapons); there is no evidence for public literacy in the earliest phase. There is some debate on which exact Germanic language (stage) is encoded in the first documents; it is accordingly hard to argue how well the older fuþark represents the phonemic system(s) of the language(s) it denotes. Graphically, the script is very uniform from the beginning; beyond a few minor differences in letter forms, there are no recognisable regional or chronological variants. The writing direction, on the other hand, is not fixed, and word separation is optional; apparently random retrograde runes, mirrored runes and various types of ligatures are common.

In some ways, the older fuþark is quite an ordinary specimen of Palaeo-European scripts—a group which, after all, boasts members like the Iberian script and Ogam—but the fact of its existence remains baffling in many respects. The plethora of contributions to the question of how the runes came to be is usually collected in three camps according to whether the (primary) model is the Latin, the Greek, or a North Italic alphabet, respectively. Each of these camps includes a large number of widely different theories which involve different geographical, diachronic or stylistic alphabet variants and emphasise different aspects—formal, grammatological, linguistic, archaeological, historical, cultural—of the borrowing, and have correspondingly different virtues and shortcomings. As of today, no single attested Mediterranean alphabet has been identified which provides everything a model for the runes ought to provide, namely:

– models for all Runic graphemes and motivation for their sound values,
– explanations for the deviant order and the letter names,
– paradigms for the epigraphic culture (writing conventions and text types), and
– a plausible historical context for a borrowing.

While the recent decades have seen, to some extent, a shift away from formal to historical-archaeological considerations, it is the letter forms and values which were and are the focus of theories of Runic origin. Since the work of Jacob Bredsdorff (1822), the scientific community has been widely agreed that the runes are not derived directly from the Phoenician alphabet; the claim that they represent a Germanic or even Indo-European proto-script has also rather lost in appeal. The many suggestions offered to this day work with a handful of potential model

alphabets which are derived from each other and are consequently so similar in many respects that the distinction between genetical and typological developments is as difficult as the identification of discrete geographical and diachronic variants (Wimmer, 1887, p. 20; Mees, 1999, p. 149). The debate moves within such a narrow field that the numerous possibilities for formal derivations are hard to prefer to each other—any rune can be argued to correspond to a daunting number of letters from various northern Mediterranean alphabets and alphabet variants. Many derivations proposed by scholars have been criticised and/or rejected for what was considered an inadequate or even principally flawed handling of the establishment of graphic or systematic relationships between model letters and runes. The demand for a consistent approach which respects both character shapes and grapheme-phoneme relationships, and for the avoidance of ad-hoc explanations, is found regularly in the runological literature—again, it can be traced back to Wimmer (1887):

> da ich als h a u p t g r u n d s a t z für die ableitung zweier alphabete von einander die forderung aufstelle, daſs die zeichen einander s o w o h l i n f o r m w i e b e d e u t u n g entsprechen müssen, wofern man nicht, wo dies in der einen oder andern richtung nicht der fall ist, ganz evident die gründe der abweichungen nachweisen kann. Sonst wird man leicht zu den willkürlichsten und unbegreiflichsten zusammenstellungen verleitet (1887, S. 120).[2]

How hard it is to meet this requirement was demonstrated by Wimmer himself. The initial impact of his seminal work was probably to no little extent owed to the favourable impression that his tidy presentation of well and elaborately argued derivations of all the runes from the letters of the Classical Latin alphabet made in comparison to earlier efforts. In hindsight, Wimmer heads a long and illustrious line of scholars whose theories involve a few plausible or even seemingly obvious correspondences and explanations beside a considerable number of motivations for discrepancies that range from the disputable to the highly improbable. It is often attempted to support individual derivations by referring to similar, but unrelated developments in other alphabets, by positing principles of rune formation which are then used to circularly motivate the forms they were inferred from, and/or by making unsubstantiated assumptions about the circumstances of the derivations. Ad-hoc explanations of sound values which were switched, adapted or misinterpreted, and letters which were inverted, mirrored, doubled and confused

---

2. 'since I posit as *main principle* for the derivation of two alphabets from each other the requirement that the characters must correspond to each other *in form as well as in meaning*, unless one can, where this is not the case in one or the other direction, demonstrate evidently the reasons for the deviation. Otherwise one is tempted to the most arbitrary and incomprehensible combinations'.

with each other, are equally numerous.[3] Morris (1988, p. 48) calls this the "mental gymnastics" of Runic derivation.

2.2.   The Rune Master

In light of what was said in the previous section, it becomes under-standable that some scholars have asked the question whether the search for individual derivations is really, as claimed by Wimmer, useful and necessary. Indeed, there is a school of thought in runology which licenses sidestepping the problem of character correspondence on the basis of the claim that the fuþark is not so much an adjusted derivation of its model alphabet, but more of an independent creation. That is, the fuþark is not regarded as the result of an adoption whose deviating features must be reasonably accounted for, but as an adaptation undertaken by a purposeful creator who made ultimately arbitrary decisions about the treatment of letter shapes and values (including the use of superflu-ous characters and the introduction of new ones), the inner logic of the system (or lack thereof), the overall style—in short, about every aspect of the new script he created. As a consequence, the modern scholar's attempt to derive each rune from a letter in a Mediterranean alphabet must be "a fruitless endeavor" (ibid., p. 150). This view was, I believe, first advanced by Askeberg (1944), who wrote that the fuþark was not "en slavisk kopia", but "en tämligen fri omarbetning av förebilden"[4] (78). Askeberg's statement was echoed by Moltke (1976, p. 53) and features in a near-translation in Moltke's (1981) paper: the fuþark is "not a slavish imitation, but a free moulding" (7), the focus on the letters and their sequence an infatuation (6).

The notion of a rune master who created a script for the Germanic language is present from the 18th century, with Göransson (1747) ob-serving that the fuþark was the work of a "sehr weisen meister" (§ 3)— "Die runen sind nicht von einem heiden, sondern von einem from-men und von gottes heiligem offenbartem worte hocherleuchteten und weisen gottes-manne erfunden" (§ 7)[5]—and is found regularly in the runological literature.[6] Some scholars think of a small group of peo-

---

3. Examples and discussion, e.g., in Odenstedt (1990, pp. 145–167) and Morris (1988, pp. 9–54).

4. 'a slavish copy'—'a rather free reworking of the model'.

5. 'very wise master'—'The runes were not invented by a heathen, but by a pious man of God, wise and highly enlightened by God's holy revealed word'. Cited from Wimmer (1887, p. 12) (there already in German translation).

6. E.g., Wimmer (ibid., p. 176); Bugge (1913, p. 185); Kluge (1919, p. 48); Baesecke (1940, p. 101); Rosenfeld (1956, p. 236); Kabell (1967); Jensen (1969, p. 129); Höfler (1971, p. 135); Jungandreas (1974, p. 366); Elliott (1989, p. 9); Rausing (1992, p. 202); Williams (1996, p. 213); Birkhan (2006, p. 89).

ple within whose sphere the fuþark originated rather than of a single person, but tend also towards purposeful creation.[7]

Though theories involving an unsophisticated creator (i.e., a person with little to no literacy in the model script according to the terminology of Daniels (1996a)) do exist (e.g., Fairfax, 2014, pp. 215–217 and Friesen, 1918–1919, p. 12, whose Germanic script inventors received only very basic or inadequate tutoring), the inventor of the runes is more often considered to be a speaker of a Germanic language not merely with competence in writing the source language, but often with some level of classical education. The sophisticated creator is necessary particularly for theories which consider certain aspects of the Runic script to be so tidy that they cannot be explained but by a purposefully regulating hand—this concerns mainly the "perfect fit", i.e., the much-debated bi-unique correspondence between the runes of the older fuþark and the phoneme system of the language it initially denoted,[8] and the phonetically ordered rune row.

Theories which involve the reconstruction of a phonemic fit require a sophisticated inventor who performed a (graphemic and) phonemic analysis of model and target language (e.g., Derolez, 1998, p. 109).[9] Grønvik (2001, p. 58f) says that the runes were created "durch einen einmaligen, genau geplanten und in einem Zug durchgeführten Vorgang". The creator was

> ein Mann mit eingehendem Verständnis des eigenen Sprachsystems, aber auch mit sicherer Kenntnis lateinischer Schrift und Kultur. Wir können ihn uns als einen bereisten und hoch kultivierten dänischen Häuptling vorstellen, der imstande war, das Prinzip der Buchstabenschrift zu übernehmen und es seiner eigenen Sprache anzupassen, der aber zugleich eine bedeutende sozia-

---

7. E.g., Moltke (1981, p. 4); Braunmüller (1998, p. 18f); Spurkland (2005, p. 6).

8. This is not the place for an exhaustive discussion of the question of the perfect fit. There are some problematic cases in the rune row which require particular attention, also in terms of motivating their existence despite the ruling hand of a creator. Basically, there are four options to accomodate these elements: (1) the script is older than the oldest preserved texts and consequently fitted to a different phoneme system (e.g., Antonsen's explanation of ᛁ); (2) the script is tied to the model in more ways than one (usually theories involving script magic or gematria, e.g., Wimmer's explanation [Wimmer, 1887, p. 135f.] of ᛁ as a filler to make twenty-four letters); (3) the creator failed to completely emancipate himself from the normative force of the model (e.g., Antonsen's explanation of ᛟ); (4) the creator did not have a perfect grasp of the model (e.g., Williams, 1997, p. 186).

9. See also Agrell (1938, p. 89); Alexander (1975, p. 7); Odenstedt (1990, p. 169); Beck (2001, p. 6f); Stoklund (2003, p. 172); Düwel (2003, p. 582); Braunmüller (2004, p. 25); Düwel (2008, p. 181); Heizmann (2010, pp. 18–20); Spurkland (2010, p. 65); Barnes (2012, p. 10), and Dillmann's *Runenmeister*-entry in *Reallexikon der germanischen Altertumskunde* (2003, 540f).

le Position in seinem Heimatland hatte, so daß sein Alphabet sich bei seinen Standesgenossen schnell durchsetzen konnte.[10]

The sophistication of the rune master(s) is also discussed explicitly by Braunmüller (1998, p. 18f), who ascribes the creation of the runes to a small, presumably co-ordinated group of inventors with Latin education, either soldiers or traders: one must

> wohl davon ausgehen, dass [the rune masters] über ein nicht geringes linguistisches Fachwissen verfügt haben, das sie wohl nur im Umkreis einer Sprache mit einer längeren Schrift- und Bildungstradition erworben haben können [...] Den 'Erfindern' der Runenschrift muss beispielsweise bekannt gewesen sein, welches Abbildungsverhältnis zwischen Allophonen und Phonemen in der/den Entlehnungssprache/n bestand, wie dort die Zuordnungen von Phonemen und Graphemen aussahen sowie schließlich auch, ob es mehrere Grapheme für 1 Phonem [...] und ob es z. B. 1 Graphem für 2 Phoneme [...] gab. Darüber hinaus mußten die ersten Runenmeister [...] die eigene Sprache dahingehend untersucht haben, ob es hier nicht Phoneme gab, für die im Ausgangs- oder Entlehnungsalphabet keine entsprechenden Grapheme zu finden waren. [...] M. a. W., es ist, zumal nach der Analyse des sehr guten Phonem-Graphem-Abbildungsverhältnisses im älteren Fuþark, davon auszugehen, daß hier Leute mit einem fundierten Fachwissen am Werk waren und daß sie zweifellos die Absicht hatten, eine einheimische Gebrauchsschrift zu schaffen.[11]

The same goes for theories which explain the order of the rune row as phonetically motivated, e.g., Jensen (1969, p. 134), who postulates patterns in the distribution of types of articulation, adding: "The hypothesis that so much abstract theory lies behind the alphabet of our

---

10. 'by a one-time, precisely planned operation executed in one go'—'a man with in-depth understanding of his own language system, but also with reliable knowledge of Latin writing and culture. We may picture him as a travelled and highly cultivated Danish chieftain who was capable of adopting the principle of alphabetic writing and adapting it to his own language, but who at the same time had an important social position in his homeland, so that his alphabet could establish itself quickly among his peers'.

11. 'assume that [the rune masters] possessed considerable linguistic expertise, which they can only have acquired in contact with a language with a long tradition of writing and education. [...] It must, for example, have been known to the 'inventors' of the Runic script which relationship existed between allophones and phonemes in the source language(s), how the allocation of phonemes and graphemes worked there, and finally also whether there was more than one grapheme for one phoneme [...] and whether there was, e.g., one grapheme for two phonemes. Furthermore, the first rune masters must have [...] studied their own language with regard to whether there were phonemes for which no corresponding graphemes could be found in the source or model alphabet. [...] In other words, one must, particularly after the analysis of the excellent phoneme-grapheme relationships in the older fuþark, assume that this was the work of people with sound expertise, and that they had without doubt the intention to create an indigenous functional script'.

shaggy forefathers may be hard to swallow for whosoever believes that new scripts arise only through corruption of other alphabets" (p. 134). (Cf. also Miller, 1994, p. 68.)

The assumption that the creator knew what he was doing calls for a motivation to explain the many non-obvious deviations from the model. The most popular stance is to suspect an ethno-nationalistic motive behind the reworking, viz. that the runes were created as a "Geheimschrift" ('secret script', Grønvik, 2001, p. 58) which was designed specifically to be undecipherable to a person literate in the source language.[12]

If the involvement of a deliberate creator, who maybe even purposefully distorted the model, is assumed, certain aspects of the relationship between model and, in the present case, rune row become irrelevant to the argument of derivation—most importantly, the problems pertaining to graphic forms and grapheme-phoneme relationships. Deviations from the model can be summarily explained as idiosyncrasies which are due to an individual's fancy and do not require or indeed do not allow for detailed argumentation. The potential for randomness in this bottleneck-approach is acknowledged by Miller (1994, p. 67): "There is no reason to accord the fuþark inventor(s) any less creativity or prerogative than known script designers."

Of course, as was shown above, the notion that the older fuþark is a deliberate creation is not merely an excuse to save one's self the task of explaining the details of the script's weirdness—features like the phonemic fit and the deviating order of the row are indeed best explained through the intervention of a creator. The uniformity of the earliest Runic documents is also frequently taken to speak for a one-off creation as opposed to a gradual development (e.g., Mees, 1999, p. 145; 2000, p. 57). All features, however, which have been claimed in favour of a rune master are ultimately theory-dependent, i.e., they are not accepted by all scholars and/or have also been explained differently, and thus cannot be used as conclusive arguments for the existence of an inventor. Also, there are other characteristics of early Runic writing which have been cited as arguments for a gradual borrowing process, such as the preponderance of owner's inscriptions, which Markey (2001, p. 88) considers to reflect the first stage of the borrowing process: reproduction of the model without a specific purpose. Pedersen (1923, p. 51f) assumes a pre-attestation phase in which the Runic script was gradually developed out of an imitation of the Latin alphabet. Following Pedersen, Odenstedt (1990, pp. 163–167) expresses the opinion that all the peculiarities of the fuþark can be explained organically and that the fuþark does not de-

---

12. Such and similar positions in, e.g., Musset (1965, pp. 47–49); Prosdocimi (1985, pp. 392–395; 2003, p. 438); Scardigli (1993); Barnes (1997, pp. 9–11); Griffiths (1999, p. 193); Stoklund (2003, p. 178); Williams (2004, p. 272); Spurkland (2010, p. 76); Heizmann (2010, p. 20).

viate from its (in his case also Latin) model so far that a "single inventor (often described as "ingenious")" (1989, p. 48) needs to be brought in. It is admissible to argue that certain differences between the Runic script and the Mediterranean alphabets point to the existence of a sophisticated creator of the runes, but this assessment is tentative, and must not in turn be used to explain those very same characteristics.

A way to avoid the circularity of an argument which motivates a Runic feature with a rune master and the rune master with that same feature is to propose that script transfer exclusively happens through the intervention of a script creator. For the runes, this was claimed by, e.g., Elmer Antonsen, who is of the opinion that, generally, the adaptation of a script for another language requires a person who is not only bilingual, but endowed with an intuitive understanding of linguistics, who must learn the model script in all its aspects and then systematically rework it (1987, p. 26). Antonsen states quite decidedly that writing is never borrowed via diffusion, but always systematically adapted by an individual (1996, p. 7).

That the assumption of an individual creator was considered communis opinio in runology from early on is demonstrated by the emphasis with which this view is sporadically repudiated.[13] Taylor (1879), who thinks that the developments undergone by scripts are subject to laws akin to those governing language, rejects the derivations from Latin letters proposed by Wimmer (1887) on the basis that they neglect the "fundamental principles of alphabetic change":

> His method assumes that the inventors of the runes arbitrarily discarded a certain number of the Latin letters, and then without any Sufficient Reason invented other letters to supply the vacant places. If his explanations are correct, several of the runes, instead of having been evolved, like the letters of all other alphabets, by the action of slow and natural processes, must have been invented off hand by some alphabetic lawgiver, […] whose arbitrary behests were promptly obeyed over a vast region extending from the Rhone to the Baltic, and from the Baltic to the Danube. (p. 27f)

Schrader (1901, p. 736) dismissively writes:

> Die Vorstellung von einem "genialen praeceptor Germaniae", wie man jenen Mann ernsthaft genannt hat, der seinen Deutschen ein Alphabet zusammengesetzt haben soll, dürfte jeder kulturgeschichtlichen Analogie entbehren."[14]

---

13. See also Luft (1898, p. 1f); Hempl (1896, p. 17).

14. 'The concept of an "ingenious praeceptor Germaniae", as that man has in all seriousness been called [namely by Meyer (1896, S. 162)], who assembled an alphabet for his Germans, probably lacks any analogy in cultural history.'

More recently, Markey (2001, pp. 84–86) comments critically on the notion that writing could be invented on the spot—in his opinion, script transfer exclusively happens by incremental diffusion.

Is either of these positions correct, and if so—which? The runes are not a primary script, but a secondary one. Hence, our question does not concern the processes leading to the primary creation of script, but the mechanisms of script transfer. Despite the fact that the data situation is rather better here, there being a great deal more cases and the documentation extending into recent times, these mechanisms are not clear at all. Do scripts diffuse from one script culture into another, or are they adapted by individuals? If the borrowing happens between two specific groups of people, such as traders or priests, should this be considered a subtype of the first or the second case? How to assess cases in which a conscious creation undergoes secondary changes in use within the writing community, or, conversely, a script which has already been in use to some extent and is only afterwards systematically adapted? Can we distinguish such processes in ancient times without the help of secondary sources, i.e., actual accounts of the borrowing? Can we posit rules for how writing is borrowed and associate them with different cases—assuming that different things happen to the original script in the different scenarios—and can we use these to identify the processes in those cases where no historical information is available (or trustworthy)?

3.   Script Transfer

3.1.   What Is a New Script?

An issue that needs to be addressed in this context is what exactly we call a "different" and therefore, in a transfer situation, a "new" script, in opposition to the same script for a different language. I suspect that, for many scholars, this distinction is immediately connected to the question of how scripts come about, in that only the intervention of a creator results in what can be considered a new script, whereas the gradual transfer of a script to a new writing community does not. With the prevalent definition of "script" as an inventory of graphemes which can serve for the denotation of different languages, resulting in language-specific writing systems with their various orthographies,[15] the above distinction is intuitively plausible—gradual diffusion involves mainly orthographic and minor graphic changes, while a script inventor may completely reform the model script's characters or simply come up with new

---

15. E.g., Sproat (2000, p. 25); Coulmas (2003, p. 35); Daniels (2018, p. 155).

ones to create a sufficiently different character set: the Latin alphabet spread gradually through Western Europe with only minor adaptations, hence is has remained one script with language-specific orthographies, but the Cyrillic alphabet was a one-time creation and is therefore considered a different script.

Of course, the question of what makes a script one script rather than another one is more complex than this, and its discussion would exceed the scope of this paper. I limit myself to a reference to Wang (2019), who shows that the definition of the Latin or Roman alphabet as one cohesive script based on the modern writing systems which are considered to employ it is hard to justify on purely graphematic terms, and involves both historical and social factors. Historical connections inform our definitions in some cases, but not always—one would be hard pressed to pinpoint the intervention that made different scripts out of the Greek and Latin alphabets, but as different scripts they are unanimously regarded. It must also be said that many runologists do not appear to ascribe to the above distinction, considering a creator necessary for a script's systematic adaptation to a new language ("reworking"), without explicitly referring to changes in its outer form. I will leave this aspect of the matter aside in the following sections, and use the terms *script* and *writing system* interchangeably (as done in Cubberley (1996, pp. xliii–xlv)).

3.2.   Adaptation vs. Adoption

Isaac Taylor as cited above provides an example for an alphabet historian who expressly declares himself for gradual diffusion as the primary means of script transfer. Otherwise, I have not been able to find a lot in the way of categorical statements, but the ones I did come across point towards a general preference for the purposeful inventor. Prominently, Gelb (1963, p. 199) observes that

> we must always reckon in the case of all great cultural achievements with the decisive intervention of men of genius who were able either to break away from sacred tradition or to transfer into practical form something on which others could only speculate.

However, he also admits that

> [u]nfortunately, we do not know any of the geniuses who were responsible for the most important reforms in the history of writing. Their names […] are lost to us forever in the dimness of antiquity.

In an article concerned with the typology of the spread of script, Voogt (2012), who adheres to the traditional view that primary scripts evolve gradually from precursors of some description, contrasts these cases with borrowings: secondary scripts cannot be expected to pass

through the same stages of development as primary ones; their emergence happens "relatively sudden" (p. 2) and they "need to be largely completed before the script can be put to use" (p. 6). Daniels, in a short introduction concerning the invention of writing, expresses himself somewhat vaguely: in the context of *Scripts Invented in Modern Times*, he exclusively refers to "grammatogenists" Daniels (1996a, p. 578), then writes: "The normal way for a society to acquire its own script is by evolving, adapting, or adopting an existing writing system" (Daniels, 1996b, p. 579), and contrasts this scenario with cases in which one person creates an original script which does not have much in common with the model. Curiously, there appears to be disagreement about what the communis opinio on the matter is (whether one subscribes to it or not). O'Connor (1996, p. 90), writing about the development of the Semitic script from the Egyptian one, observes that "there is a long-standing and plausible tradition of regarding writing as an invention, i.e., as something that reflects the work of one person at one time". McManus (1991) in his treatment of Ogam paints a different picture—he repeatedly makes a point of how older theories about the origin of that script are faulty because they are based on the principle that developments must be natural, while he himself advocates, as a new approach, to "ascribe at least some of the peculiarities to the *creative* rather than the *natural* input" (p. 13). He ascribes the creation of Ogam to a "creative individual or school" and opines that the details of the derivation "can be safely left to the ingenuity of the creator".

Jeffery (1990) in her study of the archaic Greek alphabets devotes some space to the discussion of different scenarios for script transfer, in which contexts they happen, and how to tell them apart:

> How does an illiterate people A normally achieve literacy? It may be in sufficiently close contact with a literate civilisation B to acquire the knowledge inevitably from mutual intercourse, particularly if there are intermarriages which produce bilingual speakers; this may be either because literate members of B are scattered throughout A or because in one particular area people of both A and B are in contact, whence the knowledge is spread to the rest of A. The diffusion of the Roman alphabet country by country throughout the Roman Empire illustrates the former method on a large scale; the spread of the alphabet through archaic Etruria from the original contact of the Greeks of Kyme with the Etruscans illustrates the latter. Alternatively, a script may be deliberately introduced into the illiterate country A by an individual or small group of persons, as happened in the cases of the Gothic, Armenian, and Cyrillic (or Glagolitic) scripts. A member of A or B, outstanding in position and personality, and with a thorough knowledge of the B script, creates a script for A by synthesis, basing it upon the existing B script and adding any extra signs felt to be necessary for the A language, either by borrowing from other scripts or by newly invented signs. The underlying motives for this may be either political or religious, or a mixture of both, but in either case they imply a more deliberate connexion between the two coun-

tries than is indicated by the more haphazard method of commercial contact, such as the contact between the Etruscans and the Greeks of Kyme (p. 1f).

Jeffery distinguishes between two basic types of script transfer:

Type 1 The knowledge of writing diffuses "inevitably" into a previously illiterate community.
Type 2 The model system is purposefully changed and strategically adapted before being put to use.

Type 1 implies the involvement of a large number of people, a longer time needed before changes are established, and a less uniform result (either only in the early phases, or ultimately leading to local variants). The system is adopted and then gradually adapted to circumstances in use in the same way that any new technology is; it is subjected to a—mainly phonetically conditioned—process of gradual change which eventually results in a more or less different system. The emergence of the new script happens gradually, in step with actual practice; changes accrue due to problems which arise in use. The eventual result of a different script is not intentional: the model script is used to write a different language—the users would conceivably consider themselves to be using the model script even at a time when new conventions have created a system which differs notably and systematically from the model. Type 2, on the other hand, presupposes one person, or a small group of co-ordinated persons, who devise(s), in relatively short time, a new system, more or less closely modelled on an existing one, on the drawing board. This new script is immediately uniform, the formalisms and rules are binding, and any variation is the consequence of secondary developments.

Jeffery associates type 1 with a lack of sophistication: users who are interested in the practical aspects of the technology do not demand a great deal from the system in terms of phonological precision and consistency; they initially adopt graphemes and their values without reflection. Any changes and adaptations, such as the loss of superfluous characters or the substitution of foreign (sound) values with similar ones in the new language happen automatically. Jeffery names the creation and distinction of duplicates and the borrowing of individual characters from other sources as innovations which are typical of scenarios of this type. On the other hand, the recycling of unnecessary characters for phonetically dissimilar sounds, the creation of individual characters without a graphic model, as well as changes in script type, she assumes to be particular to sophisticated creations (p. 4).

Certainly, and this is the point made by some runologists, it is the slow, unstrategic diffusion borne by many which is generally considered to lead to results that can be registered statistically, compared and

used to determine what is called "principles of alphabet history"[16]—thus also Daniels (1996a, p. 583), who observes that insights into the process of script invention can only be got from the study of unsophisticated grammatogenies. A single creator, on the other hand, forms a black box: while he may be equally inclined to make phonologically or graphically obvious and comprehensible choices in his work, he must be expected to sometimes solve a problem in a completely arbitrary manner or even introduce purposefully unnecessary changes—if the creator makes an effort to set his creation apart from the model, extensive redesigning may take place. Unstrategic diffusion does not provide a context for abrupt changes by which a system loses its tradition of transmission; even small-scale "creative" innovations would have a hard time getting established, and the reasons for why it developed as it did should be re-constructable.

TABLE 2. The differences between script transfer types 1 and 2 based on Jeffery (1990, pp. 1–4)

Type 1—Diffusion	Type 2—Invention
gradual	abrupt
automatic	deliberate
practice-based	theory-based
unsophisticated	sophisticated
unco-ordinated	co-ordinated
many people	one person or small group
unintentional changes	strategic changes
unregulated	binding rules
variation	uniform
duplication of letters	reallocation of letters
source eclecticism	new characters
natural	arbitrary
principles of script history	not reproducible

It is not evident, however, that the differences between the effects of these two types of script transfer are quite as clear-cut. Jeffery's allocation of certain kinds of changes in letter shape and value to different types is interesting, but would need to be supported with a considerable number of convincing examples to be diagnostically useful. Also, the distinction between "unsophisticated diffusion" and "sophisticated cre-

---

16. There is of course no reason why it should not be possible to identify tendencies unspecific to script type which can be applied to different kinds of script; the usual reference to alphabet history is due to this script type being the best studied one.

ation" as implied by Jeffery is intuitive, but not universal. On the one hand, we know of unsophisticated script inventors; on the other hand, it is debatable to what extent diffusion can happen without a certain level of sophistication: people who use the model script, however inexpertly, must either have at least an idea of how to write the source language (if there was extended contact between the groups) or must have been taught the basics without having literacy in the source language; in the latter case, even the most basic instruction (the teaching of the letter inventory and values, or how to write one's name) must involve an explanation of how the characters relate to elements of spoken language. The problem here is the definition of what exactly one calls "sophistication": there is a difference between a person having no understanding of how a writing system works beyond the notion of visual signs encoding meaning, a person having rudimentary skills in writing the source language, a person being bilingual or well trained in writing the source language, and a person having enjoyed an education which includes theoretical linguistic/grammatological knowledge of some sort.

Another one of the problems involved in Jeffery's distinction between creation and diffusion is the fact that one can imagine a considerable number of scenarios—as indeed demonstrated by runologists—which are hard to assign to either of the two options. Jeffery books as a subtype of type 1 the borrowing of writing within one particular group of people, with the script spreading to the rest of the population after a certain period of time. Yet in such a case, a fairly uniform and functional system may develop before spreading to other groups of users. If this earliest phase happens not to be attested, or to be attested so sparsely that the documents' relevance is dubiuos, the existing inscriptions may appear to reflect a systematically created script, despite having evolved without the help of a purposeful inventor. The question is ultimately not only which scenarios of script transfer are possible, but how and under which circumstances they can be identified and classified by modern scholars.

Historical examples for sophisticated script invention or adaptation as envisioned by Jeffery (type 2), Gelb and Voogt do of course exist in quantities. Indeed, documented cases of the emergence of new scripts in recent times are almost exclusively cases of a purposeful, even if sometimes unsophisticated creation.[17] The question is to what extent these apparently clear-cut statistics reflect reality—it might be argued that these cases are the ones which will be documented (usually by the creator), while examples for the unsupervised diffusion of a script into a previously illiterate society tend to go unnoticed. Even if this caveat should be uncalled-for, it is at least debatable whether the situation in antiquity (and earlier) should be judged on the basis of modern conditions. The abundance of historically documented creations of scripts

---

17. Examples in Daniels (1996b, pp. 580–585)

is in large part due to the activity of Christian missionaries and their efforts to bring the text of the Gospel into the farthest corners of the earth. It might be asked whether, since the onset of the Age of Discovery, scripts have even had much of a chance to diffuse anywhere—though Voogt himself provides a clear example for gradual, decentralised script transfer from a literary language to a previously unwritten one in Voogt and Döhla (2012): speakers of Nubian on Saï Island (Sudan) have recently taken to using the Arabic script to write their vernacular in public graffiti. There are only few changes from Arabic orthography and sound values, but those appear to have been agreed upon by convention in the small writing community—"in this case there is no clear inventor or teacher of the writing system whom we can immediately identify" (p. 55).

Cases other than modern ones in which the process of development/creation can be retraced with (some) certainty are few and far between. In the following, I will discuss a few examples for different transfer situations with special regard to the more or less arcane figure of the script inventor.

3.3.   Creating a Script: Hankul

A special case in all aspects is that of Korean Hankul,[18] whose creation in 1443 and promulgation in 1446 was obligingly accompanied by a contemporary proclamation (*Hwunmin cengum* 'Correct Sounds for the Instruction of the People') and a handbook (*Hwunmin cengum haylyey* 'Explanations and examples of the correct sounds for the instruction of the people', lost until 1940). In an effort to make literacy more widespread than he thought feasible with the complex systems of writing Korean with Chinese characters (*hanca*), King Seycong—or one or more of his scholars—created a purely phonographic script with characters which were designed to be easy to learn.

Hankul ('Han writing', a modern term) was constructed with considerable linguistic insight: five graphically simple consonant characters, whose shape reflects the position of the articulatory organs pronouncing the respective sounds, are used as basis to systematically derive characters for sounds with a different manner of articulation (e.g., doubling for the tense plosives). There is a clear graphic distinction between consonants and vowels; tone is also marked. The great versatility arising from the combination of graphic elements which indicate features, theoretically allowing the denoting of considerably more sounds than necessary for Korean, has led Sampson (1985, pp. 120–144) to introduce a special typological category for Hankul, viz. "featural" scripts. The (original)

---

18. Korean transcribed according to the Yale romanisation.

system is one of the most logical and symmetrical ever to be created for common use and represents a prime example of sophisticated grammatogeny by one person or a small group of competent persons inventing a script for their language and perfecting it before making it available for use (Taylor and Taylor, 1995, pp. 211–216; King, 1996, p. 219f).

3.4.   Claiming to Have Created a Script: Old Persian Cuneiform

A historical document which has been considered to refer explicitly to the creation of a new script is also preserved for Old Persian cuneiform— the text in question is rather less detailed than the Hankul *Explanations*, but it was never lost, being prominently inscribed on a cliff of Mount Behistun (IR), accompanied by a huge relief. The trilingual Behistun inscription, applied some time after 521 BC by mandate of Darius I, consists in Elamite and Old Babylonian versions of the same text, both written in long established varieties of cuneiform, and an Old Persian version written in a script which resembles cuneiform in style, but is of a different type, and features unrelated characters and grapheme-phoneme correspondences. The text is concerned with the legitimisation of rule, and tells of how Darius prevailed over a series of pretenders after the demise of Cambyses II. The section in question, often instructively called "Schrifterfindungsparagraph" ('script invention paragraph', DB/OP § 70 [IV 89–92] and its Elamite counterpart), has been taken to announce that Darius had commissioned the invention of the script then used for the first time in the present inscription. This was already suggested by Weißbach 1911 and elaborated by Hinz (1942, pp. 346–349); Hinz (1952). The Old Persian part is heavily damaged, and a Babylonian counterpart is absent; it is the well preserved Elamite part, a secondary addition to go with the Old Persian text, which contains the crucial reference to something which had not previously existed (which is lost in the Old Persian version). Hinz (ibid., p. 30) argues for a translation of Elam. *tup-pi-me* as 'script' and translates: "[…] machte ich eine andersartige Schrift, auf arisch, was es vordem nicht gab" (p. 32f).[19]

   Though Hinz' translation and interpretation of the paragraph were accepted by many scholars (e.g., R. Schmitt, 1998, p. 458f), it is not at all evident. Most importantly, Elam. *tuppime* (*tuppi-* 'inscription' with an abstract suffix[?] *-me*) ∼ OP IV 89 *dipiciça-* may instead signify a type of text (Diakonoff, 1970, p. 99; Tuplin, 2005, p. 224), a version or copy (Huyse, 1999, p. 47; R. Schmitt, 2009, p. 87) or a part of the inscription (Vallat, 2011, p. 266). As pointed out by Hinz (1973, p. 15), this does not necessarily preclude his interpretation: even without an explicit reference

---

19. '[…] I made a different script, in Aryan, something which had not existed before'.

to script, the claim that the inscription/text/… is the first in Old Persian (Aryan) implies that the Old Persian script (which is not attested to write any language but Old Persian) is used for the first time in the Behistun inscription. Still, of the numerous translations which have been put forward of both the Elamite and the reconstructed Old Persian parts (see Rossi forthc. for an overview of recent attempts), many do not allow for an interpretation in Hinz' sense—for example, Vallat (2011, p. 266) translates the Elamite text as "J'ai traduit autrement en aryen cette inscription. Elle [the OP part] ne se trouvait pas ici [on the rock face] auparavant",[20] doing away with both the reference to the script and the claim of writing Old Persian for the first time.[21] It is not even clear that Old Persian *aryā* (Elam. *har-ri-ya-ma*) refers to the language (Rossi forthc., § 2.2.1). The lines OP IV 97–99 make mention of *tuppime/dipiciça-* being sent among the people—this was taken by Hinz (1952, p. 32) to mean that the new script was disseminated among Darius' new subjects to be learned by them, but it may as well refer to the Old Persian version of the text (R. Schmitt, 2009, p. 87), to Darius' titles and his lineage as mentioned in OP IV 93–94 (Vallat, 2011, p. 268) or to "the political message conveyed by the whole monument" (Rossi forthc., § 2.1.3). As long as there is no agreement on the reading of the paragraph, Hinz' popular interpretation cannot be considered disproved, but it should be borne in mind that the notion "daß *Darius hier tatsächlich für sich in Anspruch nimmt, die altpersische Schrift eingeführt zu haben*"[22] (Hinz, 1952, p. 24) depends on a very specific and uncertain translation.[23]

So, while, in the case of Hankul, the discovery of a document explicating on the origin of the script helped to clear things up, the matter turns out to be more complicated in Old Persian. Apart from the doubtful meaning of the Behistun paragraph, a major stumbling block for Hinz' theory are a number of inscriptions from Pasargadae, the capital of Cyrus II. As in Behistun, the three relevant inscriptions come in triplicate in Elamite, Babylonian and Old Persian. CMa, preserved five times on antae and doorways, reads 'I [am] Cyrus the king, an Achamenid';

---

20. 'I have also translated this inscription into Aryan. This [the Old Persian part] did not exist here [on the rock face] before.'

21. Cf. Schmitt's translation of the Old Persian text: "[…] (ist) dies die Fassung der Inschrift, die ich hinzugesetzt habe, (und zwar) auf Arisch"—'[…] (is) this the version of the inscription which I have added, in Aryan' (2009, p. 87).

22. 'that *Darius really claims here for himself to have introduced the Old Persian script*'.

23. The interpretation of the section as referring to Old Persian cuneiform is considered to be supported by the fact that the Elamite and Babylonian parts of the inscription were inscribed simultaneously, whereas the Persian third of the trilingua was added belatedly (Mayrhofer, 1978, p. 7). There are issues, however, concerning the layout and the relative chronology not just of the three parts in their entirety, but of subsections (cf. R. Schmitt, 1990), as well as the language in which the text was originally composed (e.g., Bae, 2001, pp. 152–154; Tuplin, 2005, p. 221).

CMc, three times on reliefs depicting Cyrus, reads 'Cyrus the great king, the Achaemenid'—no Old Persian versions are preserved of CMc, but a separate Old Persian fragment may belong here (R. Schmitt, 2009, pp. 9, 36). Hinz originally held that these inscriptions, like others from Pasargadae (particularly DMa as reconstructed by him), date from the reign of Darius, who had them inscribed to honour his predecessor (Borger and Hinz, 1959). Nylander (1967, pp. 151–170) adduces arguments to show that they are indeed of Cyrus' time, but suggests that only the Elamite and Babylonian versions were applied under Cyrus, whereas the Old Persian versions were supplied under Darius (p. 175–177)—a proposal followed by Hinz (1973, pp. 19–21) to circumvent the problem of pre-Behistun attestations of Old Persian and Old Persian cuneiform. Others, however, take the Old Persian inscriptions to be original as well (e.g., Diakonoff, 1970, pp. 100–103 with arguments).

Furthermore, a script invention under Darius has been questioned because of the logic (or rather the lack of such) behind the character inventory. Structurally, Old Persian cuneiform is basically an abugida, in which individual characters write a consonant plus one consistent standard vowel and different vowels are denoted by adding elements to the respective <CV>-characters. The graphs of Old Persian cuneiform imitate the general look of cuneiform characters, but are less graphically complex. Old Persian cuneiform has a complete paradigm of twenty-two characters for CV-syllables with inherent a (also ∂); the syllables' vowel can be modified by way of additional vowel characters for i and u. Beside these, there are also a number of characters for CV-syllables with i or u. These bonus <Ci/Cu>-syllabograms are unevenly distributed: only two consonants are provided with three characters combining them with all three vowels. Two more get syllabograms with i, but none with u, with five it is the other way round, and the remaining thirteen consonants come only with the modifiable <Ca>-character. Some syllabogram-gaps are also linguistic gaps (e.g., the syllables ki and gi do not occur in Old Persian), but others are not (e.g., ti, ni). According to Mayrhofer (1979, p. 291), the Ci/u-syllables which are represented by extra characters are no more frequent in Old Persian than the ones which are not. Conversely, characters for certain Ci/u-syllables, e.g., ti in inflection, might conceivably have been useful (Mayrhofer, 1978, p. 8). A graphic reflection of assimilation processes is not plausible either (Hoffmann, 1976, p. 625f). The selection of <Ci/Cu>-syllabograms appears not to be linguistically motivated.

The orthography is perfectly straight-forward from the writer's perspective: an unmarked <Ca>-character represents Ca, C∂ or C, an additional <a> indicates long $\bar{a}$. If <i> or <u> follows a <Ca>-character, for whose consonant a <Ci>- or <Cu>-character, respectively, is available, a diphthong must be read. If, in the same case, no <Ci>- or <Cu>-character is available, the spelling is ambiguous: <d[a]-i> is dai, be-

cause *di* would be written <di-i>, but <p[a]-i> is *pai* or *pi*. While all <Ca>-characters, as is normal for abugidas, can be modified by the characters <i> and <u>, this is not the case for the <Ci/Cu>-characters, which never represent only the consonant or are modified to represent, e.g., C*a* ([†]<Ci-a>). However, the <Ci/Cu>-characters do not represent C*i*/C*u* on their own, as would be expected of syllabograms, but must still be accompanied by the respective vowel character (plene writing), so that long and short *i* and *u* cannot be distinguished: <Ci-i> is both C*i* and C*ī*. This redundant vowel marking also occurs sporadically with <Ca>-characters (<C[a]-a> for C*a* rather than C*ā*), conceivably paralleling the rule for <Ci/Cu>-characters (ibid., p. 627).

According to Hoffmann (ibid., p. 622), the redundant vowel marking in <Ci/Cu>-characters is a secondary development, due to an extension of the abugida-principle of modifiable syllable characters—the <Ci/Cu>-characters were originally "traditional" syllabograms. Hoffmann argues that relic spellings can be found in the Behistun inscription: while the text generally follows the standard orthography as outlined in the preceding paragraph, there are instances of <Ci/Cu>-characters being employed without the redundant vowel character, e.g., in the name of Darius' father Hystaspes, which is exclusively (nine times) spelled <vi-š[a]-ta-a-s[a]-pa-> *vištāspa-* (details in R. Schmitt, 1990, p. 26).

These inconsistencies could be explained as scribal errors (Werba, 2006, p. 266) or as the consequences of lack of experience with writing the new-fangled script. R. Schmitt (1990, pp. 25–28) interprets these and other spelling variants as evidence for different hands. Hoffmann, as indicated above, explains them as the remnants of an older orthography, which obviously requires a pre-Behistun existence of the system. According to Hoffmann (1976, pp. 621–623), there is general agreement that the script cannot be much older than the Behistun inscription and that it was not created for a different diachronic stage of Old Persian or even another dialect of Iranian (such as Median, as suggested by Diakonoff, 1970), seeing that the spelling conventions do ultimately fit well with Old Persian as it can be reconstructed from other sources (but see Hoffmann, 1976, pp. 643–645 on a potential historical spelling). An Iranian variety which has phonotactic restrictions fitting the gaps of the character paradigm is not known.

Mayrhofer (1979), following Hoffmann's lead, argues that the <Ci/Cu>- syllabograms are the remains of a defective writing tradition which predates Darius' reign. In reference to Hallock (1970), who connects the graphically simple characters <ku> and <ru> with the name *kuruš*, and Hoffmann's (1976) determination of the principles which (allegedly) govern the creation of the pseudo-cuneiform characters, he attempts to explain the seemingly random selection of *i*- and *u*-syllabograms. Mayrhofer suggests that, during the reign of Cyrus

II, the name of the king *kuruš* was already written with new, graphically simplified cuneiform characters, which represented syllables: <ku-ru-š>, using the syllabary-appropriate spelling conventions which, according to Hoffmann, can still be detected in the Behistun inscription. More characters for spelling frequent words followed—all with vowel *a*, until the names of Cyrus' sons became relevant: <ji> was created for *kamb*(*a*)*ujiya-* (Cambyses II), and <di> for *bardiya-* (Smerdis). The other <Ci/Cu>-characters, according to Mayrhofer, can be accounted for by the text of the Behistun inscription itself: to avoid increasingly complex character shapes, the scribes handled the creation of more <Ci/Cu>-characters economically. Unambiguous words such as Old Persian *puça* 'son' could be written with an ambiguous spelling (<p[a]-u-ca>), but <Ci/Cu>-characters were created for personal names, foreign names and other less commonly used words, e.g., <mi> for *armina*. A systematic character inventory, completely reflecting the phonotactic realities of Old Persian, did not come about due to the pressure of time under which the scribes of the Behistun inscription were working on their addendum (cf. already Hoffmann, 1976, p. 626f). Mayrhofer explains that his theory does not contradict the Schrifterfindungsparagraph (as such), if one reads *tuppime* as 'text' rather than 'script' so as not to exclude the existence of older documents in which certain characters were used to write names. He also believes, like Hallock, to be able to deduce the order in which the characters were created from their graphic complexity, assuming that the simpler a character, the older it is.

Mayrhofer's theory cannot satisfactorily explain all the data—particularly the lack of <Ci/Cu>-characters which would conceivably have come in handy: the lack of a syllabogram for the frequent inflectional ending *ti* can be accounted for, as common vernacular sequences did not have to be spelled unambiguously (1989, p. 180), but there are also syllables in (foreign) names in the Behistun inscription which are spelled ambiguously (Mayrhofer, 1989, p. 182f with explanation attempts). The potentially archaic Pasargadae inscriptions do not support the theory: both CMa and the possible fragment of CMc use standard orthography, also in the spelling of *kuruš* (<ku-u-ru-u-š[a]>) (R. Schmitt, 2009, p. 35f). Still, the theory is accepted by Schmitt 1981, p. 20 and Werba (1983). The latter suggests a more specific model to account for some problems, proposing that the invention of the new script had been commissioned by Smerdis, who would have had as good a motive as Darius for launching a prestige enterprise. Werba reconstructs a hypothetical monumental inscription written with a syllabary, in which the <Ci/Cu>-syllabograms <ku>, <ru>, <ji>, <di> and <nu> occur in Smerdis' name **Bərdiδanu-*. Darius, he suggests, had the monuments of Smerdis' rule destroyed and announced himself as the originator of the script in his own imperial inscription, wrongfully claiming the merit of having created a script for his people. It was only Darius' scribes, schooled in Aramaic,

who introduced the abugida-principle of inherent *a* and re-interpreted some of the old syllabograms accordingly.

Whether the scenarios posited by Mayrhofer and Werba are correct in detail or not, it appears that the inconsistencies in the system are best explained as the consequence of the existence of a (defective?) version of the script prior to its wide dissemination under Darius. As far as this proto-version is concerned, we end up in the same situation as with any undocumented emergence of a new script, not knowing whether the syllabograms were a purposeful creation (as proposed by Werba) or a kind of inconsistently used shorthand which took over gradually before being taken care of by Darius' scribes.

3.5.   Being Credited With Creating a Script: Eastern European Alphabets

Despite the fact that the brothers and missionaries Constantine and Michael, later St. Cyril and St. Methodius, undoubtedly played an important part in the history of Eastern Europe, the chronology of the writing of the Slavic languages is still not quite cleared up. The Glagolica, whose character forms are more difficult to derive from a model than those of the Cirilica, which are mostly recognisably Greek, is generally held to be the older adaptation, and the one that is attributed to Constantine, while the Cirilica—despite its modern name—postdates the Moravian mission (Cubberley, 1996, p. 346; Franklin, 2002, p. 93 with n. 38). Constantine's dissatisfaction with the lack of a script for the Slavic language and his creation of the Glagolica, performed spontaneously under divine inspiration before the mission even started, is made much of in the *Vita Constantini*, and indeed the difficulty of finding convincing models for many letters and the apparent mixture of sources has led to a communis opinio which considers the Glagolica a completely independent effort on the part of Constantine (Cubberley, 1982, p. 291; Franklin, 2002, p. 93f). Dissonant voices which argue for pre-Christian writing of Slavic point to two sources: the treatise *On Letters* by (maybe) the Bulgarian monk Khrabr (late 9th or early 10th century), which mentions that the Slavs had "read and divined" by means of "marks and notches" before the establishment of the Glagolica, and a (palaeographically uncertain) reference in the *Vita Constantini* to a Gospel and Psalter written "in Rus letters" which was acquired by Constantine in the Crimea (see ibid., p. 90f for details). Cubberley (1982, p. 292), arguing that Constantine would not have based a script with which to write the Bible on the Greek cursive, from which the Greek-looking Glagolitic letters are best derived, unless he had an already existing Slavic writing tradition to refer to, suggests that there was such an older tradition of writing Slavic with the Greek cursive which had arisen "more or less spontaneously" to fulfil "practical needs of com-

merce and militarism" (p. 291), and was only expanded by Constantine by adding letters for the sounds not present in Greek. Again, we are stuck with the question of whether this putative original version was the result of someone's purposeful adaptation, or whether Slavic was occasionally and unsystematically written with Greek cursive letters before Constantine took the matter in hand (and maybe thereby checked a potential gradual spread and customisation).

From times closer to the emergence of the fuþark, two oft-cited ecclesiastical figures whose work as script inventors is also connected with spreading the Word of God are the Gothic bishop Wulfila and the Armenian vardapet Maštocʿ. Wulfila is credited with the invention of the γράμματα γοτθικά, a Gothic alphabet which is an adaptation of the Greek cursive specifically for his translation of the New Testament around the middle of the 4th century AD, by various ecclesiastical historians already in the 5th century (Krause, 1968, p. 63; Scardigli, 1998, p. 455f). The creation of the Armenian alphabet in the early 5th century AD by the learned cleric Maštocʿ is equally well established, even though he arguably did not work alone, and though the derivation of individual characters is still under discussion. Though the alphabet created by Maštocʿ appears to be original, there was an earlier script. The vardapet's disciple and biographer Koriwn tells of how the king sent an emissary to a Syriac bishop called Daniel to learn letters. The "Danielian" script referred to here may have been an adaptation of the Aramaic alphabet devised by Daniel, but Koriwn's assessment that the characters were a random collection of foreign letters, little suited to represent the sounds of Armenian, may indicate an older tradition of writing Armenian with Semitic scripts. Maštocʿ spent two years teaching this script before he got tired of dealing with its shortcomings and proceeded to create a better system with the help of a Greek scribe (Krikorian, 2011, p. 65f). It cannot be demonstrated that he used the unattested Danielian script as a basis for his alphabet, but only twenty-two of the original thirty-six characters of the Armenian alphabet can be derived from the Greek cursive—unless one wants to assume that Maštocʿ invented the other shapes freely, the best models are found among Semitic scripts. A number of possible sources present themselves, but the best candidates are Pahlavi, used in Armenia before the Christianisation, and the Syriac script, which was like Greek used to write Armenian biblical and liturgical texts (Sanjian, 1996, p. 356f). The possible existence of scripts for Caucasian languages prior to the ones known today is also discussed for Caucasian Albanian (Kananchev, 2011, p. 61f) and Georgian (literature in Imnaishvili, 2011, p. 51; critical Seibt, 2011, p. 85).

The scripts discussed so far have in common that their creation is ascribed to "culture heroes"—self-proclaimed or established through history. While in the case of Hankul, a creation from scratch performed by King Seycong or rather under his aegis is reliably documented by

sources, the circumstances of the emergence of Old Persian cuneiform and of the Eastern European alphabets are at least (to varying degrees) debatable. For Wulfila, the testimony of the sources is not usually called into question (Ebbinghaus, 1996, p. 290), but the men who are credited with the creation of Old Persian cuneiform and the Glagolica have been argued to have reworked pre-existing traditions of writing in the very languages for which they are supposed to have first created their new script. Unless one would claim that all the respective proto-versions were in turn invented by unknown individuals (as with Smerdis' original Old Persian cuneiform according to Werba),[24] we may in fact be concerned with cases of script diffusion, i.e., the employment of a foreign script for one's own language without any prior established adaptations, whose existence was obscured by the secondary intervention of individuals who were in a position to establish extensive changes. The possibility that such earlier versions influenced or even formed the basis of the later reworkings lends an aspect of "naturalness" also to the development of seemingly independent creations. In cases where either no secondary intervention happened, or an intervention happened late enough that we have a lot of older material, we observe script diffusion and gradual development.

3.6. "Ingenious" or "natural"? The first alphabet(s)

The farther back we go in time, the more does the historical figure of the script creator become indistinguishable from the (semi-)mythical script giver whom we know from numerous ancient cultures. In Ancient Greece, it is the name of Kadmos which is associated with the introduction of writing. This connection is so vague that it has even been questioned whether the "Phoenician characters" introduced by Kadmos are the alphabetic ones, which are indeed derived from a North Semitic source, or those of Linear B, which fit better dating-wise (cf. Rocchi, 1991, p. 529 with n. 2; Voutiras, 2007, p. 266f). In any case, the exact circumstances of the emergence of the Greek alphabet remain obscure. A rough time frame is formed by the use of Mycenean Linear B on the Greek mainland until the end of the 12th century and the appearance of the earliest alphabetic documents around the middle of the 8th century. That the Greeks were closely engaged with the Phoenicians through trade in this phase is clear, but a precise dating or location of the transfer is difficult—while classicists, following Carpenter (1933), have tradition-

---

24. Cubberley (1996, p. 346) ascribes the formation of this proto-alphabet to "some Slavs".

ally favoured a terminus post quem in the late 9th century,[25] Semitists
tend towards an earlier transfer date in the 11th century (thus now also
Waal, 2020). Furthermore, the central role that has traditionally been
accorded the Greek alphabet in the introduction of vowel letters and the
spread of the alphabet in the northern Mediterranean is increasingly be-
ing called into question.[26]

In his extensive treatment of the matter, Wachter (1989) evokes
a somewhat fanciful scenario featuring at least two Greeks and one
Phoenician, all of them merchants, gathered together in "einer kleinen
Tafelrunde an einem angenehmen Sommerabend"[27] (p. 37). The Greeks,
presumably provided with a document containing a Phoenician alpha-
betarium, memorised what Wachter calls the "Merkspruch", i.e., the re-
cited row of letter names to accompany written alphabetaria. The fact
that the Phoenician letter names, meaningless in Greek, were retained
is taken by Wachter as indication that the creator of the Greek alphabet
was not an individual who knew both spoken and written Phoenician,
as such a person would, he argues, have understood the significance of
the Phoenician names and would have replaced them with semantically
transparent Greek lexemes.

Despite the many local variants attested in the archaic phase and
despite the general assumption that the contact between Greeks and
Phoenicians was extensive and not locally restricted, a monogenesis of
the Greek alphabet as represented by Wachter is communis opinio be-
cause of the "auf jeden Fall genialen" ('definitely ingenious'; Wachter,
1987, p. 11) reassignment of a number of Phoenician letters to write
the Greek vowels: ʾālep—alpha, wāw—upsilon, hē—epsilon, yōd—iota,
ʿayin—omicron. Yet it is evident that the introduction of the vowel
characters is connected to the letter names. The Phoenician consonan-
tal anlauts of all corresponding letters except wāw (glottal stop, voiced
and unvoiced pharyngeal fricative, palatal glide) were non-phonemic
in Greek and may consequently be argued to have simply been lost to
speakers of Greek. The resulting, effectively vowel-initial names could
then have determined new sound values according to the acrophonic
principle. While this works out for ʾālep, hē, yōd and eventually also
ḥēt[28], the correlation between ʿayin and o is more difficult to argue pho-
netically. The Semitic voiced pharyngeal fricative did tend to occur in

---

25. E.g., Heubeck (1979, pp. 75–80); Jeffery (1990, p. 18); Swiggers (1996, p. 267);
Woodard (2014, p. 3).

26. E.g., Brixhe (2004); Waal (2020); Elti di Rodeano (2021).

27. 'a small Round Table on a mild summer evening'.

28. Ḥēt was initially used to write h, and only came to designate long open ē af-
ter psilosis eliminated anlauting h in Ionian dialects in the 6th century; omega was
subsequently introduced for long open ō to parallel this distinction between long and
short vowel.

the context of *o* (Driver, 1948, p. 179) and has been claimed to have a rounding effect upon *a* (Gardiner, 1916, p. 11; Allen, 1987, p. 171), but the motivation is dubious—the assignment of ʿayin to designate *o* may have been a conscious decision, coupling the last remaining "vowel-initial" letter name with the left-over vowel.

Unlike *i̯*, *u̯* was phonemic in most Greek dialects at the time, so that wāw was initially retained as a consonantal character; a graphic variant to represent *u* was added after tau. Wachter (1989, pp. 37–40), dismissing the evidence of the Würzburg tablet alphabetarium which was presented by Heubeck in 1986 and assuming that upsilon was present as the first additional letter in all known alphabetaria, takes this to indicate that the letter was introduced at the first creation of the alphabet, as an amendment by a person who noticed the asymmetry—viz. the missing letter for one of the five vowels—conditioned by the different phonemic status of the Greek glides. Despite the difficulty in deciphering the alphabetaria on the Würzburg copper plaque, however, Heubeck's original assessment was correct: analysis with modern techniques shows that the Würzburg tablet as well as its two "sisters" (the Fayum tablets, cut from the same copper sheet) feature a Greek alphabet without upsilon (Woodard, 2014, p. 1f). Even if the plaques should be younger than the late 9th century and the inscribed alphabets be ritually archaising (ibid., p. 3f), they testify to an archaic Greek alphabet with the same number of letters as its Semitic model. That yōd was used with a vocalic quality, while wāw retained its consonantal value and the corresponding vowel character was only appended secondarily, points towards a mechanical interpretation of the letter names.

Apart from ʿayin for *o*, there are a number of Phoenician letters whose Greek sound value is not self-evident (Heubeck, 1979, p. 89f). The letter for the Semitic aspirated unvoiced stop (tāw) was not used for that sound's Greek counterpart, but for Greek unaspirated *t*; instead, ṭēt (for the Semitic emphatic unvoiced stop) came to designate Greek t^h. This distribution, in itself surprising, is not even consistently executed: among the velars, kap (Semitic aspirated) designates Greek *k*, but qōp (Semitic emphatic) is not used for the aspirated unvoiced k^h, but displays the typical features of a retained superfluous letter. It appears to have not been used in practice in a number of alphabet variants; where it is employed, it redundantly designates an allophone of *k* in certain contexts (again determined by the letter name). The question of how exactly the four Phoenician letters for sibilants were dealt with is unclear; their treatment (according to the theory of Jeffery, e.g., 1990, pp. 25–28) is adduced as an argument for monogenesis by Marek (1993, p. 29). The use of zayin (*z*) for the Greek dental affricate is general, but different alphabet variants chose šīn or ṣādē for the unvoiced sibilant.

Heubeck (1979, pp. 94–100) prefers to think of a polygenesis, arguing that the above-mentioned distributions of sound values are not so odd

that they could not have come about repeatedly and independently—the vowels possibly with influence from Semitic matres lectionis (cf. Segert, 1963, pp. 48–54; Marek, 1993)—while the early variations are difficult to explain if a one-off authoritative creation is assumed. The latter argument is also adduced by Cook and Woodhead (1959, p. 178), who dismiss the notion of an Uralphabet, but allow for the possibility that the distribution of the vowels was determined only once and spread through the local variants. The naturalness of the mechanics of sound substitution which can explain the changes effected in the transmission is stressed by Brixhe (2007, pp. 282–285), who decidedly rejects the notion of a single creator. The polygenesis theory does rather diminish the relevance of the ingenious creator, assuming instead that any number of Greek (or, for Brixhe, also Phrygian, or, for Waal, unspecified Indo-European) merchants could at some point have had a Phoenician trade partner teach them to write the characters and say the Merkspruch, and come up with a full alphabet by simple sound substitution without a conscious effort to improve upon the system as they had learned it. The monogenesis theory obviously leaves room for the Greek culture hero,[29] but with regard to the possibility that the changes introduced are mechanical, it does not exclude the possibility of unsophisticated adoption (e.g., Marek, 1993). Jeffery, 1990 is also sceptical of the existence of a Greek εὑρετής (p. 4), arguing that the less obvious innovations of the Greek alphabet only indicate that it originated within a limited area (p. 7).

Jeffery cites the Etruscan alphabet as an example for her transfer type 1 of contact-induced diffusion. Indeed, the spread of the alphabet to and within Italy is, I believe, widely considered to have happened without the intervention of a script creator—harking back to the remarks on the distinction between different scripts in section 3.1, one might argue that this is because there is no recognisable point at which a new alphabet emerged, even though many of them do end up recognisably different graphically as well as orthographically. According to the traditional account, the Etruscans learned to write from the Greek settlers (or traders) of Pithekoussai and/or Kyme in the 8th century, with whom they must have been in contact since the founding of the colony/trading post. Pithekoussai is the find place of one of the oldest preserved Greek inscriptions, the Cup of Nestor, dated to the last quarter of the 8th century BC (ibid., p. 235). The oldest document of written Etruscan, a kotyle from Tarquinia, is dated to about 700 (Wallace, 2008, p. 17). There are hardly any formal differences between the two inscriptions (different orientation of sigma, asymmetrical vs. symmetrical alpha and slightly different forms of pi)—were it not for the different languages, the two documents would be considered to be writ-

---

29. See Marek (1993, p. 27) and Heubeck (1979, p. 87f) (n. 520) for collections of epithets.

ten with the same script. The different language is reflected in the script
by the non-occurrence of beta, delta and omicron in the kotyle inscrip-
tion (the corresponding phonemes not existing in Etruscan), and indi-
rectly also in the use of gamma to write not a voiced stop, but the palatal
allophone of the unvoiced stop according to the *kacriqu*-rule.[30] The old-
est Etruscan alphabetarium (on an ivory writing tablet from Marsiliana
d'Albegna; about 650) shows a deviation from the Greek alphabet, in its
eastern Greek "red" variety as used in Euboia, in the form of san, which
does not co-exist with sigma in any Greek alphabet, and is tradition-
ally considered to be borrowed from a different variety. Still, Wachter
(1989) treats the Marsiliana d'Albegna alphabetarium as a testimony for
the chronology of the early Greek alphabet. Only by and by do the doc-
umented alphabetaria reflect a process of adaptation to writing prac-
tice (see also Maras, 2014, p. 77). The archaic Etruscan inscriptions
were written with a script that was, for all intents and purposes, Greek,
and even the later adaptations came in such a piecemeal manner that it
is hard to argue for comprehensive orthographic reforms—and if there
were such reforms, they only officially implemented previous develop-
ments which had gradually established themselves in use. The existence
of local varieties points in the same direction. Yet despite the fact that
one could argue that the early Etruscan alphabet is the same script as the
early Greek alphabet(s), their subsequent developments result in dis-
tinct scripts.[31] Had the documents of archaic Etruscan—a mere eighth
of the corpus—not come down to us, the neo-Etruscan alphabet with its
evolved letter forms and discarded and additional characters would look
like a fairly well thought-out purposeful adaptation.

    The same goes for the Latin alphabet, whose emergence is not as well
documented—notably, archaic alphabetaria are lacking. The (partial)
employment of the Etruscan *kacriqu*-rule in early Latin inscriptions sug-
gests that no systematic adaptation was made prior to the use of Graeco-

---

30. In archaic Etruscan inscriptions, kappa is used before *a*, gamma before front
vowels, qoppa before *u*. This orthographic rule has been explained as phonetically
motivated (distinguishing three allophones of the unvoiced velar stop), e.g., Cristofani
(1972, p. 471), or as conditioned by the Phoenician/Greek letter names (extending
the Greek convention of the use of kappa and qoppa, e.g., Wachter (1987, pp. 16–
18); Wachter has to assume that the name of the third letter was *gemma* rather than
gamma). Of course, the two explanations ultimately amount to the same thing, as the
phonetic distinction, even if it was purposeful, must have been suggested by the letter
names and the Greek practice.

31. Cf. also Prosdocimi (1990, pp. 195–203), who stresses the difference between
the "alfabeto princeps" (the attested alphabetarium) and the "corpus princeps" (the
entirety of texts available for reference to the writer) and argues that orthographic
rules ("regole d'uso") make the difference between scripts and, consequently, that the
Marsiliana d'Albegna alphabetarium, belonging with an Etruscan "corpus princeps",
must be considered an Etruscan document.

Etruscan letters to write Latin: while the rule was merely unnecessary in Etruscan, it was detrimental in Latin, where it blocked the use of gamma for *g* (Wachter, 1987, pp. 19–21). One would expect a sophisticated inventor to realise the relevance of gamma next to that of beta and delta, whether the latter were available from the Etruscan model alphabet or taken from the Greek one. Wallace (1989, p. 123f) suggests that ritual exchange of gifts—sometimes inscribed—across ethnographic/linguistic boundaries provided the context for a diffusion of writing into the early Roman culture.[32]

As a final alphabetic example, the North Italic Venetic writing culture is special insofar as there is ample evidence not merely for institutionalised writing, but for a writing cult (see Marinetti, 2002, p. 40f). The oldest Venetic documents demonstrate an early break in the tradition: there is evidence for an archaic Venetic alphabet ("phase 1") which shows similarities with that of the Northern Etruscan city of Chiusi, while the younger variants ("phase 2") are clearly connected with the writing cult of the Portonaccio sanctuary in Southern Etruscan Veii (e.g., Prosdocimi, 1988). The Venetic case appears to provide a solid example for an early unsystematically adopted script being superseded by a sophisticated and institutionalised adaptation as suggested for some of the above-mentioned scripts.[33]

Wachter (1987, p. 8) emphasises the importance of the Merkspruch for the spread of the alphabet in Greece and Italy. Where alphabetaria demonstrate that the order of the row was preserved, they testify to the art of writing being taught and learned—the testimony of the Marsiliana d'Albegna alphabetarium is important not only because it is old, but also because it is inscribed on the rim of a writing tablet, presumably to act as a memory aid for the writer who used the tablet. This does of course not exclude the intervention of an individual adaptor, but the almost seamless adoption of the alphabet in Italy by speakers of various languages in the two centuries following its establishment in Greece points to a "mechanische und ganz auf die Praxis ausgerichtete Methode […] und eine theoretische Verfeinerung normalerweise erst in zweiter Linie"[34]— thus Wachter (ibid., p. 13) despite his conviction that acts of script creation were performed in Italy (p. 24) as well as Greece. The alphabet in Italy does indeed seem to be a fairly clear case (or collection of cases) of the gradual diffusion of scripts into previously illiterate communities.

---

32. Wallace does, however, speak of bilingual "authors" (p. 126); at what point these people are thought to have set to their adaptation work is not made clear.

33. Maggiani (e.g., 2002, p. 56) goes so far as to identify one Pupon Rakos, named on the oldest phase-2 document from Padova, as the Etruscan responsible for establishing Southern Etruscan cult and writing culture in the Veneto.

34. 'mechanical and entirely practice-oriented method […] and a theoretical refinement usually only secondarily'.

The more or less problematic examples of purposeful and sophisticated script creation and of unsophisticated script transfer and development discussed so far can be juxtaposed with cases where a succession of learned users take a long time to adapt a foreign script to their own language (gradual sophisticated development) and with such where illiterate grammatogenists produce perfectly acceptable systems which have only a passing similarity to the model (unsophisticated script creation). Examples for the two latter types of transfer will be presented in the following sections.

3.7.   Unsophisticated Inventors: The Cherokee Syllabary

The Cherokee script was invented by an ingenious tribesman between 1809 and 1821. Unfortunately, information about Sequoyah's life is sparse and partly unreliable; the accounts are collected in Davis (1930). It seems clear that Sequoyah was monolingual (ibid., p. 155) and illiterate. He did, however, understand that shapes which he observed printed on paper (viz. Latin letters) reflected speech. After claiming before the patrons of his public house that he could come up with a tool which would allow the Cherokee to communicate by means of "talking leaves" in the manner of the foreigners, he set to work, initially attempting to invent a character for every word in his language. After realising that such an approach would require more characters than could easily be remembered, and that characters for concepts were not practicable either, he hit upon the notion of writing recurring sounds. According to Davis (ibid., p. 160), he did not rely upon his own language competence, but also listened to others to make sure that all sounds would be represented. He "obtained an old English book" (ibid., p. 30) and used most of the character shapes he found there, modified some and invented the rest. Similarities of Cherokee characters with Latin ones and with Arabic numerals are entirely graphic—since Sequoyah did not read English, there is no correspondence in the sound values. Similarities with letters from the Greek and Cyrillic alphabets (Scancarelli, 1996, p. 587) are probably fortuitious. It must also be pointed out that Sequoyah's original characters were soon assimilated to the letters which were available in printing presses. An early source stresses Sequoyah's lack of "sophistication":

> A form of alphabetical writing invented by a Cherokee named George Guyst,[35] who does not speak English, and was never taught to read English books, is attracting great notice among the people generally. Having

---

35. Sequoyah's English name, inherited from his allegedly German father (Davis, 1930, p. 153f).

become acquainted with the principle, that marks can be made the symbol of sound, this uninstructed man conceived the notion that he could express all the syllables by separate characters, but for the specific purpose of writing his native language" (from *The Christian Observer* [London], vol. 26 [May 1826], 317; quoted from Davis (1930, p. 154) [n. 22]).

The result of Sequoyah's efforts, a syllabary of eighty-five characters, is better suited to write Cherokee that the adapted Roman alphabet, though its creator's lack of linguistic training is reflected in the system not being able to write the language quite unambiguously (Scancarelli, 1996, p. 590; Scancarelli, 2005, pp. 359–364)—it would appear that Sequoyah, while paying particular attention to the realities of spoken Cherokee, did not go out of his way to make his system symmetrical.

After a rough start, which almost saw the man executed for sorcery (Davis, 1930, p. 161), Sequoyah's creation took on very well (Walker and Sarbaugh, 1993; Cushman, 2010)—and not only among his own people. According to Unseth (2016), the Cherokee example was emulated by a great number of illiterate societies, inspiring the creation of twenty-one scripts for over sixty-five languages. Sequoyah's case is indeed the first documented case of unsophisticated grammatogeny in Daniels' narrow sense (involving a single creator). More examples can be found in Daniels (1996a), Singler (1996) (West African examples) and Ratliff (1996) (Pahawh Hmong script).[36] A recurring element is inspiration from a dream, which was claimed by the creators of the Vai script in West Africa (Singler, 1996, p. 593f), of the Afaka script created for the Ndjuka creole of Surinam (Daniels, 1996a) and of the Bamum script (A. Schmitt, 1963). The circumstances of the latter's creation are well researched: Njoya, head of the Bamum tribe of Cameroon, became aware of other peoples' ability to communicate via signs made on paper (ibid., p. 14). He first conceived of about four-hundred and fifty iconic ideograms designed for mnemonic purposes (ibid., pp. 110–112). Between 1896 and 1910, a series of six well documented revisions, in whose course Njoya and his scribes re-invented the rebus principle, introduced syllabic writing, which culminated in an eighty-character syllabary called *akauku*.

3.8. Sophisticated Users: Writing Japanese

The converse scenario can occur in a previously illiterate society whose (or some of whose) members have literacy in the source language, coupled with a high level education associated with the prestigious foreign culture—under such circumstances, the employment of the script for the vernacular may happen rather late. Professional scribes who, once the

---

36. See also Walker and Sarbaugh (1993, p. 88) (n. 1).

notion becomes popular, begin to spell their native language with the well known characters must be assumed to make decisions and come up with solutions which are different from those of people who have only a cursory user's understanding of how the script relates to the source language.

The transition from writing Chinese with Chinese characters to writing Japanese with Japanese kana did not happen suddenly. Chinese writing was first brought to Japan by Korean scholars in the 4th or 5th century AD in the course of a general Sinicisation of Japanese culture. While the Chinese characters, called *kanji* in Japan, were soon used to write Japanese, adaptation processes appear to have started only in the 9th century. All stages of the change from Chinese logo-syllabic to Japanese syllabic writing are not only attested, but still in use today.

The kanji in their original form are used as logograms, i.e., with focus on their semantic content (e.g., the kanji for 'ten' being used to write 'ten' in a Japanese text). For the pronunciation of a kanji, there are two options: on- and kun-reading. On-reading means that the kanji is read according to the Chinese pronunciation (e.g., the kanji for 'ten' being read *shi* 'ten' in Chinese). For kun-reading, the designated word is translated into Japanese (e.g., the kanji for 'ten' being read *tō* 'ten' in Japanese). Whether, for any one kanji in a text, on- or kun-reading is intended must be judged from context. The matter is further complicated by the fact that a kanji can have more than one meaning (e.g., literal vs. metaphorical), and more than one phonetic shape can be associated with a meaning in either language. Furthermore, the phonetic shape based on on-reading is variable due to the phonetic differences between the two languages (i.e., the Chinese phonetic sequence in an on-reading may come out in different ways when pronounced by Japanese speakers), and kun-readings may only approximate the Japanese phonetic shape of the word. There are also conventionalised on-readings, whose pronunciation depends on when they were introduced from which Chinese dialect, resulting in multiple on-readings for one kanji (which can even include conventionalised misreadings). The two readings may be mixed in compound (two-kanji) words (Taylor and Taylor, 1995, pp. 299–303).

These multiple readings become especially relevant when kanji are used to write phonetically. Just like the Koreans, the Japanese saw the necessity to write not only lexical items, but also their grammatical morphemes. To represent a Japanese syllable, a writer could theoretically obtain a sound value via any of the readings described above, always ignoring the respective kanji's semantic content—shakuon/ongana is a phonetic character obtained through on-reading, shakukun/kungana is one which is based on kun-reading. So, the kanji for 'ten' could theoretically be used to write the syllables *shi*, *tō*, *to*, or any of the other sound shapes available through the various reading options mentioned above (examples in Tollini, 2012). A reasonable preference for graphically sim-

ple kanji with convenient one-syllable readings did something to limit the plethora of options, gradually reducing the number of kanji which were habitually used to write phonetic sequences. By the 9th century, the preferred kanji formed a usable system called *man'yōgana*. This was then further simplified to two distinct syllabaries: katakana and hiragana. Katakana developed from the use of man'yōgana in interlinear or marginal glosses, with drastically simplified characters for small and quick writing. Hiragana sports more artful character shapes, being a cursive script used mainly for writing literature. Only a few corresponding hiragana and katakana characters have been derived from the same kanji (Taylor and Taylor, 1995, pp. 306–308).

Though it cannot, of course, be excluded that, at one or different times, scribes who struggled with the use of kanji to write Japanese made coordinated efforts to reduce and systematise character use, the development of kana happened gradually, only governed by the needs of an uncoordinated writing community and the willingness to follow emerging conventions, however random. Tollini (2012, p. 171) refers to the importance of the early 8th-century chronicle *Kojiki*, the first lengthy text in Japanese, which is prefaced by a passage explaining the difficulties in writing Japanese with Chinese characters and indicating the strategy used in *Kojiki*—such a seminal work may well have served as a reference text for scribes, not unlike the orthographic conventions of Luther's German Bible translation were used as a model by early printers. Still, the general predilection for culture heroes does not exclude Japan: the Buddhist monk Kūkai, founder of the Shingon school of Buddhism, who lived around AD 800, was the right man at the right time and place to be credited with taking the definitive step towards the purely phonetic writing of the Japanese language. Trained in reading the original Indic Buddhist texts, he was acquainted with a purely phonetic writing system. The 11th-century poem *Iroha uta*, famous for containing each of the archaic kana once, is ascribed to Kūkai, but this is not supported by historical sources (Taylor and Taylor, 1995, p. 308). Kūkai's role in the development of phonetic writing in Japan, opposed to that of countless nameless civil servants and scribes taking one little step at a time, is highly questionable. This development may be considered to represent a case of "sophisticated diffusion", with a considerable number of competent users independently introducing changes which are discarded or adopted to gradually accumulate and form a new system.

A similar scenario can be envisioned for the distribution of the Latin alphabet in Europe. The persons who employed the Latin script for writing their native languages were ecclesiastical and lay scholars trained not merely in writing the model language with the associated script, but with a classical education—men who can be assumed to make informed decisions when applying themselves to the task of adapting a script. Yet the adaptations were introduced in a piecemeal manner

to form the various national alphabets with their special characters—often evolved from diacritics—and their different orthographies. The prominent difference between the development in Japan and in Europe is that in the former case, the results were scripts which are typologically different from the model, precipitated by the fundamental difference in language type, whereas the European alphabets keep the structural properties of the model.

3.9.   Misunderstood Models? The Indic Scripts

In 1905, the missionary Alfred Snelling and a group of men from Chuuk island got lost at sea and ended up on the more westerly Eauripik island. A few months later they were transferred by the inhabitants to nearby Woleai island, where Snelling died. His fellow passengers returned home, but left their alphabet behind. The Chuukese had been blessed with script, in the form of a minimally adapted variant of the Roman alphabet, in 1878 by an American missionary who introduced regular syllabic letter names for consonants, all following the pattern C*i*. The inhabitants of the Eauripik and Woleai islands must have been taught the letter values through recitation of these names; the difficult circumstances of the transfer and subsequent breaking-off of contact made possible a misinterpretation: left to draw their own conclusions, the islanders took the C*i*-letter names to be the actual sound values, which resulted in a rather lopsided syllabary. The C*i*-characters were used to write all CV-syllables and word-final C; the correct vowel could only be indicated in syllables without an initial consonant (with the four non-*i* vowel characters). A few years later, the system was expanded to designate syllables with vowels other than *i*. The new characters were created mostly according to the rebus principle, i.e., stylised drawings of things whose names correlate with the syllable. Others are modifications of the corresponding C*i*-characters, and four appear to be modelled on Japanese characters. Riesenberg & Kaneshiro 1960, p. 295 assume that four to ten Faraulep islanders were responsible for the creation of this younger version (confusingly called "type 1"), though variants of both the old, defective system ("type 2") and the new, expanded one indicate an "interactive and partly indirect mode of script transmission (and possibly development)" (Justeson and Stephens, 1993, p. 9). Neither type appears to have been widely used; a standard (Roman) orthography for Woleian was created in 1951 (Voogt, 1993, p. 8).

According to Justeson and Stephens (1993), a similar mechanism, viz. a misunderstanding concerning the actual sound values arising from a syllabic strategy of teaching (letter-value recitation, letter naming or syllabic spelling paradigms), caused the formation of a number of other syllabaries, alphasyllabaries and abugidas, including the Old Persian, the

Indian and the Iberian script. Where the receiving group is not literate in the model script, what Wachter calls Merkspruch is "the only shared context of sign use" (Justeson and Stephens, 1993, p. 6). In Old Persian cuneiform, the <Ci/Cu>-syllabograms would then originate from the character names of the Mediterranean area, whereas the <Ca>-characters would go back to the same Aramaic scribal school tradition as the Indic ones (ibid., pp. 33–36).

A connection with the Aramaic abjad is evident for Karoṣṭhī, the older of the two original Indic scripts, which was used to write Gāndhārī in the north-western area of the Indian subcontinent and was ultimately abandoned in favour of Brāhmī. The area in which Karoṣṭhī was used coincides with that which had been under Achaemenid rule; Aśokan edicts are attested in Aramaic versions. Furthermore, the majority of Karoṣṭhī characters correspond to Aramaic counterparts (Salomon, 1998, p. 52). Much like in the Runic script, however, some correspondences concern both character shape and sound value, while others are purely graphic, the Indic sound value being unconnected to that of Aramaic—for example, the Karoṣṭhī character which is graphically based on bēt represents the sound value *ba*, but a character which resembles tāw represents *pa* (Falk, 1993, p. 103). Also reminiscent of Runic character derivations is the necessity to assume inversion, cursivisation and disambiguation. Of the Brāhmī characters, only about half can be associated with Semitic ones, but a derivation from the Aramaic script remains the best option (Salomon, 1996, p. 378; Salomon, 1998, pp. 28–30). Neither of the scripts was originally developed to write Sanskrit (Falk, 1993, p. 134; Salomon, 1998, p. 16).

This sheds doubt on whether the emergence of Indic literacy is connected with Brahmanic scholarship. Going by the extant data, India had a grammarian tradition at the time the Indic scripts (were) developed, whose representatives have been assumed to be responsible for the creation of both systems (see Falk, 1993, p. 133f). The oldest inscriptions, which provide evidence for both Karoṣṭhī (in the north-west) and Brāhmī, are the Edicts of Aśoka, dated to the mid-3rd century BC. Unless one considers the Indic scripts (or one of them) to be at least a century, maybe up to three centuries older than the Aśokan documents (depending on the preferred dating of Pāṇini), the grammarian tradition predates Indic writing.

Regarding the first attestation on the Aśokan stelae, the situation is similar to the Old Persian one in that the first documents are proclamations made by a historical ruler. While for Old Persian cuneiform, a one-off creation of the script has always been the starting point of argumentation because of the Schrifterfindungsparagraph, Aśoka's edicts make no meta-reference to the scripts in which they are written. Some scholars have ascribed the creation of one or both scripts to Aśoka himself or his scribes—see Falk (ibid., pp. 162–165), affirmative and with

arguments for the scripts being no older than the Aśokan inscriptions (e.g., the quick development of Brāhmī during Aśoka's time and the fact that the edicts refer to a proclamation of the texts rather than to reading or copying, which suggests restricted literacy). On the other hand, there is a school of thought which denies the possibility that the large Vedic and grammarian text corpus (especially Pāṇini's grammar) could have been passed down orally (see Bronkhorst, 2002, pp. 798–808 with literature). This position is hard to argue conclusively; putative evidence for a writing tradition prior to the time of Aśoka, including archaeological finds as well as literary references by vernacular and Greek sources, is inconclusive (Salomon, 1998, pp. 11–13). For example, Pāṇini, datable to the mid-4th century BC at the latest, makes reference to scribes (*lipikara*, *Aṣṭādhyāyī* 3.2.21), but this may well refer to foreigners, probably Aramaic scribes (Hinüber, 1990, p. 58; Falk, 1993, p. 258). There is, however, epigraphic material in the form of a group of potsherds, inscribed with proper names, from Anurādhapura (Sri Lanka), which appear to come from strata ^{14}C-dated to the early 4th century BC at the latest (Salomon, 1998, p. 12). Also, the existence of a "fully fledged writing system […] available for Aśoka to use" (Norman, 1988, p. 14f) as well as alleged graphic variants in the Aśokan inscriptions (Norman, 1993, p. 279) have been used as arguments for a somewhat higher age of the scripts. Norman (1993, p. 279) explains the absence of older documents, much like his runological colleagues, with their being mere administrative records written on perishable supports, assuming that the Aśokan imperial stelae owe their existence to inspiration from Achaemenid monumental inscriptions. Salomon (1998, p. 13f) is inclined to accept an emergence of both Indic scripts in the 5th or 4th century BC, suggesting a scenario with which we are by now well acquainted, viz. that older, rather unsophisticated systems were revised and standardised to make a national script, developed under Aśoka for purposes of governing his vast pan-Indian empire.

Norman (1993, p. 280) attributes the inconsistency concerning the graphic correspondences between characters for similarly articulated sounds in Brāhmī to the script predating grammatical theory—but also Falk (1993, pp. 134–136), despite his preference of a later development, argues against a profound understanding of phonology on the part of the creators, pointing to a number of imperfections and inconsistencies with regard to how the scripts represent the phoneme inventory of the respective underlying Prakrit varieties which he considers to be incompatible with the notion of highly sophisticated inventors. He suggests the involvement of people who had some level of śikṣā training or a vague understanding of phonology as disseminated by such "Studienabbrechern" ('college dropouts') in Brahmanic circles.

An argument against specifically Karoṣṭhī as the work of grammarians is furnished by the character row. The varṇamālā, the standard or-

der of the characters in Indic, which is insightfully arranged by place and type of articulation, was created in the 4th century BC with regard to Sanskrit and does not originally have anything to do with writing. The characters of a script created by persons with Vedic schooling would be expected to be arranged according to the established varṇamālā sequence (as was indeed done later on, when Brāhmī was used to write Sanskrit). Yet, there is no evidence for this, or for an original arrangement which follows that of the abjad. Instead, there is evidence for a different original order of Karoṣṭhī—more in the Semitic style in its apparent randomness—called *arapacana* (after the first five letters). Mainly known in a Sanskritised version from Buddhist texts, the arapacana is epigraphically attested in four documents, none older than the first centuries AD (Salomon, 1990, pp. 258–268). It is not certain that this order is as old as Karoṣṭhī itself—it has been prominently, though tentatively, explained as a mnemonic device for a Buddhist text by Brough 1977, p. 93f. Salomon (1990, p. 271f) suggests the possibility that the arapacana is Karoṣṭhī's conventional character row, indicating that two of the arapacana-inscriptions, applied on writing boards, may be interpreted as the works of pupils and have parallels in inscriptions which have Brāhmī characters arranged according to the varṇamālā. He also points out that, where there is a connection between a character row and a text, it is usually the text which is arranged according to the established order, not the other way round. Salomon hesitates to fully commit to this interpretation because of the presence of twelve seemingly randomly selected characters for conjunct consonants in the arapacana, but Falk (1993, pp. 237–239) does prefer an interpretation of the sequence as an original letter row; the presence of a few obsolete letters may be taken to speak for its being archaic.

A possible point in favour of a sophisticated creation of the Indic scripts is the alleged correlation between language structure and script type: an abugida is an expedient system for languages in which, as in the Indic ones, one vowel occurs considerably more frequently than the others. Yet it would have to be assumed that this consideration was of sufficient appeal to cause the inventor(s) of the Indic scripts to reintroduce the syllabic principle into a script which was modelled on an abjad, rather than to use certain characters as letters for vowels like the Greeks. The latter approach was indeed to some extent followed in Karoṣṭhī, where the graphic correspondent of aleph is the letter for initial *a*, all other letters for initial vowels being graphic variants of it. Salomon (1998, p. 16) (n. 34) suggests that the established "concept of the akṣara or syllable as the essential unit of language" was responsible for the development of a syllable-based writing system in India—a notion which would point to the involvement of grammarians. Falk (1993, p. 336) notes a few (general) advantages of the abugida over the alphabet, but in my view the alternative scenario suggested by Justeson and

Stephens (1993) is altogether more attractive. Rather than being the result of profound linguistic insight, the system originated in "a basic misunderstanding of the principles of the parent system" (ibid., p. 37). An imperfect knowledge of the model could also explain the shape-only correspondences between Aramaic and Karoṣṭhī characters; Falk (1993, p. 238) notes that the first eight characters of the arapacana-sequence are full or at least graphic correspondences with Aramaic characters, suggesting that a semi-literate creator of Karoṣṭhī started with those characters whose values he could remember, and only then began to invent values for familiar forms or entirely new character shapes.

3.10. Complete Chaos? The Carian Alphabet

In the previous section, reference was made to similarities between the issues involved in the origin question of the Indic and the Runic scripts. The Carian alphabet is another excellent case for comparison with the Runic script in terms of the problems with their respective derivation: it has the same structure as its most obvious model, being one of a number of Greek-based alphabets in Asia Minor, and thus can hardly be classified as a result of unsophisticated grammatogeny of the Cherokee type. Yet it deviates from that model in detail in a way which has so far proved inexplicable. It features a few letters which resemble letters of the obvious model and have the appropriate sound value, but also letters which resemble letters of the model but have seemingly random sound values, as well as letters which can be derived from letters of the model at something of a stretch, and some letters which really do not look like anything that might legitimately be compared with the model.[37] Accordingly, the study of the Carian alphabet knows its own version of the runemaster-theory, aptly named the "chaos hypothesis" (also "μεταχαρακτηρισμός"), according to which there is simply no logical relationship between the letters of the Greek and the Carian alphabet—the concept of alphabetic writing and a handful of letters were taken from Greek, but some of the latter were given different sound values at random, and supplemented by newly invented letters. Voogt (2012, p. 5) books the Carian alphabet as representative of his transfer type L4 (borrowed characters, different values) on the assumption that a Carian creator purposefully rearranged

---

37. The profound difference between the two fields lies in the fact that the Runic script boasts a continuous tradition which connects the last phase of its use with the earliest scholarly treatments, so that it never had to be deciphered. A glance at the history of the decipherment of the Carian inscriptions (Eichner, 1994), with an older tradition of scholarship adhering to the principle that the sound values of graphically similar letters must always correspond to the Greek values, may give an impression of the state the field of runology might be in today if it had started out assuming that ᛘ was *m* and ᚠ was *p*.

the grapheme-phoneme correspondences to make his script unlike the Greek model—though why he allowed alpha, omega, upsilon and san to keep their Greek values, and why it should not have occurred to him to simply change all the letter forms, remains open to question. Adiego (2007, p. 230f) doubts the chaos hypothesis. His own theory (in detail Adiego, 1998) suggests that the Carian letters do in fact go back to those Greek letters which their sound values indicate and that the graphic deviations are due to extensive formal changes introduced between the alphabet's emergence and its attestation. Notably, the Carian alphabet, like the early Greek alphabet, is attested in a number of local variants which may or may not go back to one single proto-alphabet.

3.11.   A Script of One's Own

Ethno-nationalist motives are quite frequently referred to in the context of script creation. The possibility of a conscious effort to set oneself apart from the model was, e.g., suggested for Ogam—the drastic graphic and systematic deviance from traditional alphabets has been explained as "a rebuff to Rome, a deliberate expression of anti-Roman sentiment" (McManus, 1991, p. 14) or as the features of a cipher specifically created to be illegible to people with literacy in Latin (see ibid. with literature). The importance of creating original alphabets for the political and cultural identity of Caucasian speaker communities is stressed by Barkhudaryan (2011), Drost-Abgarjan (2011), Kananchev (2011, p. 63) and Seibt (2011, p. 85). The latter suggests that the Armenian letters were graphically changed so as not to look too Greek to avoid conflict with Persia.[38] But also the adoption of a script (presumably) without intervention of a creator may have motives related to ingroup writing: the first Celtiberian documents, written in the structurally ill-suited Iberian script, date to ca. the middle of the 2nd century BC, i.e., the time of the Numantinian War against Rome—Stifter 2019, p. 109 attributes this delayed adoption of the Iberian script in favour of the Latin alphabet, which must have been known to the Iberian Celts, to "a deliberate political decision fraught with deep cultural symbolism". In the same vein, Justeson and Stephens (1993, p. 38) point to the potential role played by "script as an ethnic attribute" in the context of their theory of misunderstood models—the wish to establish the new script as a mark of ethnic

---

38. Cf. also Granberg (2010), who argues that, of the alphabets which emerged in the 1st millennium AD in the context of Christianisation, those which wrote languages which had not been written before deviate from to the Greek model in both letter forms and order, while those which replaced and had to compete with previous traditions (Coptic with Demotic, Gothic with Runic, Cyrillic with Glagolitic) emulated the prestigious Greek script.

identity may be a factor in perpetuating the results of misinterpretations in cases where contact with the model writing culture is maintained. As stressed by Coulmas (1989), writing "creates social coherence" (p. 8), it

> indicat[es …] group loyalties and identities. […] Language attitudes such as the desire to have an orthography which makes the language in question graphically similar to another or, conversely, makes the language dissimilar to another, may be irrational but they are social facts which often strongly influence the success of a proposed system (p. 226f).

In a Runic context, Rix (1992, p. 141) calls the notion that an attempt to set oneself apart from the culture which provides the model could be the cause for the otherness of the fuþark "modern gedacht" ('a modern thought'), but the possibility can certainly not be excluded for the runes.

This opens the question of whether illiterate communities only adopt scripts if they require the technology to serve a specific purpose. This is claimed, for example, by Spurkland (2005, p. 3), who assumes "a compelling need for a means of written communication due to an expanding economy and growing administrative structure", and Rausing (1992, p. 202), according to whom the fuþark was "devised by practical men to meet a practical need".[39] The opposite position is held, for example, by Williams (1997, p. 181), who observes that "[g]iven the contact with Roman culture, it would be a strange thing indeed if some Germanic individual had *not* been impressed by the Roman art of writing and tried to imitate it". Like Seebold (1986, p. 534) and Odenstedt (1990, pp. 171, 173), Williams argues that, despite the existence of the fuþark, the Germani were "functionally illiterate" (p. 187), relying on oral transmission well into the Middle Ages and using writing for marginal purposes.[40]

The examples of communities which had writing bestowed upon them, nolens volens, are legion. This prominently includes the numerous examples of scripts created by Christian missionaries, whose primary objective was not to raise literacy levels, but to get natives to read the holy texts. Yet cases in which a script, once known, was not used in some way, must be rare, if they exist at all. Like any technology, and probably more than most, writing is a tool which has an immediate appeal, and can and will be used for its own sake, even if it does not serve any particular purpose. The knowledge of writing may also be tied to a cultural asset of high(er) appeal, such as a cult, and enter through the back door. Furthermore, there is the question of who, exactly, "needs" or "is ready for" script—a society as a whole? A specific group of professionals? Any one individual, reacting to a perceived latent demand—or

---

39. See also, e.g., Düwel (2003, p. 583); Stoklund (2003, p. 173); Heizmann (2010, p. 16).

40. See also Bæksted (1952, pp. 134–138, 328); further Williams (2004, pp. 268–273); Fairfax (2014, p. 187f).

to his own fancies? Hankul was a rather enlightened pet idea of King Seycong, aimed at educating the people—while he considered it useful, it was widely rejected by the members of court, who were classically trained in writing hanca and had no need for the new "proletarian" script (Taylor and Taylor, 1995, p. 212). Förster (2011, p. 35) argues that the Greek-based Coptic alphabet, which superseded the dying Demotic script in the first half of the 1st millennium AD, was vital for keeping the vernacular language alive in the face of Hellenisation, even if it failed to represent that language as well as the obsolete Demotic had, but it may be doubted whether this was the express purpose of its creators/users. The divided Armenians of the 4th century, on the other hand, are said to have been in need of a script for political reasons (Barkhudaryan, 2011, p. 17); the invention of that script, supported by the clerical leaders, immediately triggered the development of national historiography. The Cherokee also took to Sequoyah's syllabary with considerable enthusiasm, with even the shamans putting their wisdom into writing (which they notoriously refused to do in any of the adapted European alphabets), but inhowfar they "needed" a script is open to debate. Are we to assume that the Etruscans would have rejected the Phoenician script, had it arrived at their shores two hundred years before the Greek one, because they could have found no purpose for it?

These considerations are tied to the presumptive creator's provenance and his native language. When assuming script diffusion, it is clear that the people who carry the process are speakers of the target language. When there is talk of a script creator, I believe, scholars also generally think of a member of the previously illiterate culture[41]—runologists, as shown above, definitely do (cf. Rix, 1992, p. 412). This is by no means obvious. Theoretically, the creator (or creators) could have been a member of the new writing culture (Germanic), a member of the model writing culture (Roman/Greek/…) or the member of an intermediary writing culture (Celtic/…)—examples can be found for most scenarios: grammatogeny by speakers of the source language who have attained an understanding of the target language (e.g., the Lisu script[42]), by speakers of the target language who are literate in the source lan-

---

41. Not so Prosdocimi (e.g., 2002, p. 28), who makes the point that, in regard to script adaptation, the teachers of writing whom he calls "maestri" always belong with the source language's culture in that, even if they should be members of the target language's culture, they can be literate only in the source language. While this is certainly true, Prosdocimi goes on to claim that these bilingual maestri must consequently have the same perspective on the adaptation as their source-language-speaking colleagues, and that therefore a new script is never created to properly fit the target language, but must reflect the necessarily conservative point of view of the source language's maestri.

42. The English missionary James O. Fraser created a highly systematic abugida-like script for the Tibeto-Burman language around 1915 (Daniels, 1996a, p. 581).

guage (e.g., the Armenian alphabet) and by speakers of the target language with no literacy in the source language (e.g., Cherokee). While it is true that the first option draws its many examples from modern grammatogeny performed by missionaries, it must be observed that examples for the second option can be difficult to classify. There is a smooth transition from native speakers of the target language with competence in the source language via functionally bilingual speakers of both languages to thoroughly acculturated persons with only a remote connection to their native culture and language, and in pre-modern times the distinction is often hard to make—e.g., the ethnicity and Slavic competence of Constantine (St. Cyril) has long been a point of contention (see Ševčenko, 1971, p. 341f for an overview).

4.   Concluding Remarks

To sum up: very nearly every imaginable process of script transfer is attested or at least being discussed. Scripts are devised for a specific purpose by ingenious and educated men, on a whim by ingenious and uneducated men, by natives and by foreigners, by individuals, co-ordinated collaborators and unco-ordinated groups of people. They evolve gradually out of systems when these are applied to a new language and are adapted secondarily, or not. They define a cultural entity, or are only used playfully until they are abandoned or superseded. They are created by kings, clerics or innkeepers to write literature, lists, or nothing in particular. They are learned, imitated or forced on people; they are purposefully made to emulate or to set apart, they are faithful to the model or accidentally revolutionary.

As said in section 2.2, there is no doubt that in the case of the fuþark, there are features which indicate that its formation did not happen in the same way as that of most other Mediterranean alphabets. The deviating order of the row shows that the alphabet was not learned in the traditional way, through the Merkspruch. Numerous attempts to explain this idiosyncrasy use widely different approaches, from the phonetically motivated re-arrangements mentioned above via graphic considerations (e.g., Kabell, 1967, p. 114) and underlying texts (e.g., Skeat, 1890) to the semantics of the rune names. All these presuppose the regulative hand of a creator; only explanations which work with transmission errors (e.g., Williams, 1996) are reconcilable with diffusion. In the latter case, the question remains how a fairly uniform row emerged. The rearrangement is best explained as the intervention of a creator, even if his motives remain unclear.

Secondly, the graphic uniformity of the earliest inscriptions is supposed to indicate that the Runic script was invented at once, as diffusion should lead to a certain amount of inconsistency and variation in

the early phases and be reflected in documents in which graphic forms and problematic character-sound relationships vary. The homogeneity of the early finds, however, is debatable; the stance taken on the matter depends on how experienced the respective scholar is with epigraphic corpora, and with which one(s), and which standard of uniformity these data suggest to them. Furthermore, it is not even entirely clear whether the documents which are currently considered the earliest Runic inscriptions really represent the initial phase of Runic writing: the argumentum ex silentio is as precarious in runology as it is in other epigraphic fields. The potential precursors of runes such as the Meldorf fibula, if they are to be interpreted as such, do not agree with the notion of a creator, unless one were to assume a scenario similar to that of the Venetic alphabet: initial unsystematic employment of a foreign script for one's own language being cut short by an inventor taking charge.

In any case, the mere fact that all these features have also been explained differently, be it by assuming an unattested intermediary alphabet or some specific context for the transmission, shows that it is far from clear whether a sophisticated creator of the runes ever existed and can be relied on to account for any unexpected feature of the fuþark with his "imaginative approach" (Spurkland, 2005, p. 6).

It is more often than not impossible to be sure which transfer scenario we are faced with, because the impression we get depends on the transmission situation. As noted by Jeffery, uniform invented scripts are not stable and variation will develop; on the other hand, gradual diffusion can be cut short by the intervention of a culture hero or a regulating body at any point. Depending on when our attestation sets in, we may misinterpret the state of the script and the reasons behind its characteristics. We may overlook a systematic creation if the inventor's name is lost and the oldest documents already show some variation, and we may take for an original one-off creation a script that is really just a secondary regulation of a gradually evolved tradition, especially if there is a prominent name associated with it.

Finally, it may be observed that scholars who are concerned with scripts which are known to have been created by highly competent persons with a free hand, such as the Armenian alphabet, still occupy themselves with the search for the models of individual letters, the assumption that the creator invented letters and rules and introduced changes off the top of his head being considered a last resort. There are scholars who seek to account for changes even when assuming a single creator—e.g., Fairfax (2014, p. 217), who points out that assuming what he calls an "impressionistic" element in script transmission does not necessarily mean that letter derivations are unnecessary, as even the alleged creator must be expected to proceed with a certain amount of "procedural rigour". A non-Runic example, referenced by Fairfax himself, is Ebbinghaus (1979), who presents an elaborate attempt at explaining how ex-

actly Wulfila proceeded when he derived his Gothic letters from the Greek alphabet. This approach is methodologically sound. Thus Krause (1970, p. 41), who deems Moltke's theory to be a non-explanation:

> Eine solche Erklärung dieses oder jenes Runenzeichens ist freilich im Grunde keine Erklärung. Man wird daher doch bestrebt sein, auch bei zunächst als unableitbar geltenden Runen irgendwelche Vorbilder oder wenigstens Anregungsmuster aufzuspüren.[43]

Similarly, Cubberley (1982, p. 291) observes that theories which explain the Glagolica as a completely original creation are "quite unchallengeable in any formal sense". If we assume that any irregularity or unexpected element in a derived script is due to the arbitrary decisions of an unknown figure lost to history, we move on methodologically dangerous ground. This does not mean that theories which include formal letter derivations according to the "naturalness"-approach could not do with a higher level of methodical rigour—McManus (1991) passes valid methodological criticism on the "juggling and reshuffling" (p. 25) of characters to make them fit with their putative models, writing that "[m]ost attempts to outline the successive stages in the development from the prototype to [in his case] Ogam amount to no more than exercises in anticipating what one knows became the alphabet in its final form" (p. 22)—"[i]t is in effect a hit and miss approach which cannot miss since it has the benefit of hindsight and its arguments tend to become circular in nature" (p. 26).

References

Adiego, Ignacio J. (1998). "Die neue Bilingue von Kaunos und das Problem des karischen Alphabets." In: *Colloquium Caricum. Akten der internationalen Tagung über die karisch-griechische Bilingue von Kaunos 31.10–1.11.1997*. Ed. by Wolfgang Blümel et al. Vol. 37. Kadmos. Berlin: de Gruyter, pp. 57–79.

——— (2007). *The Carian Language*. Leiden/Boston: Brill.

Agrell, Sigurd (1938). "Die Herkunft der Runenschrift." In: *Kungliga Humanistiska Vetenskapssamfundet i Lund, Årsberättelse 1937–1938*, pp. 65–117.

Alexander, Gerhard (1975). "Die Herkunft der Ing-Rune." In: *Zeitschrift für deutsches Altertum* 104, pp. 1–11.

Allen, Sidney (1987). *Vox Graeca. A guide to the pronunciation of Classical Greek*. 3rd ed. Cambridge, UK: Cambridge University Press.

---

43. 'Such an explanation of this or that Runic character is of course ultimately not an explanation. One will therefore still strive to trace some models or at least inspirations also for runes which are regarded as impossible to derive'.

Antonsen, Elmer H. (1987). "The Oldest Runic Inscriptions in the Light of New Finds and Interpretations." In: *Runor och runin-skrifter. Föredrag vid Riksantikvarieämbetets och Vitterhetsakademiens symposium 8–11 september 1985*. Vol. 15. Kungl. Vitterhets Historie och Antikvitets Akademien. Stockholm: Almqvist & Wiksell, pp. 17–28.

——— (1996). "Runes and Romans on the Rhine." In: *Frisian Runes and Neighbouring Traditions*. Ed. by Tineke Looijenga and Arendt Quak. Vol. 45. Amsterdamer Beiträge zur älteren Germanistik. Amsterdam: Rodopi, pp. 5–13.

Askeberg, Fritz (1944). *Norden och kontinenten in gammal tid. Studier I forngermansk kulturhistoria*. Uppsala: Almqvist & Wiksells Boktryckeri.

Bae, Chul-Hyun (2001). "Comparative Studies of King Darius's Bisitun Inscription." PhD thesis. Harvard University.

Bæksted, Anders (1952). *Målruner og Troldruner*. Vol. 4. Nationalmuseets Skrifter, Arkæologisk-Historisk Række. Kopenhagen: Nationalmuseet.

Baesecke, Georg (1940). *Vorgeschichte des deutschen Schrifttums*. Halle a. d. Saale: Max Niemeyer.

Barkhudaryan, Vladimir (2011). "The Creation of the Armenian Alphabet and the Armenian Identity." In: *Die Entstehung der kaukasischen Alphabete als kulturhistorisches Phänomen. Referate des Internationalen Symposions (Wien, 1.–4. Dezember 2005)*. Ed. by Werner Seibt and Johannes Preiser-Kapeller. Vol. 28. Veröffentlichungen zur Byzanzforschung. Wien: Verlag der Österreichischen Akademie der Wissenschaften, pp. 17–20.

Barnes, Michael P. (1994). "On Types of Argumentation in Runic Studies." In: *Proceedings of the Third International Symposium on Runes and Runic Inscriptions. Grindaheim, Norwayn 8–12 August 1990*. Ed. by James E. Knirk. Vol. 9. Runrön. Uppsala: Uppsala universiteit, pp. 11–29.

——— (1997). "Native and foreign in the runes and runic writing of Scandinavia." In: *Runor och ABC. Elva föreläsningar från ett symposium i Stockholm våren 1995*. Ed. by Staffan Nyström. Vol. 4. Runica et Mediævalia, Opuscula. Stockholm: Sällsk, pp. 9–21.

——— (2012). *Runes. A Handbook*. Woodbridge: Boydell Press.

Beck, Heinrich (2001). "Runen und Schriftlichkeit." In: *Von Thorsberg nach Schleswig. Sprache und Schriftlichkeit eines Grenzgebietes im Wandel eines Jahrtausends. Internationales Kolloquium im Wikinger Museum Haithabu vom 29. September – 4. Oktober 1994*. Ed. by Klaus Düwel et al. Vol. 25. Reallexikon der germanischen Altertumskunde. Berlin/New York: De Gruyter, pp. 1–23.

Birkhan, Helmut (2006). "Keltisches in germanischen Runennamen?" In: *Das* futhark *und seine einzelsprachlichen Weiterentwicklungen. Akten der Tagung in Eichstätt vom 20. bis 24. Juli 2003*. Ed. by Alfred Bammesberger, Gaby Waxenberger, and René Derolez. Vol. 51. Reallexikon der germanischen Altertumskunde. Berlin/New York: De Gruyter, pp. 80–100.

Borger, Rykle and Walther Hinz (1959). "Eine Dareios-Inschrift aus Pasargadae." In: *Zeitschrift der Deutschen Morgenländischen Gesellschaft* 109, pp. 117–127.

Braunmüller, Kurt (1998). "Methodische Probleme in der Runologie – einige Überlegungen aus linguistischer Sicht." In: *Runeninschriften als Quellen interdisziplinärer Forschung. Abhandlungen des Vierten Internationalen Symposiums über Runen und Runeninschriften in Göttingen vom 4.–9. August 1995*. Ed. by Klaus Düwel. Vol. 15. Reallexikon der germanischen Altertumskunde. Berlin/New York: De Gruyter, pp. 3–23.

——— (2004). "Zum Einfluss des Lateinischen auf die ältesten Runeninschriften." In: *Verschränkung der Kulturen. Der Sprach- und Literaturaustausch zwischen Skandinavien und den deutschsprachigen Ländern*. Ed. by Oskar Bundle et al. Vol. 37. Beiträge zur nordischen Philologie. Tübingen/Basel: Francke, pp. 23–50.

Bredsdorff, Jacob Hornemann (1822). *Om Runeskriftens Oprindelse*. Kjøbenhavn: Andreas Seidelin.

Brixhe, Claude (2004). "Nouvelle chronologie anatolienne et date d'élaboration des alphabets grec et phrygien." In: *Comptes-rendus des séances de l'Académie des Inscriptions et Belles-Lettres* 148.1, pp. 271–289.

——— (2007). "History of the alphabet: Some guidelines for oversimplification." In: *A History of Ancient Greek from the Beginnings to Late Antiquity*. Ed. by Anastasios F. Christidis. Cambridge: Cambridge University Press, pp. 277–287.

Bronkhorst, Johannes (2002). "Literacy and rationality in Ancient India." In: *Asiatische Studien* 56, pp. 797–831.

Brough, John (1977). "The Arapacana Syllabary in the Old Lalitavistara." In: *Bulletin of the School of Oriental and African Studies* 40, pp. 85–95.

Bugge, Sophus (1913). *Runeskriftens Oprindelse og ældste Historie*. Ed. by Sophus Bugge. Vol. 1. Norges Indskrifter med de ældre Runer. Christiania: Brøgger.

Carpenter, Rhys (1933). "The antiquity of the Greek alphabet." In: *American Journal of Archaeology* 37, pp. 8–29.

Cook, Robert M. and Arthur G. Woodhead (1959). "The Diffusion of the Greek Alphabet." In: *American Journal of Archaeology* 63.2, pp. 175–178.

Coulmas, Florian (1989). *The Writing Systems of the World*. Oxford/New York: Oxford University Press.

——— (2003). *Writing Systems. An Introduction to Their Linguistic Analysis*. Cambridge: Cambridge University Press.

Cristofani, Mauro (1972). "Sull'origine e la diffusione dell'alfabeto etrusco." In: *Aufstieg und Niedergang der römischen Welt. Geschichte und Kultur Roms im Spiegel der neueren Forschung*. Ed. by Hildegard Temporini and Wolfgang Haase. Berlin/New York: De Gruyter, pp. 466–489.

Cubberley, Paul (1982). "Glagolitic's Armenian Connection." In: *Wiener Slawistischer Almanach* 9, pp. 291–304.

Cubberley, Paul (1996). "The Slavic Alphabets." In: *The World's Writing Systems*. Ed. by William Bright and Peter T. Daniels. Oxford/New York: Oxford University Press, pp. 346–355.

Cushman, Ellen (2010). "The Cherokee Syllabary from Script to Print." In: *Ethnohistory* 57, pp. 625–629.

Daniels, Peter T. (1996a). "Scripts Invented in Modern Times—Introduction." In: *The World's Writing Systems*. Ed. by William Bright and Peter T. Daniels. Oxford/New York: Oxford University Press, pp. 577–578.

———— (1996b). "The Invention of Writing." In: *The World's Writing Systems*. Ed. by William Bright and Peter T. Daniels. Oxford/New York: Oxford University Press, pp. 579–586.

———— (2018). *An Exploration of Writing*. London: Equinox Publishing.

Davis, John B. (1930). "The Life and Work of Sequoyah." In: *Chronicles of Oklahoma* 8.2, pp. 149–180.

Derolez, René (1998). "On the "Otherness" of the Anglo-Saxon Runes and the "Perfect Fit" of the Fuþark." In: *Runeninschriften als Quellen interdisziplinärer Forschung. Abhandlungen des Vierten Internationalen Symposiums über Runen und Runeninschriften in Göttingen vom 4.–9. August 1995*. Ed. by Klaus Düwel. Vol. 15. Reallexikon der germanischen Altertumskunde. Berlin/New York: De Gruyter, pp. 103–116.

Diakonoff, Igor M. (1970). "The origin of the 'Old Persian' writing system and the ancient Oriental epigraphic and annalistic traditions." In: *W.B. Henning Memorial Volume*. Ed. by Mary Boyce and Ilya Gershevitch. London: Lund Humphries, pp. 98–124.

Dillmann, François-Xavier (2003). "Runenmeister." In: *Reallexikon der germanischen Altertumskunde*. Vol. 25. Berlin/New York: De Gruyter, pp. 537–546.

Driver, Godfrey R. (1948). *Semitic Writing from Pictograph to Alphabet*. London: Periodicals Service Co.

Drost-Abgarjan, Armenuhi (2011). "Das armenische Alphabet im Kontext der autochthonen Schriftsysteme des Christlichen Orients." In: *Die Entstehung der kaukasischen Alphabete als kulturhistorisches Phänomen. Referate des Internationalen Symposions (Wien, 1.–4. Dezember 2005)*. Ed. by Werner Seibt and Johannes Preiser-Kapeller. Vol. 28. Veröffentlichungen zur Byzanzforschung. Wien: Verlag der Österreichischen Akademie der Wissenschaften, pp. 21–28.

Düwel, Klaus (2003). "Runenschrift." In: *Reallexikon der germanischen Altertumskunde*. Vol. 25. Berlin/New York: De Gruyter, pp. 571–585.

———— (2008). *Runenkunde*. 4th ed. Vol. 72. Sammlung Metzler. Stuttgart/Weimar: J. B. Metzler.

Ebbinghaus, Ernest A. (1979). "The Origin of Wulfila's Alphabet." In: *General Linguistics* 19.1, pp. 15–29.

———— (1996). "The Gothic Alphabet." In: *The World's Writing Systems*. Ed. by William Bright and Peter T. Daniels. Oxford/New York: Oxford University Press, pp. 290–296.

Eichner, Heiner (1994). "Zur Entzifferung des Karischen." In: *La Decifrazione del Cario. Atti del 1° Simposio Internazionale, Roma, 3–4 maggio 1993*. Ed. by Maria E. Giannotta et al. Roma: Consiglio nazionale delle ricerche, pp. 167–169.

Elliott, Ralph W. V. (1989). *Runes. An Introduction*. 2nd ed. Manchester: Manchester University Press.

Elti di Rodeano, Sveva (2021). "Scripts in Contact: Transmission of the First Alphabets." In: *Proceedings of Grapholinguistics in the 21st Century, 2020*. Ed. by Yannis Haralambous. Brest: Fluxus Editions, this volume.

Fairfax, Edmund (2014). "The twisting path of runes from the Greek alphabet." In: *North-Western European Language Evolution* 67.2, pp. 173–230.

Falk, Harry (1993). *Schrift im alten Indien. Ein Forschungsbericht mit Anmerkungen*. Vol. 56. ScriptOralia. Tübingen: Günter Narr.

Förster, Hans (2011). "Koptisches Alphabet und koptische Identität." In: *Die Entstehung der kaukasischen Alphabete als kulturhistorisches Phänomen. Referate des Internationalen Symposions (Wien, 1.–4. Dezember 2005)*. Ed. by Werner Seibt and Johannes Preiser-Kapeller. Vol. 28. Veröffentlichungen zur Byzanzforschung. Wien: Verlag der Österreichischen Akademie der Wissenschaften, pp. 29–37.

Franklin, Simon (2002). *Writing, Society and Culture in Early Rus, c. 950–1300*. Cambridge: Cambridge University Press.

Friesen, Otto von (1918–1919). "Runenschrift – I. Das erste Auftreten und die Herkunft der Runenschrift." In: *Reallexikon der germanischen Altertumskunde*. Ed. by Johannes Hoops. Vol. 4. Straßburg: Karl J. Trübner, pp. 5–13.

Gardiner, Alan H. (1916). "The Egyptian Origin of the Semitic Alphabet." In: *Journal of Egyptian Archaeology* 3, pp. 1–16.

Gelb, Ignaz J. (1963). *A Study of Writing*. 2nd ed. Chicago/London: The University of Chicago Press.

Göransson, Johan (1747). *Is atlinga, der är: De forna Göters, här uti Svea rike, bokstäfver ok salighets lära, tvåtusend tvåhundrad år före Christum utspridde i all land*. Stockholm: Lars Salvius.

Granberg, Antoaneta (2010). "Wulfila's alphabet in the light of neighbouring scripts." In: *North-Western European Language Evolution* 58/59, pp. 169–193.

Griffiths, Alan (1999). "The fuþark (an ogam): order as a key to origin." In: *Indogermanische Forschungen* 109, pp. 164–210.

Grønvik, Ottar (2001). *Über die Bildung des älteren und des jüngeren Runenalphabets*. Vol. 29. Osloer Beiträge zu Germanistik. Frankfurt a. M: Peter Lang.

Hallock, Richard T. (1970). "On the Old Persian Signs." In: *Journal of Near Eastern Studies* 29.1, pp. 52–55.

Heizmann, Wilhelm (2010). "Zur Entstehung der Runenschrift." In: *Zentrale Probleme bei der Erforschung der älteren Runen. Akten einer internationalen Tagung an der Norwegischen Akademie der Wissenschaften*. Ed. by John Ole Askedal et al. Vol. 41. Osloer Beiträge zu Germanistik. Frankfurt a. M: Peter Lang, pp. 9–32.

Hempl, George (1896). "Wimmers Runenlehre." In: *Philologische Studien (Festgabe für Eduard Sievers)*. Ed. by Karl Bohnenberger. Halle a. d. Saale: Max Niemeyer, pp. 12–20.

Heubeck, Alfred (1979). *Schrift*. Vol. 3. Archaeologia Homerica. Göttingen: Vandenhoek & Ruprecht.

————— (1986). "Die Würzburger Alphabettafel." In: *Würzburger Jahrbücher für die Altertumswissenschaft* 12, pp. 7–20.

Hinüber, Oskar von (1990). *Der Beginn der Schrift und frühe Schriftlichkeit in Indien*. Vol. 11. Akademie der Wissenschaften und der Literatur Mainz, Abh. d. geistes- u. sozialwiss. Kl. Mainz.

Hinz, Walther (1942). "Zur Behistun-Inschrift des Dareios." In: *Zeitschrift der Deutschen Morgenländischen Gesellschaft* 96, pp. 326–349.

————— (1952). "Zur Behistun-Inschrift des Dareios." In: *Zeitschrift der Deutschen Morgenländischen Gesellschaft* 102, pp. 28–38.

————— (1973). *Neue Wege im Altpersischen*. Vol. 1. Iranica. Wiesbaden: Harrassowitz.

Hoffmann, Karl (1976). "Zur altpersischen Schrift." In: *Aufsätze zur Indo-iranistik* 2, pp. 620–645.

Höfler, Otto (1971). "Herkunft und Ausbreitung der Runen." In: *Die Sprache* 17, pp. 134–156.

Huyse, Philip (1999). "Some further thoughts on the Bisitun Monument and the genesis of the Old Persian cuneiform script." In: *Bulletin of the Asia Institute* 13, pp. 45–65.

Imnaishvili, Vakhtang (2011). "Die Folgen der Entstehung des georgischen Alphabets in den ersten Jahrhunderten." In: *Die Entstehung der kaukasischen Alphabete als kulturhistorisches Phänomen. Referate des Internationalen Symposions (Wien, 1.–4. Dezember 2005)*. Ed. by Werner Seibt and Johannes Preiser-Kapeller. Vol. 28. Veröffentlichungen zur Byzanzforschung. Wien: Verlag der Österreichischen Akademie der Wissenschaften, pp. 51–55.

Jeffery, L.[ilian] H. (1990). *The Local Scripts of Archaic Greece. A study of the Origin of the Greek Alphabet and its Development from the Eighth to the Fifth Centuries*. With a suppl. by A. W. Johnston. Oxford: Oxford University Press.

Jensen, Jens Juhl (1969). "The problem of the runes in the light of some other alphabets." In: *Norsk Tidsskrift for Sprogvidenskap* 23, pp. 128–146.

Jungandreas, Wolfgang (1974). "Die Namen der Runen. Futhark und Kosmologie." In: *Onoma* 18, pp. 365–390.

Justeson, John S. and Laurence D. Stephens (1993). "The evolution of syllabaries from alphabets: transmission, language contrast, and script typology." In: *Die Sprache* 35.1, pp. 2–46.

Kabell, Aage (1967). "Periculum runicum." In: *Norsk Tidsskrift for Sprogvidenskap* 21, pp. 94–126.

Kananchev, Zurab (2011). "Die Albanische Schrift—zum Problem "Mesrop Maštoc"." In: *Die Entstehung der kaukasischen Alphabete als kulturhistorisches Phänomen. Referate des Internationalen Symposions (Wien, 1.–4. Dezember 2005)*. Ed. by Werner Seibt and Johannes Preiser-Kapeller. Vol. 28. Veröffentlichungen zur Byzanzforschung. Wien: Verlag der Österreichischen Akademie der Wissenschaften, pp. 57–64.

King, Ross (1996). "Korean Writing." In: *The World's Writing Systems*. Ed. by William Bright and Peter T. Daniels. Oxford/New York: Oxford University Press, pp. 218–227.

Kluge, Friedrich (1919). "Runenschrift und Christentum." In: *Germania* 3, pp. 43–48.

Krause, Wolfgang (1968). *Handbuch des Gotischen*. 3rd ed. München: C. H. Beck.

——— (1970). *Runen*. Vol. 1244. Sammlung Göschen. Berlin.

Krikorian, Mesrob K. (2011). "Wo, wann und zu welchem Zweck wurde das georgische Alphabet geschaffen?" In: *Die Entstehung der kaukasischen Alphabete als kulturhistorisches Phänomen. Referate des Internationalen Symposions (Wien, 1.–4. Dezember 2005)*. Ed. by Werner Seibt and Johannes Preiser-Kapeller. Vol. 28. Veröffentlichungen zur Byzanzforschung. Wien: Verlag der Österreichischen Akademie der Wissenschaften, pp. 83–90.

Luft, Wilhelm (1898). *Studien zu den ältesten germanischen Alphabeten*. Gütersloh: C. Bertelsmann.

Maggiani, Adriano (2002). "L'alfabeto etrusco nel Veneto." In: *AKEO. I tempi della scrittura. Veneti antichi: alfabeti e documenti*. Ed. by Giovanna Gambacurta et al. Montebelluna: Museo di Storia Naturale e Archeologia di Montebelluna, pp. 55–63.

Maras, Daniele F. (2014). "Breve storia della scrittura celtica d'Italia. L'area Golasecchiana." In: *ziχu. Studi sulla cultura celtica di Golasecca* 1, pp. 73–93.

Marek, Christian (1993). "Euboia und die Entstehung der Alphabetschrift bei den Griechen." In: *Klio* 75, pp. 27–44.

Marinetti, Anna (2002). "Caratteri e diffusione dell'alfabeto venetico." In: *AKEO. I tempi della scrittura. Veneti antichi: alfabeti e documenti*. Ed. by Giovanna Gambacurta et al. Montebelluna: Museo di Storia Naturale e Archeologia di Montebelluna, pp. 39–54.

Markey, Tom (2001). "A Tale of Two Helmets: The Negau A and B Inscriptions." In: *Journal of Indo-European Studies* 29, pp. 69–172.

Mayrhofer, Manfred (1978). *Nachlese altpersischer Inschriften. Zu übersehenen und neugefundenen beschrifteten Objekten und zur Schriftproblematik im persi-*

schen Weltreich. Vol. 19. Innsbrucker Beiträge zur Sprachwissenschaft, Vorträge. Innsbruck.

Mayrhofer, Manfred (1979). "Überlegungen zur Entstehung der altpersischen Keilschrift." In: *Bulletin of the School of Oriental and African Studies* 42.2, pp. 290–296.

———— (1989). "Über die Verschriftung des Altpersischen." In: *Historische Sprachforschung* 102, pp. 174–186.

McManus, Damian (1991). *A Guide to Ogam*. Vol. 4. Maynooth Monographs. Maynooth: Maynooth University.

Mees, Bernard (1999). "The Celts and the Origin of the Runic Script." In: *Studia Neophilologica* 71, pp. 143–155.

———— (2000). "The North Etruscan Thesis of the Origin of the Runes." In: *Arkiv för Nordisk Filologi* 115, pp. 33–82.

Meyer, Richard M. (1896). "Runenstudien I. Die urgermanischen Runen." In: *Beiträge zur Geschichte der deutschen Sprache und Literatur* 21, pp. 162–184.

Miller, D. Gary (1994). *Ancient Scripts and Phonological Knowledge*. Amsterdam: John Benjamins.

Moltke, Erik (1976). *Runerne i Danmark og deres oprindelse*. Kopenhagen: Forum.

———— (1981). "The Origins of the Runes." In: *Michigan Germanic Studies* 7.1, pp. 3–7.

Morris, Richard L. (1988). *Runic and Mediterranean Epigraphy*. Vol. 4. North-Western European Language Evolution Supplement. Amsterdam: John Benjamins.

Musset, Lucien (1965). *Introduction à la runologie. En partie après les notes de Ferdinand Mossé*. 2nd ed. Vol. 20. Bibliothèque de philologie germanique. Paris: Aubier, Montaigne.

Norman, Kenneth R. (1988). "The origin of Pāli and its position among the Indo-European languages." In: *Journal of Pali and Buddhist Studies* 1, pp. 1–27.

———— (1993). "Review of [Hinüber, *Der Beginn der Schrift und frühe Schriftlichkeit in Indien*, 1990]." In: *Journal of the Royal Asiatic Society* 3.2, pp. 277–281.

Nylander, Carl (1967). "Who Wrote the Inscriptions at Pasargadae? Achaemenian Problems." In: *Orientalia Suecana* 3, pp. 135–180.

O'Connor, Michael (1996). "Epigraphic Semitic Scripts." In: *The World's Writing Systems*. Ed. by William Bright and Peter T. Daniels. Oxford/New York: Oxford University Press, pp. 88–107.

Odenstedt, Bengt (1990). *On the Origin and Early History of the Runic Script. Typology and Graphic Variation in the Older Futhark*. Vol. 59. Acta Academiae Regiae Gustavi Adolphi. Uppsala: Gustav Adolfs.

Pedersen, Holger (1923). "Runernes Oprindelse." In: *Aarbøger for Nordisk Oldkyndighed og Historie* 3.13.2, pp. 37–82.

Prosdocimi, Aldo Luigi (1985). "L'origine delle rune come questione di trasmissione di alfabeti." In: *Studi linguistici e filologici per Carlo Alberto Mastrelli*. Ed. by Luciano Agostiniani et al. Pisa: Pacini editore, pp. 387–399.

———— (1988). "La scrittura." In: *I Veneti Antichi. Lingua e cultura*. Ed. by Giulia Fogolari and Aldo Luigi Prosdocimi. Padova: Programma, pp. 328–351.

———— (1990). "Insegnamento e apprendimento della scrittura nell'Italia antica." In: *Alfabetari e insegnamento della scrittura in Etruria e nell'Italia antica*. Ed. by Maristella Pandolfini and Aldo Luigi Prosdocimi. Vol. 20. Biblioteca di Studi Etruschi. Firenze, pp. 155–301.

———— (2002). "Trasmissioni alfabetiche e insegnamento della scrittura." In: *AKEO. I tempi della scrittura. Veneti antichi: alfabeti e documenti*. Ed. by Giovanna Gambacurta et al. Montebelluna: Museo di Storia Naturale e Archeologia di Montebelluna, pp. 25–38.

———— (2003). "Sulla formazione dell'alfabeto runico. Promessa di novità documentali forse decisive." In: *Corona Alpium II. Miscellanea di studi in onore di Carlo Alberto Mastrelli*. Firenze: Istituto di studi per l'Alto Adige, pp. 427–440.

Ratliff, Martha (1996). "The Pahawh Hmong Script." In: *The World's Writing Systems*. Ed. by William Bright and Peter T. Daniels. Oxford/New York: Oxford University Press, pp. 619–624.

Rausing, Gad (1992). "On the Origin of the Runes." In: *Fornvännen* 87, pp. 200–205.

Riesenberg, Saul H. and Shigeru Kaneshiro (1960). "A Caroline Island script." In: *Smithsonian Institution Bureau of American Ethology Bulletin* 173, pp. 273–334.

Rix, Helmut (1992). "Thesen zum Ursprung der Runenschrift." In: *Etrusker nördlich von Etrurien. Etruskische Präsenz in Norditalien und nördlich der Alpen sowie ihre Einflüsse auf die einheimischen Kulturen. Akten des Symposions von Wien – Schloß Neuwaldegg, 2.–5. Oktober 1989*. Ed. by Luciana Aigner-Foresti. Vol. 589. Sitzungsberichte der ÖAW, Phil. Hist. Kl. Wien: Verlag der Österreichischen Akademie der Wissenschaften, pp. 411–441.

Rocchi, Maria (1991). "Kadmos e i *phoinikeia grammata*." In: *Atti del II congresso internazionale di studi fenici e punici, Roma, 9-14 Novembre 1987*. Vol. 30. Collezione di studi fenici. Roma: Consiglio nazionale delle ricerche, pp. 529–533.

Rosenfeld, Hellmut (1956). "Die Inschrift des Helms von Negau." In: *Zeitschrift für deutsches Altertum* 86, pp. 241–265.

Salomon, Richard (1990). "New Evidence for a Gāndhārī Origin of the Arapacana Syllabary." In: *Journal of the American Oriental Society* 110.2, pp. 255–273.

Salomon, Richard (1996). "Brahmi and Karoshthi." In: *The World's Writing Systems*. Ed. by William Bright and Peter T. Daniels. Oxford/New York: Oxford University Press, pp. 373–383.

———— (1998). *Indian Epigraphy. A Guide to the Study of Inscriptions in Sanskrit, Prakrit, and the Other Indo-Aryan Languages*. New York: Oxford University Press.

Sampson, Geoffrey (1985). *Writing Systems. A linguistic introduction*. Stanford: Stanford University Press.

Sanjian, Avedis K. (1996). "The Armenian Alphabet." In: *The World's Writing Systems*. Ed. by William Bright and Peter T. Daniels. Oxford/New York: Oxford University Press, pp. 356–363.

Scancarelli, Janine (1996). "Cherokee Writing." In: *The World's Writing Systems*. Ed. by William Bright and Peter T. Daniels. Oxford/New York: Oxford University Press, pp. 587–592.

———— (2005). "Cherokee." In: *Native languages of the Southeastern United States*. Ed. by Heather K. Hardy and Janine Scancarelli. Lincoln: University of Nebraska Press, pp. 351–384.

Scardigli, Piergiuseppe (1993). "Zur Herkunft der Runenschrift aus der nordetruskischen Schrift." In: *Die Etrusker und Europa*. Ausstellungskatalog Altes Museum Berlin 28.2.–31.5.1993. Berlin: medimops.

———— (1998). "Gotische Schrift." In: *Reallexikon der germanischen Altertumskunde*. Vol. 12. Berlin/New York: De Gruyter, pp. 455–458.

Schmitt, Alfred (1963). *Die Bamum-Schrift*. Wiesbaden: Harrassowitz.

Schmitt, Rüdiger (1981). "I. Forschungsbericht. Altpersisch-Forschung in den Siebzigerjahren." In: *Kratylos* 25.

———— (1990). *Epigraphisch-exegetische Noten zu Dareios' Bīsutūn-Inschriften*. Vol. 561. Sitzungsberichte der ÖAW, Phil.-hist. Kl. Wien: Verlag der Österreichischen Akademie der Wissenschaften.

———— (1998). "Neue Lesungen des Bīsutūn-Textes." In: *Studia iranica et alanica: Festschrift for prof. Vasilij Ivanovič Abaev on the occasion of his 95th birthday*. Vol. 82. Serie orientale roma. Naples: Istituto universitario orientale, pp. 447–464.

———— (2009). *Die altpersischen Inschriften der Achaimeniden*. Wiesbaden: Reichert.

Schrader, Otto (1901). *Reallexikon der indogermanischen Altertumskunde. Grundzüge einer Kultur und Völkergeschichte Alteuropas*. Strassburg: Karl J. Trübner.

Seebold, Elmar (1986). "Was haben die Germanen mit den Runen gemacht? Und wieviel haben sie davon von ihren antiken Vorbildern gelernt?" In: *Germanic Dialects. Linguistic and Philological Investigations*. Ed. by Bela Brogyanyi and Thomas Krömmelbein. Amsterdam: John Benjamins, pp. 525–583.

Segert, Stanislav (1963). "Altaramäische Schrift und Anfänge des griechischen Alphabets." In: *Klio* 41, pp. 38–57.

Seibt, Werner (2011). "Wo, wann und zu welchem Zweck wurde das georgische Alphabet geschaffen?" In: *Die Entstehung der kaukasischen Alphabete als kulturhistorisches Phänomen. Referate des Internationalen Symposions (Wien, 1.–4. Dezember 2005)*. Ed. by Werner Seibt and Johannes Preiser-Kapeller. Vol. 28. Veröffentlichungen zur Byzanzforschung. Wien: Verlag der Österreichischen Akademie der Wissenschaften, pp. 83–90.

Ševčenko, Ihor (1971). "On the Social Background of Cyril and Methodius." In: *Studia Paleoslovenica*, pp. 341–351.

Singler, John Victor (1996). "Scripts of West Africa." In: *The World's Writing Systems*. Ed. by William Bright and Peter T. Daniels. Oxford/New York: Oxford University Press, pp. 593–598.

Skeat, Walter W. (1890). "The Order of the Letters in the Runic "Futhork"." In: *The Academy* 38, p. 477.

Sproat, Richard W. (2000). *A Computational Theory of Writing Systems*. Cambridge: Cambridge University Press.

Spurkland, Terje (2005). *Norwegian Runes and Runic Inscriptions*. Woodbridge: Boydell Press.

———— (2010). "The Older Fuþark and Roman Script Literacy." In: *Futhark* 1, pp. 65–84.

Stifter, David (2019). "Ancient Celtic Epigraphy and its Interface with Classical Epigraphy." In: *Sprachen – Schriftkulturen – Identitäten der Antike. Beiträge des XV. Internationalen Kongresses für Griechische und Lateinische Epigraphik*. Ed. by Petra Amann et al. Vol. 10. Tyche Suppl. Wien, pp. 97–123.

Stoklund, Marie (2003). "The first runes – the literary language of the Germani." In: *The Spoils of Victory. The North in the shadow of the Roman Empire*. Ed. by Lars Jørgensen, Birger Storgaard, and Lone G. Thomsen. National Museum Copenhagen, pp. 172–179.

Swiggers, Pierre (1996). "Transmission of the Phoenician Script to the West." In: *The World's Writing Systems*. Ed. by William Bright and Peter T. Daniels. Oxford/New York: Oxford University Press, pp. 261–270.

Taylor, Insup and M. Martin Taylor (1995). *Writing and Literacy in Chinese, Korean and Japanese*. Vol. 3. Studies in Written Language and Literacy. Amsterdam: John Benjamins.

Taylor, Isaac (1879). *Greeks and Goths: A Study on the Runes*. London: Macmillan and co.

Tollini, Aldo (2012). "Symmetry and asymmetry. Chinese writing in Japan: The case of Kojiki (712)." In: *The Idea of Writing. Writing Across Borders*. Ed. by Alexander Johan de Voogt and Joachim Friedrich Quack. Leiden/Boston: Brill, pp. 169–179.

Tuplin, Christopher (2005). "Darius' Accession in (the) Media." In: *Writing and Ancient Near Eastern societies*. Ed. by Piotr Bienkowski, Christopher Mee, and Elizabeth Slater. New York/London: T&T Clark, pp. 217–244.

Unseth, Peter (2016). "The international impact of Sequoyah's Cherokee syllabary." In: *Written Language & Literacy* 19.1, pp. 75–93.

Vallat, François (2011). "Darius, l'héritier légitime et les premiers Achéménides." In: *Elam and Persia*. Ed. by Javier Álvarez-Mon and Mark B. Garrison. Winona Lake, Indiana: Eisenbrauns, pp. 263–284.

Voogt, Alexander Johan de (1993). "The Caroline Islands script." PhD thesis. University of Hawai'i.

——— (2012). "Invention and borrowing in the development and dispersal of writing systems." In: *The Idea of Writing. Writing Across Borders*. Ed. by Alexander Johan de Voogt and Joachim Friedrich Quack. Leiden/Boston: Brill, pp. 1–10.

Voogt, Alexander Johan de and Hans-Jörg Döhla (2012). "Nubian graffiti messages and the history of writing in the Sudanese Nile Basin." In: *The Idea of Writing. Writing Across Borders*. Ed. by Alexander Johan de Voogt and Joachim Friedrich Quack. Leiden/Boston: Brill, pp. 53–67.

Voutiras, Emmanuel (2007). "The introduction of the alphabet." In: *A History of Ancient Greek from the Beginnings to Late Antiquity*. Ed. by Anastasios F. Christidis. Cambridge: Cambridge University Press, pp. 266–276.

Waal, Willemijn (2020). "Mother or sister? Rethinking the origins of the Greek alphabet and its relation to the other 'western' alphabets." In: *Understanding Relations Between Scripts II. Early Alphabets*. Ed. by Philipp J. Boyes and Philippa M. Steele. Oxford/Philadelphia: Oxbow Books, pp. 109–124.

Wachter, Rudolf (1987). "Altlateinische Inschriften." In: *Sprachliche und epigraphische Untersuchungen zu den Dokumenten bis etwa 150 v. Chr.* Vol. 15. European University Studies. Bern: Peter Lang.

——— (1989). "Zur Vorgeschichte des griechischen Alphabets." In: *Kadmos* 28.1, pp. 19–78.

Walker, Willard and James Sarbaugh (1993). "The Early History of the Cherokee Syllabary." In: *Ethnohistory* 40, pp. 70–94.

Wallace, Rex (1989). "The Origins and Development of the Latin Alphabet." In: *The Origins of Writing*. Ed. by Wayne M. Senner. Lincoln/London: University of Nebraska Press, pp. 121–135.

——— (2008). *Zikh Rasna. A Manual of the Etruscan Language and Inscriptions*. Ann Arbor/New York: Beech Stave Press.

Wang, Yifan (2019). "What Are We Calling "Latin Script"? Name and Reality in the Grammatological Terminology." In: *Proceedings of Graphemics in the 21st Century, Brest 2018*. Ed. by Yannis Haralambous. Brest: Fluxus Editions, pp. 91–109.

Weißbach, Franz H. (1911). *Die Keilschriften der Achämeniden*. Vorderasiatische Bibliothek. Leipzig: Hinrichssche Buchhandlung.

Werba, Chlodwig (1983). "[Review of Mayrhofer's *Nachlese altpersischer Inschriften. Zu übersehenen und neugefundenen beschrifteten Objekten und zur*

Schriftproblematik im persischen Weltreich, 1978].” In: *Wiener Zeitschrift für die Kunde Südasiens* 27, pp. 203–207.

——— (2006). *“Mavāred-rā na bāyad ziyād kard be joz-e ehtiyāj* [Entities should not be multiplied beyond necessity] (Indo-)Iranische Rekonstrukte als textkritisches Korrektiv in der Altiranistik.” In: *Iranistik in Europa – gestern, heute, morgen*. Ed. by Heiner Eichner et al. Wien: Verlag der Österreichischen Akademie der Wissenchaften, pp. 261–306.

Williams, Henrik (1996). “The Origin of the Runes.” In: *Frisian Runes and Neighbouring Traditions*. Ed. by Tineke Looijenga and Arendt Quak. Vol. 45. Amsterdamer Beiträge zur älteren Germanistik. Amsterdam: Rodopi, pp. 211–218.

——— (1997). “The Romans and the Runes—Uses of Writing in Germania.” In: *Runor och ABC. Elva föreläsningar från ett symposium i Stockholm våren 1995*. Ed. by Staffan Nyström. Vol. 4. Runica et Mediævalia, Opuscula. Stockholm: Sällsk, pp. 177–192.

——— (2004). “Reasons for Runes.” In: *The First Writing. Script invention as history and process*. Ed. by Stephen D. Houston. Cambridge: Cambridge University Press, pp. 262–273.

Wimmer, Ludvig (1887). *Die Runenschrift*. Trans. by Friedrich Holthausen. Berlin: Weidmannsche Buchhandlung.

Woodard, Roger D. (2014). *The Textualization of the Greek Alphabet*. Cambridge, UK: Cambridge University Press.

Grammar Drives
Writing System Evolution
Lessons From the Birth of Vowels

Daniel Harbour

Abstract. Vowel omission is a common trait of Afroasiatic writing systems. The current article places this observation on empirically firm footing by showing that, across a large range of cases, the transmission of alphabetic writing within Afroasiatic shows only minimal increases in vowel writing, in contrast to transmission beyond Afroasiatic, where vowel writing markedly increases. This correlation is analysed as a reflex of grammatical differences between Afroasiatic and non-Afroasiatic languages, connected to the predictability of vowels from grammatical and pragmatic context. Where they are not contextually recoverable, omitted vowels amount, owing to Afroasiatic grammar, to omitted morphemes, a feature of other writing systems, including early Chinese and Sumerian. As a result, both the underrepresentation of vowels within Afroasiatic writing systems and the increase in vowel representation beyond Afroasiatic represent adaptations of writing systems to grammatical niches. Philographic theory must therefore recognise grammar as a driving force in writing system evolution.

Daniel Harbour   0000-0002-6335-0097
Department of Linguistics (SLLF), Queen Mary University of London, Mile End Road, London E1 4NS, United Kingdom
E-mail: d.harbour@qmul.ac.uk

Instead of the vowels being unrepresented, or only represented by points, as in all Semitic writing that was first applied to a Semitic language, we have in the cuneatic inscriptions every vowel definitely expressed. The Semitic language appears in a disguise similar to what the Maltese does in Roman letters, or the Punic in the well-known passage of Plautus.

(Hincks, 1852, p. 295, cited in Cathcart, 2011, p. 7)

[T]he Assyrian mode of writing laboured under a great disadvantage, as compared with that used for other Semitic languages, so far as respected the imperfective roots.

(Hincks, 1863, p. 27)

1.   Introduction

It has been appreciated since at least the mid 1800s that the orthographic underrepresentation of vowels is a characteristic of Afroasiatic writing systems. Perhaps because it is so widely accepted, the observation has not, to my knowledge, been put on sound empirical footing. However, the claim is an important one. If, as Hincks Hincks (1852) suggests, orthographic vowel omission is facilitated by Afroasiatic grammar, then it constitutes a case of grammar (morphosyntax/morphophonology) driving writing system evolution and, therefore, speaks strongly to the question of why and how writing systems have changed at various points in their history.

I set out to prove this as follows. Section 2 sharpens the question beyond the false dichotomy sometimes encountered, with Afroasiatic scripts being vowelless and others being vowel-complete. Section 3 then shows that vowel underrepresentation is maintained when the writing system of one Afroasiatic language is adopted or transferred to write another. Section 4, by contrast, shows that vowel writing generally markedly increases when such systems are used for non-Afroasiatic languages.

This naturally raises the question of what aspect of Afroasiatic grammar facilitates reading with minimal vowel marking. I argue that there are three factors at play here (Section 5). The first, obviously, is the famous consonantal nature of Afroasiatic roots. However, this, by itself, is not an explanation, as, under this grammatical set up, vowel-reduced writing fuels ambiguity (Crellin, 2018). There are, I propose,

two additional factors involved: one is another peculiarity of Afroasiatic, namely, that affixal consonants predict not merely affixal vowels, but root vowels too. The other is that any grammatical information that remains ambiguous constitutes a morphological impoverishment at the level of the language written, a finding that I interpret in light of recent research into artificial language learning (e.g., Martin et al., 2019). Vowel omission in Afroasiatic is therefore akin to morphological impoverishment and makes written Afroasiatic languages ambiguous in dimensions (such as category and voice) that many languages do not mark morphologically and that were unwritten in other early writing systems.

2. Sharpening the Question

I begin by dispelling the myth (e.g., Sacks, 2014) that Afroasiatic writing was uniformly vowelless and by sharpening the hypothesis to be tested below.

   An example of genuinely vowelless writing is the (ca. 500 BCE) golden Pyrgi tablets, a bilingual Etruscan-Phoenician text (Schmitz, 1995, O'Connor, 1996a).

(1) Phoenician: 𐤋𐤀 𐤌𐤁𐤊𐤊𐤄 𐤌𐤊 𐤕𐤍𐤔 𐤉𐤕𐤁𐤓 𐤌𐤋𐤀 𐤔𐤀𐤌𐤋 𐤕𐤍𐤔𐤅
     Right-to-left transcription: lʔ mbkkh mk tnš ytbr mlʔ šʔml tnšw
     /wašanat limuʔiš ʔilim rabbotay šanat kima hakokabīm ʔelle/
     'And may the years of the god's statue be as many as these stars'

   The transliteration (line 3) shows five different vowels (/a e i o u/). But none appear in the Phoenician, irrespective of length or position in the word. Likewise, the glides <w> and <y> occur only as consonants, as onset /wašanat/ or coda /rabbotay/. The Phoenician indicates all and only consonants.

   Not all Afroasiatic writing was strictly vowelless. When 'the stars' appears several times in the Old Testament (e.g., Judges 5:20, Ecclesiastes 12:2), it is written הכוכבים <hk**w**kb**y**m> /hakko**ḵā**ḇ**ī**m/.[1] As per the boldfacing, two of the four vowels are written: /o/ and /ī/ by the corresponding glides <w> and <y>. Consonants used in this way (termed *matres lectionis* 'mothers of reading') underdetermine the vowel for which they stand. For instance, <y> stands for /ē/ (and /o/ is unwritten) in ככבי <kkkb**y**> /kəḵōḵəḇ**ē**/ 'as the stars of' (Nehemia 9:23); and <w>, for /ū/ (with unwritten /ī/) in יזהרו <yzhr**w**> /yazhīr**ū**/ 'they will shine' (Daniel 12:3). (Arabic made similar but not identical use of glides; see pp. 210–211.)

---

1. Transliterations do not distinguish allographs, such as word-final ם /m/ versus nonfinal מ, or the initial, medial, and final forms of Arabic letters.

Below, I refer to Phoenician-style writing as vowelless and to Hebrew/Arabic-style as vowel reduced. Vowel-reduced writing underrepresents vowels in two ways: they may be unwritten (e.g., /hakkoḵāḇīm/, /yazhīrū/), or, if written, ambiguously represented (e.g., <w> stands for either a consonant or a vowel, and in Hebrew, the vocalic value too is ambiguous, /o/ or /u/). (Sacks' error is one of reductionism: a writing system is more its glyphs. Phoenician, Hebrew, and Arabic have vowelless alphabets, but a writing system is a set of glyphs together with a set of rules of use and the rules of use can represent vowels even when the glyphs alone do not—just as English represents <θ> without a dedicated letter.)

The Hebrew scribal tradition of 600–1000 CE developed diacritic marking to indicate vowels (as well as consonant gemination and spirantization evident in the previous paragraph; given that these are predictable from vowel length, their omission from the consonantal script is on a par with the underrepresentation of vowels). כְּכֹכְבֵי /kəḵōḵəḇē/ indicates /ə/ by two vertical dots below the letter (כְ), /ē/ by two horizontal dots beneath the letter (בֵ), /ō/ as a dot following above (כֹ). These marks were restricted to particular genres, such as holy books, where accurate reading was important. They do not impinge on whether Hebrew (or other) writing was, in general, vowel reduced. Indeed, their existence proves that it was. However, as we will see, especially for Arabic, such diacritics can play a major role in adaptation of the system beyond Afroasiatic.

The empirical question here is therefore more subtle than a dichotomy between Afroasiatic writing being wholly vowelless and non-Afroasiatic writing being vowel-complete. Rather, the question to be assessed is how vowel writing changes in completeness and obligatoriness when Afroasiatic writing systems that underrepresent vowels, partially or completely, are transferred within versus beyond the family.

3.   Transmission Within Afroasiatic

I begin with cases showing that vowel writing remains minimal when writing is transferred within the Afroasiatic family. These cover a range of sociolinguistic situations: the same script in different languages, the same language in different scripts, transfer in the presence versus absence of education systems, transfer in the presence of multiple scripts, and ancient versus modern transfer. In all these intra-Afroasiatic scenarios, vowel writing barely increases.

We begin with two different cases of Berber writing. The first, the ancient Berber script, is believed to derive from Phoenician, the likely source also of the name of its modern descendant, *Tifinigh*, from Latin

Punic (O'Connor, 1996b). Like Phoenician, the script is vowelless, as the following excerpt (ibid., p. 116; Donner and Röllig, 2002, p. 24) shows:

(2) Ancient Berber: ⵏⵥ=ⵦⵑ ⵇⵏⵏⵒ ⵉⵥⵣⵥ ⴺⵏⵒⵎⵎ
    Right-to-left transliteration: nswkm dlg ʔsys   tdgś

   /sugadenn syusaʔ gəllid mikiwsan/
   'after Micipsa became king'

Some modern varieties (written left to right, suggesting European influence) use vowels. Nonetheless, vowelless writing continues (though use of the script in either form is sporadic). An example from a Tuareg letter with minimal vowel writing is given below (O'Connor, 1996b, p. 116):

(3) Tifinigh: ⊙⵴ⵦ ⵵� �ⵉ
    Transliteration: swy hd lǵšbʔ

   /siwi hid elɣəšaba/
   'send me here a garment'

Souag (2014) presents a study of more recent Arabic-based literacy in Berber and Berber-influenced Kwarandzyey, a Songhay language. Her case studies are independent of other written forms of Berber and differ noticeably from nearby non-Arab orthographies. A range of strategies is attested throughout her sample (there having been little central planning) and, though *matres lectionis* are attested in some writing (including cases where all vowels are written), vowels are only partially written in others.[2] The following words are drawn from a range of dialects, unwritten vowels in bold.[3]

(4) عقرق   <ʕgrgy>   /ʕ**a**gg**ʷ**ərg**ʷ**əy/ 'I fought'
   تمڨنا   <tmgnʔ>   /t**a**məgna/   'head'
   تمزوغين <tmzwɣyn> /t**i**məẓẓuɣin/ 'ears'
   لقفرتّسي <lqfrtsy>   /ləqfərdzsi/   'the key to which'

<y> stands for /i/ in the last two examples (though not in the first). Likewise, <ʔ> stands for /a/ in the second.

Strikingly, even in didactic contexts vowels are frequently omitted. Online fora promoting Berber language and culture feature vocabulary challenges. Though presumably aimed at somewhat advanced speakers,

---

   2. In contrast to Hebrew, dots are integral parts of Arabic consonants (table 1). Interestingly, a consonantal dot is used in the Judeo-Arabic example (6), distinguishing ך /k/ from כ /x/; in unvowelled Hebrew, the latter represents both.

   3. Arabic ق <q> is commonly, but not exclusively, used for /g/ and I transcribe it as <g>. Labialisation is often unwritten; it 'carries a significant load only in Kwarandzyey' (Souag, p. 60).

the likely presence of more basic learners apparently does not motivate complete vowel writing:

(5) تغنجايت <tɣnjyt> /**ta**ɣə**njayt**/   تمزراين <tmzrʕyn> /**ti**məzraʕin/
     تقسريت <tqsryt> /**ta**qəsrit/   نلغمان <nlɣmʕn> /**ni**ləɣman/

<CyC> is vocalised either as /CayC/ or as /CiC/, <tC> as /taC/ or /tiC/. So, vocalisation is underdetermined.

Arabic itself has been written by speakers of other Afroasiatic languages using their own writing systems. An example of this is Judeo-Arabic. Written in Aramaic block script, it was initially significantly phonetic, then underwent a stage of imitating Arabic orthographic conventions, before settling on a system distinct from both. In this stage (and earlier), underrepresented vowels are well attested. In the following literary passage (Egypt, circa 1600), only long vowels are indicated (Hary, 1996, pp. 733–734). Boldfaced vowels in the transliteration are unwritten:

(6) Judeo-Arabic: מולאנא אל מלך אן נחן לך עביד אן שית
    Right-to-left transliteration: tyš nʔ dybʕ kl nḥn nʔ klm lʔ ʔnʔlwm

    /m**a**wlānā **il** m**a**lik **inn**a naḥn**u** lak ʕ**a**bīd **in** šīt/
    'We are truly slaves to you, and if you wish …'

The history of the Arabic script is itself interesting in this regard. Developed by the Nabataeans, who spoke Arabic but wrote Aramaic, it shows significant linguistic insight and sophistication (Daniels, 2014, p. 29, citing Diem, 1979–1983). Aramaic, and hence its script, lacked many sound distinctions that Arabic preserved from Proto-Semitic. Writing Arabic without significant ambiguity therefore required new letters. Several were derived by adding a single dot to existing letters. The choice of which letter to dot, far from being arbitrary or based on

TABLE 1. Source of Arabic <C>~<Ċ> consonant pairs

Aramaic	PrSem	Arabic		Aramaic	PrSem	Arabic	
t {	*t	t	ت	tʕ {	*tʼ	tʕ	ط
	*θ	θ	ث		*θʼ	θʕ	ظ
ḥ {	*ḥ	ḥ	ح	sʕ	*sʼ	sʕ	ص
	*x	x	خ		*ɬʼ	ðʕ	ض
d {	*d	d	د	ʕ {	*ʕ	ʕ	ع
	*ð	ð	ذ		*ɣ	ɣ	غ

superficial phonological resemblance, reflected pairs of sounds that were cognate in the two languages. In table 1, sounds that have collapsed in Aramaic correspond, for the most part, to letters differentiated by a dot in Arabic. Orthography recapitulates etymology, not in irregular spelling (like the <k> in English <knot>), but in letter design itself. Despite this sophistication, vowels remained underrepresented. In fact, the Nabataean script had several deficiencies, such as pairs of nearly indistinguishable letters. This led to problematic ambiguity, which was tolerated for a surprisingly long time. Nonetheless, its solution did not involve investment in vowel writing.

Ugaritic presents a similar redesign of form while maintaining principles of function. The script is a fascinating Mesopotamian–West Semitic hybrid, cuneiform in appearance, but consonantal in structure. It departs from the West Semitic prototype in incorporating three syllabic signs instead of a single glottal stop: <ʔa>, <ʔi>, and <ʔu>. Otherwise, it adheres to underrepresentation of vowels (Schniedewind and Hunt, 2007).

Turning to a yet older case, possibly, indeed, the oldest, Darnell et al. (2005) show that two inscriptions from Wadi el-Ḥôl (ca. 1,800 BCE) are alphabetic, rather than logo- or syllabographic, given the number of repeated glyphs, and record a language that is not Egyptian but is likely Semitic, given the connection of several signs to later West Semitic letters. Nonetheless, most of the characters are clearly Egyptian in origin. So, this is a very early case of transmission. Of the 28 characters that comprise the two inscriptions, 22 occurrences are of full consonants (b, ḥ, l, m, n, p, r, šʔ, t, ṭʔ, ʕ) and only 6 (hʔ, w, ʔ) come from the set that later served as *matres lectionis*. The 22 consonants could have spelled as few as 11 closed (CVC) syllables or as many as 22 open (CV) syllables. In consequence, even if, improbably, the inscriptions recorded some vowels via *matres lectionis*, the majority of vowels were unwritten. Even at the earliest transmission, then, a vowel-reduced orthography was maintained.

Thus, ancient or modern, by design or diffusion, when developing a new script or applying an established one, the vowelless or vowel-reduced character of Afroasiatic writing is constant.

4.   Transmission Beyond Afroasiatic

This situation contrasts sharply with the adoption of Arabic, Aramaic, Egyptian, Hebrew, and Phoenician scripts for non-Afroasiatic languages. Across a range of families and borrowing scenarios, the rise of vowel marking is both more complete and more obligatory than in inter-Afroasiatic borrowing.

The most famous case of transfer beyond Afroasiatic is the Greek borrowing of Phoenician (Taylor, 1883, Diringer, 1948, Gelb, 1963). Greek repurposed unneeded laryngeals and glides as vowels.

(7) Phoenician   Greek
     𐤀 /ʔ/   A /a/
     𐤄 /h/   E /ɛ/
                     F /w/
     𐤅 /w/
                     Y /y/
     𐤇 /ḥ/   H /e/
     𐤆 /j/   I /i/
     𐤏 /ʕ/   O /o/

Though Phoenician did not provide the steppingstone of *matres lectionis*, Greek nevertheless converged on many of the same reuses of consonants as are found elsewhere (e.g., Aramaic א ה י <ʔ h j> for /a ɛ i/). This may indicate non-Phoenician influence (see Sass, 2005 for assessment) and has inspired some rather triumphalist rhetoric (see Share, 2014 for critique). Yet a simple explanation for the convergence comes from phonetics and the letter names themselves. If Greeks ignored the laryngeal onsets of Phoenician letter names, then <ʔ ḥ h> for /a ɛ e/ is acrophonic: *(ʔ)alef* for /a/, *(ḥ)ēṭ* for /e/, *(h)ē* for /ɛ/. And phonetically, /i/ from <j> is a small step. Combining phonetic proximity and ignored onsets, *(ʕ)ayin* would have been taken for a retracted /a/, close to /o/. (The correlation between Phoenician pharyngeal C and Greek back V emerges in 𐤒 <q>, too: it served as Greek /k/ before back vowels.)

Vowel writing is far from uniquely Greek. A second example from the westward migration of Phoenician is Iberian. This script, or family of scripts, represents only vowels and continuants (e.g., /m, n/) via stand-alone signs. Other consonants are written via CV syllabograms (without voicing distinction for C). It is not entirely certain whether Iberian derives from Phoenician directly or whether the transmission proceeded via Greece. However, if the latter, it might constitute the only case of a vowelled alphabet being transformed into a (partial) syllabary, which consideration favours direct transmission from Phoenician (though a second potential case is the Caroline Islands syllabary, Riesenberg and Kaneshiro, 1960).

By contrast, the conversion from consonantal alphabet to CV signs is attested elsewhere. Meroitic, the only other descendant of the Ancient Egyptian writing (besides Proto-Semitic and hence most of the world's current writing systems), adopted the small alphabet-like set of monoconsonantal signs of Egyptian hieroglyphs but transformed them by adding pure vowels and a small number of CV syllabograms. Most of the system comprises consonant signs, C, optionally read as Ca. The result is a mixture of signs for syllables, signs for phonemes, and signs that alternate between the two.

Eastward transmission of consonantal alphabets shows the same trend of increased vowel writing, by the means just mentioned. The Indian scripts Brāhmī (source of most scripts of India and Southeast Asia) and Kharoṣṭhī (no descendants) developed from Aramaic and were ini-

tially used to write Prakrit and Sanskrit. Aramaic used *matres lectionis* (including in its application to Prakrit and Sanskrit, e.g., Dupont-Sommer, 1966, p. 444), but Brāhmī and Kharoṣṭhī greatly expanded vowel writing by innovating diacritics (Salomon, 1996), representing diverse vowels, diphthongs, and liquids. Compare for instance the second and third syllables of *śarīrā* in the sample of Kharoṣṭhī below (Salomon, p. 382).[4]

(8) Kharoṣṭhī: ꟿꟿꟿ ꟿꟿꟿꟿ ꟿꟿꟿꟿꟿꟿ ꟿꟿ ... ꟿꟿꟿ

Right-to-left transcription: m̊bt̥ʰ m̊kaṇt t̊vt̥ʰt̥p̥ rr̊ś m̊å ... r̊mk̥

/kumāre ... imē śarīrā pratiṭʰavēti taṇuakami tʰubami/
'The Prince ... establishes these bodily relics in his own stupa.'

A further, and highly productive, offshoot of Aramaic is the Sogdian script (Skjærvø, 1996). Used for an Iranian language, it was further adapted for Altaic. The resulting scripts (written vertically, presumably imitating Chinese) include Uyghur, Mongolian, the Clear Script and Manchurian (Kara, 1996), the last two of which were alphabetic. Yet, even before full alphabetism, vowel marking was systematic and substantial, as in Uyghur: <ywkwnwrmn> /yükünürmen/ 'I prostrate myself', <ʔwydwn> /ödün/ 'time.LOC', <qwtynkʔ> /qutïnga/ 'majesty.POSS.DAT', <yyqylqw [l]wq yn> /yïγïlγuluqïn/ 'meeting place'.[5] And earlier, in Sogdian, <βγw xwtʔw> 'lord master' and <nmʔcyw spʔtzʔnwky> 'reverently with bended knee' were read /βaγu xutāw/ and /namācyu spātzānuk/, in which only short /a/ is unrepresented (though written as <ʔ> in the same text).

Like the Aramaic script, the Arabic script spread both eastward and westward. The former (Kaye, 1996) was comparable to the eastward spread of Aramaic, initially finding an Iranian language, Persian, and moving from there to other families (e.g., Indo-European and Malayo-Polynesian). In Persian, as in Sogdian, *matres lectionis* were used, though non-initial short vowels were often unrepresented: compare, for instance, <z> /ze/ 'from' with <kh> /ke/ 'that', or <rxy> /roxī/ 'face' with <xvšbʔš> /xošbāš/ 'be happy'. Word-final vowels in particular are represented more thoroughly in Persian than in Arabic (Gnanadesikan, 2017).

----

4. Absence of a vowel in the transliteration signals the orthographically "inherent" vowel /a/. <a> is a place holder for vowels, hence, orthographically, a null consonant. /pr/ is written as <p> with <r> appended beneath.

5. These examples show that front/back vowel pairs were undifferentiated. Given that the language is vowel harmonic, this underrepresentation may, again, be tied to grammar: front/back is predictable for most vowels in a given word. In Turkic runes, a separate offshoot of Sogdian, several consonant phonemes corresponded to pairs of letters, one used if the following vowel was front, the other, otherwise (a solution that Ottoman Turkish would later reinvent, utilising otherwise 'dead' letters of the Arabic script, Daniels, 2014; cf. Vydrin, 2014, pp. 221, 224 on Mande languages).

And again as with Sogdian, Persian had offshoots, such as Kashmiri, that became fully alphabetic.

Less known is that the Arabic script supported a wide range of indigenous writing traditions throughout Africa (Mumin, 2014). Apparently all non-Afroasiatic languages with established Arabic-script literacy make vowel writing obligatory. Representative examples include, from West Africa, Old Kanembu and Kanuri (Bondarev, 2014) and Mandinka (Vydrin and Dumestre, 2014), and, from East Africa, Swahili (Luffin, 2014) and Chimi:ni (Banafunzi and Vianello, 2014). Some Afroasiatic languages, including for instance Kabyle Berber, also marked vowels fully (Souag, 2019) (see next section for discussion).

Old Kanembu and Kanuri (spoken around Lake Chad) are attested in manuscripts from the late 18th to early 20th century. Orthography is not standardised across (or within) manuscripts and relies substantially on speaker knowledge. Consonants and vowels are both significantly underrepresented. Some 'dead letters' of Arabic are reassigned to sounds of Kanembu/Kanuri in a one-to-one fashion (e.g., Ar. ث /θ/ to Ka. /ts/; Ar. غ /ɣ/ to Ka. /g/), but others are pressed into multiple roles (e.g., Ar. ج /ʒ/ to Ka. /dz dʒ ndz ndʒ/), with prenasalisation of stops prone to nonrepresentation, as just illustrated. There is no orthographic /o u/ distinction (comparable to some Arabic varieties), except that /ó/ can be optionally distinguished from /ó ú/. The three-tone system is underrepresented by a two-way graphic distinction, repurposing /ʔ w y/ from vowel length into tone marking (high/falling). Despite these mismatches, these writing systems invested in obligatory vowel marking rather than expansion of the consonant inventory, as is graphically obvious from the numerous diacritics in the examples below (Bondarev, 2014, pp. 121, 131, 133–4).

(9) ثْلِم <θ̊l̊m>   /tsələm/   'black'

جُنْدُوغُمَ <ʒ̊n̊dwɣ̊m̊a>   /dzundógoma/   'possessor of knowledge'

نَاسْكُودُو <n̊ʔsk̊ẘdw>   /náskóndó/   'your soul'

دِيغِبُو <dyɣb̊w>   /dígibú/   'there is not'

Mandinka presents a similar situation. Both /o u/ and /e i/ are undifferentiated. Tone is unmarked. Nonetheless, vowel symbols are obligatory. The following excerpt is from a hunter's incantation (Vydrin and Dumestre, 2014, p. 227):

(10) Mandinka:

مِنَ كَپَ كُتُ تُبُ بِا عِ كُتُ

Right-to-left transcription:

tk̊ ʕ̣ ʔb̊ bt̊ tk̊ ẙ₂k n̊m

/mìnankaɲa kòto túnbuŋ bé í kùntu/
'Old male antelope, ruins will cut you.'

In East Africa, Swahili (Luffin, 2014) and Chimi:ni (Banafunzi and Vianello, 2014) present similar patterns. Examples from Swahili court transcripts (Luffin, pp. 314f) illustrate:

(11) وُملْتِي   <ẅm̈lṭy>   /umulete/   'you bring me'

أَمفَنِيزَ   <å̈mf̈nyż>   /amefaniza/   'he did'

مُزْغُ   <m̈żg̈>   /mzungu/   'European'

مَهونغُ   <m̈ḧwng̈>   /mahongo/   'tribute'

The manuscripts surveyed vary with respect both to consonants and vowels, as (11) shows: /ŋg/ is both <g> and <ŋg>. Similarly, /e/ is sometimes encoded like /i/ via the <i> diacritic, sometimes, it is grouped with <a> and /a/. Sometimes <y> stands for /i, e/, without any further diacritic, sometimes it supports a diacritic. Despite these differences (and the absence of orthographic innovation), vowels are obligatory.

Adaptations of Aramaic block script in the Jewish diaspora shows the same pattern. Two European examples are Yiddish (Germanic) and Judeo-Spanish (Romance). The earliest full text in Frakes, 2004, *Abraham the Patriarch* of 1382 (hence Old, not Early, Yiddish), already shows rich vocalisation (text, ibid., p. 11; transcription, cf. Frakes, 2017; translation, Frakes, 2014, p. 4).[6]

(12) Yiddish   גוט גבוות וול שטרושא אלטא די וער
     Left-to-right transliteration   tvg tvvbg lvv **a**švrtš **atla** y**d** r**e**vv
     /ver di altə štrosə vol gəbóut gut/
     'He who travels the old and well-built streets'

Every vowel except one interconsonantal schwa is indicated (bold-faced in the voweled transliteration), including, interestingly, in some cases, by digraphs absent from Classical Hebrew (<vv>). In contrast to the African adaptations of Arabic script above, vowel diacritics were only occasionally exploited in Yiddish (Frakes, 2017, 22f).

Judeo-Spanish spelling is also striking. Romance vernacular writing from Muslim Spain is largely fragmentary, but Andalusian lyrical poems in Arabic or Hebrew sometimes exploit it for their closing couplets, as a way of supplying a different voice (Pountain, 2000, p. 43). A representative example (from Yehuda Halevi in the 12th century) is reproduced below:

(13) Judeo-Spanish: דמנדארי אדבלארי בבראיו נן אלחביב שן
     Right-to-left transliteration: yrʔdnmd yrʔlbdʔ wyʔrbb nn bybḥlʔ nš

---

6. א and ע are transliterated as <a> and <e>, reflecting their Yiddish usage, as the Semitic values /ʔ/ and /ʕ/ did not survive into Ashkenazi Hebrew.

/**š**in al-ḫabib n**o**n bib**i**reyu adb**o**larey d**e**ma**n**dare/
'Without my lover I will not live; I will fly away to seek [him].'

As per the boldfacing, several vowels are unrepresented here. Nonetheless, the extent of *matres lectionis* is greater than in Hebrew, both in its variety (<ʔ> is used for both /a/ and /e/) and in its extent (the prepenultimate use of vocalic <ʔ> is un-Hebraic; /kōḵāḇīm/ 'stars' is never written with <ʔ> for /a/).[7] (A later Romance text in Arabic script, from the early 15th century or before, is fully voweled, like the African writing above; Martínez Ruiz, 1974.)

5. The Grammar of Vowelless Writing

The preceding discussion shows clearly that vowel-reduced writing is preserved much more strongly within the Afroasiatic family than when writing systems move beyond it. The correlation is not perfect: Kabyle Berber is Afroasiatic, but is written vowelled; Sogdian and Persian are non-Afroasiatic (Iranian), but leave many vowels unrepresented (though they are vowel reduced, not vowelless). Nonetheless, it is clear that something about Afroasiatic languages facilitates vowel-reduced writing. What is it?[8]

An initially plausible guess is that vowel-reduced writing does not conduce ambiguity in Afroasiatic languages as it would in non-Afroasiatic ones. It is easy to find consonant strings, like p-r-t, that can host more vowels in, say, English than Hebrew:

(14) a. part, pert, port, prat, prate, parrot, pirate, pyrite, pirouette
      b. *prat* 'detail', *peret* 'list, to detail', *parat* 'to break', *porat* 'to be detailed'

However, closer reflection on English lexis and Hebrew morphology suggests that such examples are misleading. Counterbalancing (14a), it is relatively easy to find triplets of consonant phonemes that admit of

---

7. The written vowels are towards the end of the word, where Romance stress is typically located—precisely where Semitic *matres lectionis* had first taken hold more than 1500 years earlier (Cross and Freedman, 1952).

8. Fidel, used for several Eritrean and Ethiopian Afroasiatic languages, systematically indicate vowels, but the motivation seems to be sociocultural (Meyer, 2016): Fidel was influenced by two voweled scripts, Greek and Indic, and by the liturgical needs of nonnative speakers (cf. Arabic and Hebrew). An exception in the other direction is Carian (Adiego, 2007; 2020). Having only recently become aware of it, I have yet to analyse the system. However, the current research concerns trends, not exceptionless generalisations, so the conclusions do not depend on the status of any one writing system.

TABLE 2. Vowel-reduced Greek and Hebrew: Ambiguity in frequent vs. all words, with (left) and without length distinctions (Crellin, 2018)

	Frequent	Total	Frequent	Total
Hebrew (Pentateuch)	91,278	280,180	77,910	248,288
Greek (Pentateuch)	56,916	140,325	48,657	121,853
Hebrew (Judges)	103,177	315,650	85,418	275,729
Greek (Herodotus)	93,035	212,666	93,260	227,089
Greek (Xenophon)	89,148	212,098	96,159	224,733

only one vocalisation in English (/m-ʤ-k/, /r-ð-m/, /θ-k-n/). In Hebrew, however, nearly every three-consonant string is subject to multiple vocalisations. The question is whether, cumulatively, ambiguities in a system like Hebrew outnumber those of languages like English.

Clearly, this question cannot be answered for all of the languages above. However, in a study that is to my knowledge unique (though see also Sampson, 2015), Crellin (2018) compares the levels of ambiguity in two languages that more or less recreate one of the crucial transmissions of writing beyond Afroasiatic, Old/Classical Greek and, as a proxy for Phoenician, Biblical Hebrew. Crellin's method is to rewrite Greek texts as per Hebrew norms (representing initial vowels by glottal stop, using glides for others, and leaving others, along with geminate consonants, unmarked). Ambiguity was measured as the product of types and tokens for each consonant string in the first 80,000 words of each text. A second experiment disregarded vowel length. In both, ambiguity without vowels was higher in Hebrew, the language that managed without writing them.

The results are shown in table 2, with counts given for each text separately. The Pentateuch was used for both languages. To control for genre, historical texts were also analysed (*Judges* for Hebrew, Xenophon's *Anabasis* and *Hellenica*, Herodotus' *Histories* for Greek). Alongside the total ambiguity measure for each text, the eight most frequent C-strings were counted. Only for the frequent items in the second (no length) experiment is Greek more ambiguous than Hebrew (by about 10%). In all other measures, Hebrew is the more ambiguous, at times by a much greater factor (50–100%). Crellin concludes that the Greek coining of vowels cannot have been to escape unacceptably high levels of ambiguity.

Evidently, it is the nature of the ambiguity, and hence of its resolution, that makes vowel-reduced writing tolerable for Afroasiatic languages. Several factors are at play.

It is well known (and appreciated by writing system scholars, e.g., Coulmas, 2003, Sampson, 2015) that much lexical meaning in Semitic

languages is carried by consonants. The difference between, say, 'read' (q-r-ʔ) and 'write' (k-t-b), inheres entirely in consonants. Vowels and further consonants encode whether an occurrence of these roots is nominal, verbal, etc.; if verbal, whether finite; if finite, whether active or passive; and so on.

However, it is an oversimplification to say that consonantal roots carry all lexical meaning. Since Arad, 2005, it has been appreciated that lexical meaning inheres in the combination of consonantal root and a vocalic pattern. For instance, Hebrew s-p-r means 'count' with vowels -a-a-, but 'tell' with vowels -i-e-. All templates derived from -a-a- and -i-e- preserve the meanings of 'count' and 'tell', respectively (e.g., *sfira* 'counting', *sipur* 'story'). The pattern -i-e- no more derives 'tell' from s-f-r than the prefix *er-* derives *erzählen* 'tell' from *zählen* 'count' (or English *recount* from *count*). Thus, vowel underrepresentation is not harmless to lexical meaning in Afroasiatic languages.

To understand why it persists, a grasp of the grammar of the language family is crucial. Because Afroasiatic morphology only ever uses a limited number of vowel templates, the search space to recover vowels is more restricted than in other languages. For instance, -o-u- is a possible vowel pattern in English (*bonus*, *chorus*, *nodule*), but not in Hebrew.[9] Similarly, -i-i- is highly limited in Hebrew (e.g., *ḥiriq*, name of /i/ diacritic), but unremarkable in English (*limit*, *visit*, *vivid*). Thus, Afroasiatic facilitates resolution of the ambiguity by limiting the search space.

Syntax restricts the search space further. The common -e-e- pattern is restricted to nouns (*qešer* 'knot', *peret* 'list', *sefer* 'book', *gefen* 'vine'); -a-u- is confined to adjectival participles (*qašur* 'fastened', *gamur* 'completed', *barux* 'blessed'); -a-i- excludes verbs (*qašir* 'connected', *ragil* 'regular', *nagiš* 'accessible'); and so on. Syntactic cues as to category may come either from word order (for instance, in a verb-initial language, a verbal pattern is likely at the start of a sentence) or from context (a nominal pattern is more likely in the vicinity of determiners or adjectives, or after a clitic preposition).

Further, morphology is particularly important as concerns the facilitating effect of Afroasiatic grammar in reading with minimal vowels. In most of the world's languages, affixal consonants enable a reader to predict affixal vowels. For instance, English <fxng> is, by basic phonotactics, to be read as /f○x○ng/, and speakers recognise that this comprises a root f○x and an affix ○ng. From the affixal consonants, one can determine the affixal vowel: /f○xing/. But that gives no handle on the root vowel, which can be /faxing/, /fixing/, /foxing/.

In Afroasiatic, by contrast, affixal consonants frequently provide unambiguous cues to all unwritten vowels, whether part of the affix or in-

---

9. I use English as a comparator for Hebrew even though it reduces unstressed vowels. Other languages avoid this issue (e.g., German *Bonus*, *Forum*, *Tonus*).

ternal to the root. For instance, in a nominal context, tCCCt is read as tiCCoCet (with /i/ changing to /a/ for some consonants):

(15) תזמרת   <tzmrt>   /tizmoret/   'orchestra'   < /tizmer/ 'orchestrate (vb)'
     תכתבת   <tktbt>   /tixtovet/   'correspondence' < /tiktev/ 'dictate (vb)'
     תרשמת   <tršmt>   /tiršomet/   'details'   < /tiršem/ 'outline (vb)'
     תחבשת   <tqšrt>   /taxbošet/   'bandage'   < /tixbeš/ 'bandage (vb)'

Similarly, hCCCh is read as haCCaCa:

(16) הסברה   <hsbrh>   /hasbara/   'explanation' < /hisbir/ 'explain'
     הזהרה   <hzhrh>   /hazhara/   'warning'   < /hizhir/ 'warn'
     הקדמה   <hqdmh>   /haqdama/   'introduction' < /hiqdim/ 'introduce'

For monoconsonant affixes, there is often residual ambiguity. For instance, nCCC can be either third person masculine singular past "passive," niCCaC, or first person plural future active, nCaCeC (17). Similarly, mCCC can be a nonagentive nominal, miCCaC, or an agent nominal / present participle, mCaCeC, amongst other patterns.

(17) נקשר   <nqšr>   /niqšar/   'it was tied'
                     /nšaqer/   'we will tie'
     נשבר   <nšbr>   /nišbar/   'it was broken'
                     /nšaber/   'we will break'
     נלמד   <nlmd>   /nilmad/   'it was learned'
                     /nlamed/   'we will teach'
(18) מחקר   <mxqr>   /mexkar/   'research (n)'
                     /mxaker/   'researcher; researching'
     מספר   <mspr>   /mispar/   'number'
                     /msaper/   'narrator; narrating'

Obviously, discourse, syntactic, or morphological context are likely to reduce, if not resolved, such ambiguity.

Much of the residual ambiguity concerns functional vocabulary. For instance, the ambiguity between 'research' and 'researcher' amounts to the neutralisation of morphological derivation, making an agentive noun identical to what such agents produce. However, many languages would not make such a difference to begin with. Consider /šiber/ and /šuvar/. These are active and passive of the same verb, 'break'. Yet, without vowels, they are written identically, <šbr>. Although not an exact equivalent, this is similar to the causative/inchoative alternation which, for many English verbs, is unmarked: *I broke it* versus *it broke*.

Thus, Afroasiatic vowel-impoverished writing is akin to morphologically impoverished writing. This is an interesting state of affairs, in light of both recent research involving artificial language learning and of the history of writing itself.

The artificial language learning paradigm exposes experimental subjects to data from a fictitious language and then induces them to extrapolate it beyond what they are been taught. Learners' responses often

converge on typologically common systems even though neither their native tongue nor the data they have been given overtly biases them to (Martin et al., 2019). This looks like what early writers of Afroasiatic languages were doing. Their writing system can be seen as an artificial language akin to a natural language of a more common typological kind—one with less morphology.

The same strategy has arisen elsewhere. Mandarin has words that are related by now defunct derivational processes (Baxter and Sagart, 2014) but that have not come to be orthographically distinguished, despite differing in meaning and pronunciation. For instance, 乘 was both /Cə.ləŋ/ 'drive' and /Cə.ləŋ-s/ 'wagon' (modern *chéng* and *shèng*, respectively). Similarly, in Sumerian, large amounts of morphology were only sporadically written for centuries. Two copies of *The Instructions of Šuruppak* (Alster, 2005, pp. 176, 180), several centuries apart, illustrate. Abstracting away from irrelevant details of the orthography, the "standard Sumerian" of copies from Nippur, Ur, Kiš, and Susa marks ergative, possessive, dative, object agreement, and imperfective (boldfacing; <ᵏⁱ> is an orthographic disambiguator).

(19) šuruppak-ᵏⁱ- **e** dumu-**ni**- **r**   na   na- mu- **n**-   ri- **ri**
     šuruppak-CITY-ERG child- his-DAT "instruct" PVB-VENT-3SGO-lay-IMPF_RED

     'The Man from Šuruppak gave instructions to his son.'

All of these are absent from the earlier Abū Ṣalābīkh (Early Dynastic) version even though the sentence recorded is taken to be the same:

(20) šuruppak dumu na   na- mu- ri
     šuruppak child "instruct" PVB-VENT-lay
     'The Man from Šuruppak gave instructions to his son.'

The representation of morphology was largely mnemonic in Sumerian, aiding the fluent speaker/reader, not aiming at high-fidelity recording of the language (rather as punctuation scantly records prosodic groupings in English). Underrepresentation of functional material creates a writing system that is simply a language of a different grammatical type, but a legitimate one.

An obvious parallel to the effect of vowel-reduced writing in non-Afroasiatic languages is consonant-reduced writing in Afroasiatic ones. One such case arose when Akkadians adopted the Sumerian writing system, which routinely omitted coda consonants from its writing. When used phonetically (for rebus writing) <kuř> could stand for /ku/, <gub> for /gu/. With a range of logograms and other devices to clarify meaning, Sumerians clearly felt this to be unproblematic. For Akkadian, which opted initially for a much more phonetic orthography, the convention was problematic: /iprus/ 'separate' (root p-r-s plus template i--u-) would be written <i.ru>. This erases most of the root. The Akkadi-

ans consequently adopted the convention of writing /CVC/ as <CV.VC>, expanding the inventory and use VC already available within Sumerian.

Returning to Kabyle Berber in this light is also interesting. In contrast to the Berber varieties surveyed in Souag, 2014, Kabyle Berber (Souag, 2019) has been written with vowels in a range of orthographies. Some of these may reflect European influence, having been European commissions for missionary ends. However, full vocalisation, via diacritics rather than *matres lectionis*, applies to orthographies that predate European influence. Sociological factors cannot be discounted: diacritics distinguished Berber script from secular Arabic (Souag, p.c.), or Quranic Arabic may have been taken as a model. However, linguistic factors may also be at play that may limit the viability vowel-reduced writing in Kabyle Berber.

Souag (p.c.) suggests two. First, Afroasiatic grammar is not uniform. The extent of intercalating templates, as opposed to crosslinguistically more common concatenating morphology, varies. Berber may be one of the more concatenative cases, making it more like a non-Afroasiatic language in the respects relevant here. Second, several root consonants do not emerge phonetically in Kabyle Berber. For instance, of the root ʕ-r-β 'write', only the middle consonant emerges in *y-aru* in '(that) he write' (< y-ăʕrŭβ) and *y-ura* 'he wrote' (< y-ŭʕrăβ). Full assessment requires study beyond the scope of this article. But it is interesting that *matres lectionis* emerged towards the end of the word in Hebrew, a locus where consonants were prone to loss.

6.   Conclusion

The emergence of vowel writing was not a one-off affair. Vowel writing accreted gradually and partially within some Afroasiatic writing systems, and some non-Afroasiatic orthographies continue with partial representation of vowels today. However, as a whole, vowel writing increases most when an Afroasiatic writing system is adapted to a non-Afroasiatic language, and it remains most constant when the system is passed within the family. The 'sudden' innovation of vowels, whether via diacritics, letters, or syllabograms, appears exclusively within non-Afroasiatic systems, like Brāhmī, Greek, Iberian, Kharoṣṭhī, and Meroitic.

The obvious correlate of vowel expansion is, therefore, grammatical. Only Afroasiatic languages structure their lexical and functional vocabulary such that removal of vowels minimally affects lexical vocabulary and amounts, on the whole, only to impoverishment of functional vocabulary. This view of matters is supported by other writing systems that underrepresented functional vocabulary. Grammar is, therefore, a key force that shapes the evolution of writing systems.

I end on a speculative note. The alphabet has been portrayed by some as the logical, even teleological, end of writing system development (as surveyed in Share, 2014). I believe this is a radical misreading of grammatical history. With one exception, when writing systems have invested in phonetic devices (that is, sound- rather than meaning-based writing), the unit of investment has been the syllable. This applies both to pristine writing systems (Sumerian, Egyptian, Mayan) and to their descendants (Akkadian, Meroitic, Japanese) and to adoptions of the idea of writing but invention of a new system (Linear B, Cree, Vai). The exception is Egyptian. However, a syllabary for a language unconcerned with vowel writing is, simply, a consonantal alphabet. Passed onto unrelated languages, in which vowels and consonants have more equal status, the consonantal alphabet acquires vowels. On this picture, the existence of the alphabet is a highly contingent accident of history: at the right time, a language of the right grammatical type, innovated a writing system, that was then simplified by speakers of a related language, before being passed to speakers of others who invested in complete vowel writing. Had different peoples been involved, writing might never have become more finegrained than the syllabary.

References

Adiego, Ignasi-Xavier (2007). *The Carian Language*. Leiden: Brill.
——————— (2020). "Consonant Clusters, Defective Notation of Vowels and Syllable Structure in Caromemphite." In: *Hrozný and Hittite: The First Hundred Years*. Ed. by Ronald I. Kim, Jana Mynářová, and Peter Pavúk. Leiden: Brill, pp. 95–119.
Alster, Bendt (2005). *Wisdom Of Ancient Sumer*. University Park, PA: Eisenbrauns.
Arad, Maya (2005). *Roots and Patterns: Hebrew Morpho-Syntax*. Dordrecht: Springer.
Banafunzi, Bana and Alessandra Vianello (2014). "Chimi:ni in Arabic Script: Examples from Brava Poetry." In: *The Arabic Script in Africa: Studies in the Use of a Writing System*. Ed. by Meikal Mumin and Kees Versteegh. Leiden: Brill, pp. 293–310.
Baxter, William and Laurent Sagart (2014). *Old Chinese: A New Reconstruction*. Oxford: Oxford University Press.
Bondarev, Dmitry (2014). "Old Kanumbu and Kanuri in Arabic Script: Phonology through the Graphic System." In: *The Arabic Script in Africa: Studies in the Use of a Writing System*. Ed. by Meikal Mumin and Kees Versteegh. Leiden: Brill, pp. 107–142.

Cathcart, Kevin J. (2011). "The Earliest Contributions to the Decipher-ment of Sumerian and Akkadian." In: *Cuneiform Digital Library Journal* 1, pp. 1–12. URL: www.cdli.ucla.edu/pubs/cdlj/2011/cdlj2011%5C_001.html.

Coulmas, Florian (2003). *Writing Systems: An Introduction to the Linguistic Analysis*. Oxford: Blackwells.

Crellin, Robert (2018). *Measuring Ambiguity in the West-Semitic Abjad*. Paper presented at the Mainz International Colloquium on Ancient Hebrew.

Cross Frank M., Jr. and David N. Freedman (1952). *Early Hebrew Orthography: A Study of the Epigraphic Evidence*. New Haven, CT: American Oriental Society.

Daniels, Peter T. (2014). "The Type and Spread of Arabic Script." In: *The Arabic Script in Africa: Studies in the Use of a Writing System*. Ed. by Meikal Mumin and Kees Versteegh. Leiden: Brill, pp. 25–39.

Darnell, John Coleman et al. (2005). "Two Early Alphabetic Inscriptions from the Wadi el-Ḥôl: New Evidence for the Origin of the Alphabet from the Western Desert of Egypt." In: *The Annual of the American Schools of Oriental Research* 59, pp. 63–124.

Diem, Werner (1979–1983). "Untersuchungen zur frühen Geschichte der arabischen Orthographie, I–IV." In: *Orientalia* 48, pp. 207–257, 49, 67–106, 51, 332–381, 52, 357–383.

Diringer, David, ed. (1948). *The Alphabet: A Key to the History of Mankind*. London: Thames and Hudson.

Donner, Herbert and Wolfgang Röllig (2002). *Kanaanäische und aramäische Inschriften*. 5th ed. Vol. 1. Wiesbaden: Harrassowitz.

Dupont-Sommer, André (1966). "Une nouvelle inscription araméenne d'Asoka découverte à Kandahar (Afghanistan)." In: *Comptes rendus des séances de l'Académie des Inscriptions et Belles-Lettres* 110, pp. 440–451.

Frakes, Jerold C., ed. (2004). *Early Yiddish Texts 1100–1750: With Introduction and Commentary*. Oxford: Oxford University Press.

———— ed. (2014). *Early Yiddish Epic*. Syracuse, NY: Syracuse University Press.

———— (2017). *A Guide to Old Literary Yiddish*. Oxford: Oxford University Press.

Gelb, Ignace Jay (1963). *A Study of Writing*. Chicago, IL: University of Chicago Press.

Gnanadesikan, Amalia E. (2017). "Towards a typology of phonemic scripts." In: *Writing Systems Research* 9, pp. 14–35.

Hary, Bejamin (1996). "Adaptations of Hebrew Script." In: *The World's Writing Systems*. Ed. by Peter Daniels and William Bright. Oxford: Oxford University Press, 727–734 and 741–742.

Hincks, Edward (1852). "On the Assyrio-Babylonian Phonetic Charac-ters." In: *Transactions of the Royal Irish Academy* 22, pp. 293–370.

Hincks, Edward (1863). *On the Polyphony of the Assyrio-Babylonian Cuneiform Writing: A Letter to Professor Renouf*. Dublin: John F. Fowler.

Kara, György (1996). "Aramaic Scripts for Altaic Languages." In: *The World's Writing Systems*. Ed. by Peter Daniels and William Bright. Oxford: Oxford University Press, pp. 537–558.

Kaye, Alan S. (1996). "Adaptations of Arabic Script." In: *The World's Writing Systems*. Ed. by Peter Daniels and William Bright. Oxford: Oxford University Press, pp. 743–762.

Luffin, Xavier (2014). "Swahili Documents from Congo (19th Century): Variation in Orthography." In: *The Arabic Script in Africa: Studies in the Use of a Writing System*. Ed. by Meikal Mumin and Kees Versteegh. Leiden: Brill, pp. 311–318.

Martin, Alexander et al. (2019). "Cross-linguistic Evidence for Cognitive Universals in the Noun Phrase." In: *Linguistics Vanguard*, PsyArXiv doi:10.31234/osf.io/jnqug.

Martínez Ruiz, Juan (1974). "Un nuevo texto aljamiado: el recetario de sahumerios en uno de los manuscritos árabes de Ocaña." In: *Revista de dialectologia y tradiciones populares* 30, pp. 3–37.

Meyer, Ronny (2016). "The Ethiopic Script: Linguistic Features and Socio-Cultural Connotations." In: *Multilingual Ethiopia: Linguistic Challenges and Capacity Building Efforts*. Ed. by Binyam Sisay Mendisu and Janne Bondi Johannessen. Oslo: University of Oslo, pp. 137–172.

Mumin, Meikal (2014). "The Arabic Script in Africa: Understudied Literacy." In: *The Arabic Script in Africa: Studies in the Use of a Writing System*. Ed. by Meikal Mumin and Kees Versteegh. Leiden: Brill, pp. 41–76.

O'Connor, Michael (1996a). "Epigraphic Semitic Scripts." In: *The World's Writing Systems*. Ed. by Peter Daniels and William Bright. Oxford: Oxford University Press, pp. 88–107, 116–118.

————— (1996b). "The Berber Scripts." In: *The World's Writing Systems*. Ed. by Peter Daniels and William Bright. Oxford: Oxford University Press, pp. 112–116, 119.

Pountain, Christopher J. (2000). *A History of the Spanish Language through Texts*. London and New York: Routledge.

Riesenberg, Saul H. and Shigeru Kaneshiro (1960). "A Caroline Islands Script." In: *Bureau of American Ethnology Bulletin 173*. Washington DC: Smithsonian Institution, pp. 269–333.

Sacks, Jonathan (2014). *The Great Partnership: Science, Religion, and the Search for Meaning*. New York, NY: Schocken Books.

Salomon, Richard G. (1996). "Brahmi and Kharosthi." In: *The World's Writing Systems*. Ed. by Peter Daniels and William Bright. Oxford: Oxford University Press, pp. 373–383.

Sampson, Geoffrey (2015). *Writing Systems: A Linguistic Introduction*. Second edition (first edition 1985, Stanford University Press). London: Equinox.

Sass, Benjamin (2005). *The Alphabet at the Turn of the Millennium: The West Semitic Alphabet ca. 1150–850 BCE; The Antiquity of the Arabian, Greek and Phrygian Alphabets*. Tel Aviv: Tel Aviv University Institute of Archaeology.

Schmitz, Philip C. (1995). "The Phoenician Text from the Etruscan Sanctuary at Pyrgi." In: *Journal of the American Oriental Society* 115, pp. 559–575.

Schniedewind, William M. and Joel H. Hunt (2007). *A Primer on Ugaritic: Language, Culture and Literature*. Cambridge: Cambridge University Press.

Share, David L. (2014). "Alphabetism in Reading Science." In: *Frontiers in Psychology* 5, p. 752.

Skjærvø, P. Oktor (1996). "Aramaic Scripts for Iranian Languages." In: *The World's Writing Systems*. Ed. by Peter Daniels and William Bright. Oxford: Oxford University Press, pp. 515–535.

Souag, Lameen (2014). "Writing 'Shelha' in New Media: Emergent non-Arabic Literacy in Southwestern Algeria." In: *The Arabic Script in Africa: Studies in the Use of a Writing System*. Ed. by Meikal Mumin and Kees Versteegh. Leiden: Brill, pp. 91–104.

————— (2019). "Kabyle in Arabic Script: A History without Standardisation." In: *Creating Standards: Interactions with Arabic Script in 12 Manuscript Cultures*. Ed. by Dmitry Bondarev, Alessandro Gori, and Lameen Souag. Berlin, Boston: De Gruyter, pp. 273–296. URL: doi.org/10.1515/9783110639063-011.

Taylor, Isaac (1883). *The Alphabet: An Account of the Origin and Development of Letters*. London: Kegan Paul, Trench.

Vydrin, Valentin (2014). "Ajami Scripts for Mande Languages." In: *The Arabic Script in Africa: Studies in the Use of a Writing System*. Ed. by Meikal Mumin and Kees Versteegh. Leiden: Brill, pp. 199–224.

Vydrin, Valentin and Gérard Dumestre (2014). "Manding Ajami Samples: Mandinka and Bamana." In: *The Arabic Script in Africa: Studies in the Use of a Writing System*. Ed. by Meikal Mumin and Kees Versteegh. Leiden: Brill, pp. 225–260.

Scripts in Contact:
Transmission of the First Alphabets

Sveva Elti di Rodeano

Abstract. The alphabet is a type of notation which breaks language into small units, attempting to represent its phonological and/or phonetic repertoire. Given that writing is a way of thinking, based on a cognitive activity that requires mental procedures, the aim of this paper is to propose the architecture of the spelling process, described in cognitive and psycholinguistic studies, as a model for the transmission of the alphabet(s).

For this purpose, the reflection is focused on the so-called first alphabets in writing systems' history, i.e., Greek, Anatolian, Italic, and Iberian alphabets, introducing the new linguistic and archeological approaches which allow an earlier date and a less decisive role for the Greeks in the alphabets' introduction.

Ancient literatures' evidence about the teaching of writing and reading are found to match with the current results of cognitive studies about the dynamics of oral reproduction, word recognition, and written reproduction. The peculiarities of Asia minor alphabets, which are still unsolved, will be addressed and framed within the spelling process model.

1. Introduction

Currently, the alphabet is more widespread than any other system of written language.

In company with Chinese characters, the alphabet provides the forms by which all living languages are written: whether Arabic, Bengali, Cyrillic, Devanagari, Greek, Hebrew, Javanese, Latin, or Tibetan or any

Sveva Elti di Rodeano   0000-0002-7068-8192
Università degli studi di Udine, via Palladio 8, 33100 Udine
E-mail: `sveva.eltidirodeano@spes.uniud.it`

other alphabetic forms, they derive from a common source in the Sinai in the second millennium BC[1] Semitic languages, indeed those in use in the Sinai Peninsula, were the first to be written in alphabetic script[2].

In spite of this variety in contemporary visual appearance, which is the result of centuries of specialized adaptations,[3] all alphabetic forms share a similar structural property: they consist of about twenty-four to thirty signs used to represent the sounds of spoken language. The phonetic principle is at best an approximation, because, while oral forms are continually evolving, the tenacity of the alphabet tends to endure any changes. However, it must be said that no other writing system has the capacity to represent the sound of spoken language with such efficiency and adaptability.

Writing has been associated with evolutionary theory since eighteenth century.

In the late nineteenth century, Isaac Taylor proposed that writing progressed from pictorial and pictographic, through logographic and syllabic forms of writing, to a final and more efficient alphabetic system.

Taylor's scheme was systematized by Ignace Gelb (1963), in his gradualistic and unievolutionary models of script development.[4] That view implied that writing starts in a pictographic form, then develops first into logographic and then into syllabic writing, and eventually the alphabet is created.

This was the traditional answer to the question of origins, which was directly related to the classification of writing into pictographic (signs as pictorial images of objects or events), syllabic (signs correspond to syllables), and alphabetic (signs correspond to sound segments). This classification recalled the typological classification of languages of that period, into isolating, agglutinative, and inflected.[5]

Afterwards, studies on writing systems began to reconsider the evolutionary "principle of economy aiming at the expression of linguistic

---

1. To be more precise, all modern natural writing systems derive from either Egyptian hieroglyphs, or from Chinese characters.

2. However, It must be recognised that the acrophonic principle, the decisive turning point for the linguistic notation of signs, has been used since Egyptian hieroglyphs and Sumerian cuneiform attestations (late fourth millennium BC).

3. In many cases such adaptations were fostered by the accurate dedication of Christian missionaries, as for the Gothic alphabet, invented by the Bishop Wulfila in the third century AD.

4. This model was the product of its time, and it was championed by other scholars too (Damerow, 1999; Schmandt-Besserat, 1992; Michalowski, 1993).

5. The comparison between these two classification is drawn by Cardona (1981, p. 21), who arguably doubted the linguistic classification.

forms by the smallest number of signs" (ibid., p. 69) and the classification of writing.[6]

However, from the archaeological and historical point of view the prevailing opinion seemed to retain the paradigm of a Western supremacy, which saw the alphabet as an introduction made by the Greeks before the eighth century BC (Carpenter, 1933).

2.   The First Alphabets and Their Relations

Gelb's study sowed the seeds for the twentieth century Eurocentric view on the Greek alphabet as civilizing mark in human evolution[7].

The classicist Eric Havelock (1976; 1982) promoted the idea of Western supremacy linked to alphabetic writing, while the anthropologist Jack Goody (1968) supported the idea of a connection between the alphabet and literacy, reinforcing the consequent formulation that non-alphabetic cultures and predecessors in the Near East who used other forms of writing were distant and cognitively inferior in comparison to the Greeks.[8]

According to the communis opinio, the alphabet was introduced to Greece through the Phoenicians around the eighth century BC (contra Ullman, 1934). Recently, new discoveries and archeological evidence have revealed trade contacts between the Aegean and Eastern Mediterranean (Broodbank, 2013, pp. 870−1314), showing that the necessary infrastructure for transmission of the alphabet was already in place long before the traditional date of its introduction. Linguistic and epigraphic, but here we should called them graphemic and graphematics, studies (Waal, 2018; 2020) have shown that the only argument for a late introduction is the absence of evidence, an argumentum ex silentio.

Nowadays a new approach, which allows an earlier date for the introduction of the alphabet and a less decisive role for the Greeks in the transmission, helps to understand relations between the first alphabetic scripts.

What remain still unaddressed are some peculiarities of the Asia minor alphabets that constitute arguments for the Greek thesis.

---

6. A comprehensive description of all the typological classification of writing is in Borgwaldt and Joyce (2011, pp. 2−6).

7. The idea of evaluating writing systems is quite still common among scholars, as Meletis (2018; 2020, pp. 197−215) illustrates in detail.

8. The "literacy thesis" was promoted by Goody and Watt (1963), Halverson (1992) and Ong (1982), and was based on Havelock's statements about the cognitive revolution arising from alphabetic literacy.

The still unsolved enigmas are, for instance, the Carian graphemes, which resembled Greek graphemes with deviant sound values, and the Etruscan sibilants signs.

The first case constitutes a clear anomaly in the Anatolian context, for which the "chaos hypothesis" has been proposed: in the adaptation, an arbitrary assignment of phonetic values from Greek graphemes to Carian graphemes took place, maintaining only the external shape of signs. This hypothesis is frustrating and does not clarify why some letters preserve their Greek phonetic value while others did not.[9]

The second case shows the most evident problem with the thesis of the Greek role as intermediate. Etruscan retained both the *sigma* and the *san* letter for the fricative value [s],[10] whereas none of the Greek alphabets contain both these letters (Bonfante and Bonfante, 2002, p. 45).

(a)

(b)
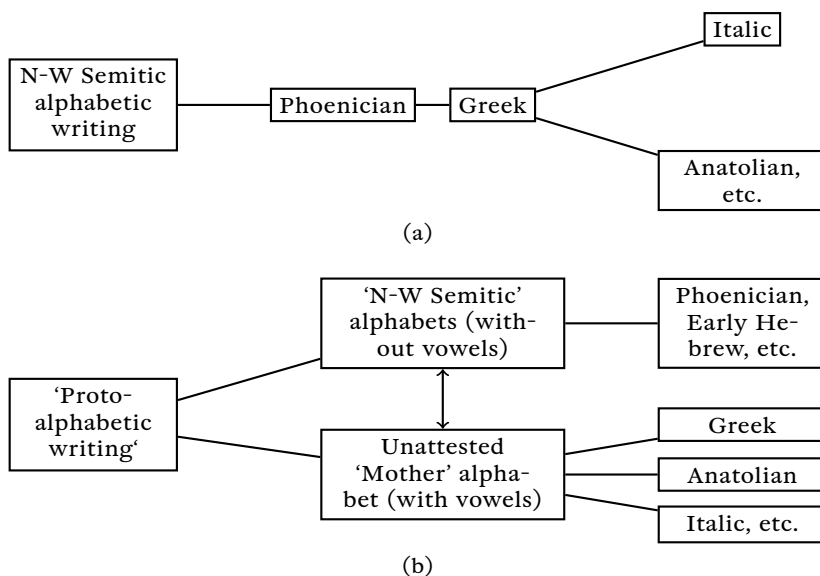
FIGURE 1. (a) Current paradigm simplified. (b) Alternative model simplified (Waal, 2020, p. 119)

These facts are hard to reconcile with the current paradigm. A different scenario (Fig. 1) has been suggested, in which the Anatolian, Italic, and Iberian alphabets did not derive from the Greek alphabet.

---

9. Car. Ψ [n] / Gr. Ψ, Car. И Ͷ [m]/ Gr. M, Car. Ϝ Ϲ [r]/ Gr. P, Car. Ϙ [t]/ Gr. T, but also Car. A / Gr. A, Car. O / Gr. O, Car. Ϻ / Gr. M [s], Car. Y / Gr. Y.

10. Etr. Ϻ (< «san») and Etr. Ϟ (< «sigma») for [s].

3.   The Alphabet and the Written/Oral Language Relation

The way in which languages are put into writing varies from language to language.

In alphabetical systems the characters tend to refer to minimal units of the sound system, whether they are phonemes or phones. This is the underlying principle that identifies the alphabet from other writing systems.

Notwithstanding that, it is crucial to repeat that no pure writing system exists (Coulmas, 1996), and that differentiating writing systems intends to reassume the relation between linguistic elements (sounds), orthographic elements (signs), and metaphorical referents ("meant" meaning).[11]

Gelb (1963) saw writing as a contribution to social change, which would necessarily end with mass literacy. In this view he conceived the evolution of writing in a functionalist way: driven by utility and maximization, the best writing system will be the one most efficient to note the language and the one most accessible to the population. Some similarities can be noted between these assumptions and the linguistic economy concept of the nineteenth century.

In the theory of George Kingsley Zipf (1949),[12] any uneconomical change, involving more effort than benefits in terms of communication, will be removed or avoided. In the same direction, André Martinet's language economy principle (1955) aims at least effort for a particular purpose, seeking a balance between efficient communication and natural human inertia.

The comparison between writing and language evolution is not the main purpose of this paper, but it can be observed that writing systems' studies has changed their conception of teleological reading in accordance with and on the basis of a different interpretation of linguistic change: Martinet rejected the teleological evolution of languages and preferred a causal explanation of economy, stated by the well-known dictum that "languages change because they function".

---

11. With "metaphoric referent" I am trying to reassume the concept of "competenza semantica mediata dal segno scrittorio" (Marazzi, 2016, p. 1) proposed by many pioneering works of linguists (Crump, 1990; Gaur, 1992), semiotics (Harris, 1995; Rotman, 1995), and graphic designers (Kress and Leeuwen, 1996) that proposed a broader view of writing. Given the fact that writing does not record language in its linguistic entirety, writing must be studied separately from its relation to speech (Derrida, 1976, pp. 30–59). Within this view writing is "any systematized graphic activity that creates sites of interpretation" (Rotman, 1995, p. 390).

12. The so-called Principle of Least Effort states that economy is a criterion regulating aspects of human behaviour as well as linguistic evolution. Economy has been considered a factor in phonetic changes too (Sweet, 1888; Passy, 1890; Vendryes, 1939).

Writing is an artefact, a τέχνη. The term τέχνη is derived from IE *tek̂- "to produce," *te-tk̂- "to build, to timber" (Beekes and van Beek, 2010, p. 1476).

The idea of τέχνη naturally came to denote the artistic capacity for producing artefact. Writing is a techné, so it can be evaluated for its utility.

The widespread use of the alphabet, nowadays the Roman alphabet, cannot be taken as evidence that is the best system because "the spread of a technology is driven by many factors in addition to utility, such as power (market dominance) and ignorance (limited information)" (Coulmas, 2009, p. 8). Moreover and as a consequence of this view, the diversity of coexisting writing systems is often overlooked as mere phases of their evolution.[13]

More recently, classifications of scripts have been proposed by Borgwaldt and Joyce (2011), Daniels (2006; 2018), and Gnanadesikan (2017). They agree upon separating the proper alphabets from scripts that note consonants only, "abjads," and scripts that note vowels with diacritical marks, "abugidas". This criterion makes distinctions mainly in the notation of phonemic repertoire.

The early alphabets—Greek, Lycian, Lydian, Carian, and Phrygian— are difficult to fit into this classification, or into the functional model of evolution, because "the alphabetic principle has no magic power which influences the destiny of other forms of writing; as Cuneiform Hittite shows, in the development of writing there is no necessary tendency towards an increasingly exact phonetic rendering of speech" (Morpurgo-Davies, 1986, p. 63). Moreover, vowels' notation appears to differ in any language and within each language.[14]

4. The Transmission

From an anthropological point of view, the alphabet is a very nice example of transmitted tradition through space and time.

For centuries the dominant view here was that the imitation, μίμησις, makes the chain of transmission possible.

Now it is proposed that what makes tradition live is not a general purpose of imitation because cultural transmission is partial, selective, and not faithful. "Some traditions live on in spite of this, because they tap into widespread and basic cognitive preferences. These attractive

---

13. This kind of argument is often expressed when no writing standard is found. Nowadays in sociolinguistics studies the concept of "standard" itself is debated: the same reasoning should be useful in graphematic studies.

14. Emblematic is the case of Carian defective vocalic notation.

traditions spread, not by being better retained or more accurately transferred, but because they are transmitted over and over" (Morin, 2016). This approach offered the chance to see the predominant role of the alphabet in the story of writing; in particular in the first millennium in Greece, Italy, and Anatolia this kind of annotation has been adapted every time to each different cultural environments. This point reinforces the assumption that transmission means adaptation, and because "linguistic interpretation of graphic symbols always began in the context of and for a particular language" (Coulmas, 2009), in the adaption process there must be some visible linguistic reasons.

In our context, thanks to the lexical root structure of Semitic languages, Semitic alphabets do not need vowel graphemes. Indoeuropean languages, on the contrary, need vowels' graphemes to mark morphemic contrasts.

From ancient literature, only two pieces of evidence explain the mode of transmission.

Dionysius of Halicarnassus (Περὶ τῶν Ἀττικῶν ῥητόρων, II, 52):

Πρῶτον μὲν τὰ ὀνόματα τῶν στοιχείων τῆς φωνῆς ἀναλαμβάνομεν, ἃ καλεῖται γράμματα· ἔπειτα <τοὺς> τύπους τε αὐτῶν καὶ δυνάμεις[15]

and Quintilianus (*Istitutio Oratoria* I, 1, 24-5):

Neque enim mihi illud saltern placet, quod fieri in plurimis video, ut litterarum nomina et contextum prius quam formas parvuli discant. obstat hoc agnitioni earum non intendentibus mox animum ad ipsos ductus, dum antecedentem memoriam sequuntur.[16]

From these two reports it can be observed that teaching was at first conducted orally, repeating letters' names, called γράμματα, then visually[17] writing letters' shapes and, at the same time, orally repeating their

---

15. "At first we learn the names of sounds' elements, which are called letters. Then we learn their shapes and sound values".

16. "At any rate I am not satisfied with the course, which I note is usually adopted, of teaching small children the names and order of the letters before their shapes. Such a practice makes them slow to recognize the letters, since they do not pay attention to their actual shape, preferring to be guided by what they have already learned by rote."

17. In a process that now can be defined as "graphomotor". Lambert-Quémart explained very well the different stages of the writing production: "word writing research involves the study of two essential processes, spelling processing and graphomotor processing. Spelling processes refer to the cognitive mechanisms by which words are transcribed into written form while adhering to the orthographic norms of the language. Graphomotor processing is generally defined as the processes involved in letter writing: allographic selection, allograph adaptation in writing support and muscle adjustment of motor programs" (Lambert and Quémart, 2019, p. 9).

sounds. As its name, alpha-bet,[18] implies, it likely that this is the method commonly used in antiquity.[19] It can be deduced that the underlying cognitive processes, both in the spelling and in the visual and motoric composition, have been responsible for the transmission of alphabetic scripts.

From the cognitive point of view, some recent studies on dysgraphia in alphabetic and logographic writing systems, especially Chinese (Bi, Han, Weekes, and Shu, 2007; Law, 1994; Weekes, Yin, Su, and Chen, 2006), have been used to categorize the mistakes in syllabographic and logographic writing systems in old texts.

For our context, recently this has been done for Hittite and Luwian, Anatolian languages of second millennium BC (Cotticelli-Kurras, Pisaniello, and Rizza, 2018).

5.   The Spelling Process

Here I will apply this theoretical framework, based upon Caramazza and Miceli (1990),[20] on contact and then transmission of scripts, which in this case are alphabets. Therein lies the meaning of the title "scripts in contact": the contact that must occurred in writers of more than one language, undoubtedly including one Semitic and one Indoeuropean language.

The contact must have included the writer as well as the speaker to facilitate language contact/transmission. Halliwell (1945, p. 174) wrote expressly about the speaker's mind as centre of the contact, because "is individuals who respond to and influence one another… Individuals are the dynamic centers of the process of interaction". Weinreich (1953, p. 6) made the same allusion, which Orioles (2008, p. XVII) highlighted.

The schematic representation of the spelling process reported in Caramazza and Miceli (1990, p. 245), in the case of scripts in contact, must be adapted at the moment of transmission of the alphabet between (at least) two different languages, then different phonologies.

---

18. Unlike the consistent references to ποινικήια / φοινικήια, an adjective that stands for a noun to designate the Phoenician letters, the name ἀλφάβητον is not attested before the Hellenistic period although the adjective ἀναλφάβητος "illiterate" occurs already in the fourth century BC (Jeffery, 1990, p. 40).

19. Regarding Greek alphabet's learning, Andreas Willi draw the same conclusion: "we may thus assume that Greek pupils already in classical times learned the canonical letter names together with, or even before, the corresponding letter shapes, just as it was the case in later centuries according to Dionysius of Halicarnassus (*Dem.* 52.2.) and Quintilianus (1.1.24)" (2008: 403).

20. This paper was the pioneer of the field, as well as Paillard (1990), Rapp and Caramazza (1997), Rapp and Kong (2002), Nottbusch (2008).
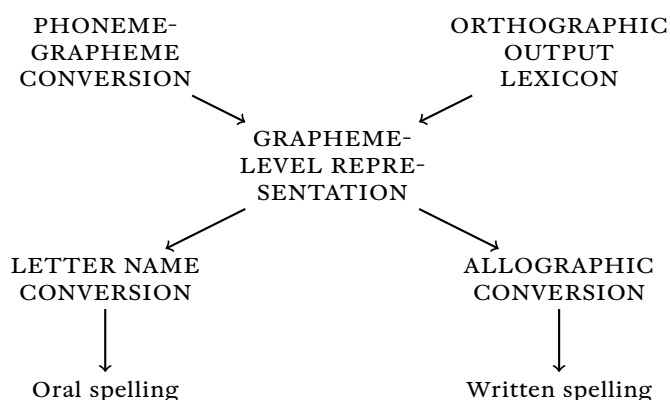
FIGURE 2. The architecture of the spelling process (Caramazza and Miceli, 1990, p. 245)

The first part is the core moment of the transmission that allows the same script to represent another language. This is the moment when the linguistic fit of the script actually proves itself, or, as Florian Coulmas put it best when he wrote, "when, early in the history of writing, graphical marks were given a linguistic interpretation, all writing systems developed a linguistic fit" (2009, p. 12).

The phoneme-grapheme conversion occurs in the reading moment of letters' names.

Since ancient literatures, Quintilianus' *litterarum nomina* and Dionysius' τὰ ὀνόματα τῶν στοιχείων τῆς φωνῆς, also placed this action at the beginning of the learning process, the architecture of the spelling process can be considered as a well-corresponding scheme for the ancient model of teaching.

The orthographic output lexicon occurs when the lexical letters' names are memorized in the short-term memory (STM).[21] These two steps constitute the first moment of the teaching method which appeared in ancient sources as discussed previously.[22]

The grapheme-level representation corresponds with the visually representation of letters' names, as perceived aurally and then memorized in the STM. The letters of the Greek alphabet maintain unaltered

---

21. A storage memory characterized by limited capacity and brief duration. For the main three models of verbal short-term memory see Baddeley (1983; 1986), Besner (1987), and Monsell (1987).

22. The same learning process seems to have been used for the Hebrew alphabet, as Aaron Demsky put it, "there can be no doubt that learning the linear alphabet, by writing the letters in a standard sequence and repeating their names, is the key to alphabetic literacy" (Demsky, 2015, p. 23).

the sequence of the Phoenician signary. This is one of the more solid arguments in favour of the Phoenician origin of the Greek alphabet, which maintain letters' names even if they are meaningless in Greek (Bourgiannis, 2018, p. 238).

In this moment the letters' names have been transmitted as they were in the Semitic language of origin;[23] then these names have then been taken as loanwords, words adopted from one language and incorporated in another one without any translation.[24]

It is precisely the absence of word meaning that could have disrupted the lexical orthography and then the phonological processing (Houghton and Zorzi, 2003, p. 120)[25] of the acrophonic value that results. According to a scholion on Dionysius Thrax (Willi, 2008, p. 404), the indeclinability of the letter names was so strongly felt as non-Greek to encourage a purpose to make the letter names easy to learn for children. The feature of alphabetic writing, which in principle provides more than one way by which a word may be spelled or read, here should have played a great role in the transmission.

Returning to the scheme (Fig. 2), the second part, below the grapheme-level representation, represents the moment of the (re)production.

There we can distinguish the oral and written output.

For the written output, it can admit a "graphemic buffer" (Günter and Ludwig, 1994, p. 1084), a failure of the STM that temporarily holds graphemic representations for subsequent spelling processes as allographic conversion. This intermediate step can explain many cases of allography in the first alphabets.

For instance, the Carian alphabet presents a number very high of letters in comparison to other Anatolian alphabets, about 34/35 different

---

23. As consequence of the predominant phonetic interpretation of alphabetic scripts, focus has been on the sounds denoted by the letters, instead of their names. This was the ratio for the absence of translation for the Semitic letter names too, "because the acrophonic principle was so useful, it was out of the question to translate the Semitic names" (Willi, 2008, p. 412). This observation again held the possibility of an oral transmission of the then-called alphabet as a poem or a song, learned by heart and only in Hellenistic times studied by the increased interest in various aspects of language and writing, which arose from the spread of literacy in Greece.

24. The Phoenician names were indeed only superficially hellenized, adding -α in names ending in a final consonant (ʾalp < ἄλφα, bēt < βῆτα) or simplifying not-admitted consonantal groups (gaml < γάμμα).

25. George Houghton and Marco Zorzi stated that the final spelling is determined by the combined output of both sound-to-spelling conversion and frequency-sensitive lexical route. In this regard, nonword or lower-frequency words differ in spelling regularity: "it is worth noting that the disruption of lexical orthographic and phonological processing in semantic dementia appears to be tightly linked to the loss of word meaning" (2003).

letters (cfr. Adiego Lajara, 2018, p. 12). This singular trait of Carian is indeed the attestation of different local varieties, for which Ignasi Adiego Lajara (2013) illustrated the epigraphic ratio in the unity underlying these local varieties, explaining all the cases of allography, which otherwise would constitute arguments for a notably high number of letters for the Carian alphabet.

For the final written output, the pronunciation of letters' names are analyzed, through the phonological mediation of the writer's language, and stored in a graphemic output lexicon (GOL), a long-term memory for words in which spelling is now acquired.[26]

The GOL determines the written output and implementation in comparison to the script model (S1).

In our case we should assume that phonological mediation produced the different sound value for the same letters in the languages involved. This phenomenon is particularly clear for vowels' signs between Lycian and Greek.

Phoenician	Greek	Lycian	
✕	A	ᐯ	ᗐ
	[a]	[a]	[ā]
		↑	�┯
		[e]	[ē]
ᐱ	E	Ɛ	
	[e]	[i]	

FIGURE 3. Vocalic signs in Phoenician, Greek and Lycian alphabet

From Fig. 3 it can be observed that signs for [a], [e] and [i] are morpho-graphically equal, but these similarities in shapes are not reflected nor maintained by the oral output of these languages.[27] The comparison between Greek adaptation and Lycian adaptation serves as an example of how the phonological mediation of the writer's L1 influences in the spelling process.

For instance, the case of the arrow grapheme, also used in Phrygian and Lydian, has been indicated as [æ] due to the correspondence in Greek: Lyc. ↑ / Gr. α (*El[puw]eti,* Ἐλπόατις; *Erttimeli,* Ἀρτέμηλις; *Huzeimi,*

---

26. Here all learned spellings are stored, ready to be written down. Once the spelling is learned through the phonological mediation and memorized, it is not likely to change. This is the reason why orthographic mistakes are the hardest to not repeat.

27. Except for [a] signs, which are in all these alphabets equal both in shape and in sound.

Ὁσάιμις); Lyc. ↑ / Gr. ε (*Tikeukēprē*, Τισευσέμβρα; *Xesñtedi*, Κεσίνδηλις); Lyc. ↑ / Gr. η (*Erttimeli*, Ἀρτέμηλις; *Xesñtedi*, Κεσίνδηλις)[28].

However, the context of the contact should have been Asia minor, and consequently the phonology to take into consideration should be Anatolian Greek. Claude Brixhe (1987, p. 49) studied the vocalism of Anatolian Greek and highlighted the alternation between α, ε and η as case of hypercorrection due to an "influence de l'école".

This explanation permits the retention of a more common vocalic value [e] for Lyc. ↑, taking into consideration that the Greek correspondence were easily alternated and that, because ε and ι were often used as if they were interchangeable,[29] Greek α seemed nearer to [e] than ε itself.[30]

Returning to the spelling process scheme (Fig. 2), the oral output comprises two different inputs: auditory and visual. Recently attention has been focused on the STM in the phonological coding.

Baddeley (1986) proposed a model for the storage of oral material which comprises a phonological storage called phonological short-term store (PSTS) and an articulatory loop.

The scheme in Nickels, Howard, and Best (1997, p. 162) presents Baddeley's model combined with the two different kinds of input (Fig. 4).

At first we can admit the auditory input, through which the phonological information gains direct access to the phonological short-term store (PSTS) which is responsible for the speech output lexicon (SOL); whereas verbal material through visual input, must be re-coded by the articulatory loop in order to be held in the PSTS.

Once these new alphabets[31] acquired a certain degree of complexity, they became more and more associated with the language (Coulmas, 2003), and, at this point, the adaptation would involve the addition of new signs for phonemes and/or phones that were still not represented, either with the creation of signs or with modification or implementation of signs that are already part of the alphabet, and this case can be the proof of the links between graphomotor processing and spelling during

---

28. Here the Greek versions of Lycian names are written with the (plausible) prosodic notation, in accordance to Greek prosodic laws. This editorial choice has been made in order to express, with the most cautious attitude, both how Greek wrote Lycian names (for this reason we used Greek alphabet and not IPA characters) and how Greek could have read them, given the fact that stress is highly distinctive and involved in phonology.

29. For instance Μιννέαν/Μεννέαν, εἰειρῖς/ἱερεῖς, εἰσεν/εἰσιν, πυήσε/ποιήσει, χάρεν/χάριν, τρές/τρίς.

30. Adiego Lajara (2018) more accurately defines the adaptation of writing systems, using Boisson's "principe de stabilité" for his analysis.

31. They can be defined as "new" due to the fact that no writing system ever came into existence independent of a particular language (Damerow, 2006, Gnanadesikan, 2009).

Auditory
input

PHONOLOGICAL
SHORT-TERM
STORE

Visual
input

Articulatory
rehearsal
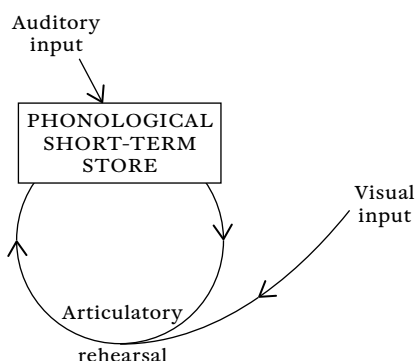
FIGURE 4. PSTM model for oral spelling (Nickels, Howard, and Best, 1997, p. 162)

the learning of writing.[32] Moreover, between oral and written spelling there are reciprocal relations: the written language cannot ignore the spoken language, perhaps because of the practices of reading aloud and of dictation. In this continuously renewed relationship, written and oral spelling can influence each other.

6.   Conclusion

Ignace Gelb, even though he attached great importance to alphabetic script, recognized its autonomy from language and, at the same time, its inadequacy to represent the spoken language:

> Even the alphabet, the most developed form of writing, is full of inconsistencies in the relations between sign and sound. […] However, the general statement that full writing expresses speech should not be taken to mean that it expresses nothing else but speech. (Gelb, 1963, p. 15)

The aim of this paper was to frame and explain the transmission of the very first alphabetic scripts into the more recent results of cognitive and psycholinguistic studies about word production and recognition, phonological, and written spelling in order to highlight the role of teaching and learning process for the transmission of the alphabet and to support the most recent arguments for an independent origin of non-Greek alphabets.
    For the sake of this purpose, the focus has been made on the linguistic counterpart of alphabetic signs.
    For the inherent phonetic nature of the alphabet, there must be some linguistic reason for its evolution. Goody (1968) defined writing as "the

---

32. I am referring to the Carian signs β [m.b/m.p], δ [n.d/n.t], and γ [n.k], which could be the graphemic reduplication of, respectively, signs *b* [b], *d* [d], *k̂* [k] (cf. Adiego Lajara, forthcoming).

technology of the intellect," while the alphabet, for what has been described up to now, could be called "the technology of the language" but always considering that, with the invention of the alphabet, writing did not lost its autonomy and did not place itself purely at the service of the spoken language.

References

Adiego Lajara, I.X. (2013). "Unity and Diversity in the Carian Alphabet." In: *Euploia. La Lycie et la Carie antiques. Dynamiques des territoires, échanges et identités. Actes du colloque de Bordeaux, 5–7 novembre 2009*. Bordeaux: Ausonius, pp. 17–28.
——— (2018). "Local Adaptations of the Alphabet among the Non-Greek Peoples of Anatolia." In: *Studi Micenei ed Egeo-anatolici, Supplemento 1*. Rome: Quasar, pp. 145–162.
——— (forthcoming). "Consonant clusters, defective notation of vowels and syllable structure in Caromemphite."
Baddeley, A.D. (1983). "Working memory." In: *Philosophical Transactions of the Royal Society of London* 302, pp. 311–324.
——— (1986). *Working memory*. Oxford: Oxford University Press.
Beekes, R. and L. van Beek (2010). *Etymological Dictionary of Greek*. Leiden: Brill.
Besner, D. (1987). "Phonology, lexical access in reading, and articulatory suppression: A critical review." In: *Quarterly Journal of Experimental Psychology* 39, pp. 467–478.
Bi, Y. et al. (2007). "The interaction between semantic and the nonsemantic systems in reading: Evidence from Chinese." In: *Neuropsychologia* 45, pp. 2660–2673.
Bonfante, G. and F. Bonfante (2002). *The Etruscan Language: An introduction*. 2nd ed. Manchester: Manchester University Press.
Borgwaldt, S.R. and T. Joyce (2011). *Typology of Writing Systems*. Amsterdam: John Benjamins.
Bourgiannis, G. (2018). "The Transmission of the Alphabet to the Aegean." In: *Change, Continuity and Connectivity. North-Eastern Mediterranean at the turn of the Bronze Age and in the early Iron Age*. Ed. by Ł. Niesiołowki-Spanò and M. Węcowski. Wiesbaden: Harrassowitz Verlag, pp. 235–257.
Brixhe, C. (1987). *Essai sur le grec anatolien au début de notre ère*. Nancy: Presses universitaires de Nancy.
Broodbank, C. (2013). *The Making of the Middle Sea. A history of the Mediterranean from the beginning to the emergence of the classical world*. London: Thames & Hudson.
Caramazza, A. and G. Miceli (1990). "The structure of graphemic representations." In: *Cognition* 37, pp. 243–297.

Cardona, G.R. (1981). *Antropologia della scrittura*. Turin: Loescher.

Carpenter, R. (1933). "The antiquity of the Greek alphabet." In: *American Journal of Archaeology* 37, pp. 8–29.

Cotticelli-Kurras, P., V. Pisaniello, and A. Rizza (2018). "Writing in Focus: mistakes as traces of cognitive behavior and more... in some Anatolian languages of the 2nd millennium BCE." In: *64ᵉ Rencontre Assyriologique Internationale, Innsbruck*. Gladbeck: PeWe-Verlag.

Coulmas, F. (1996). *The Blackwell encyclopedia of writing systems*. Oxford: Blackwell.

———— (2003). *Writing Systems. An Introduction to their Linguistic Analysis*. Cambridge: Cambridge University Press.

———— (2009). "Evaluating merit—the evolution of writing reconsidered." In: *Writing Systems Research* 1, pp. 5–17.

Crump, T. (1990). *The Anthropology of Numbers*. Cambridge: Cambridge University Press.

Damerow, P. (1999). *The Origins of Writing as a Problem of Historical Epistemology*. Berlin: Max-Planck-Institut für Wissenschaftsgeschichte.

———— (2006). "The Origins of Writing as a Problem of Historical Epistemology." In: *Cuneiform Digital Library Journal* 1, pp. 1–10.

Daniels, P. (2006). "On "Beyond alphabets"." In: *Written Language and Literacy* 9.1, pp. 7–24.

———— (2018). *An exploration of writing*. Bristol: Equinox.

Demsky, A. (2015). "The Interface of Oral and Written Traditions in Ancient Israel: The Case of Abecedaries." In: *Origins of the Alphabet: Proceedings of the First Polis Institute Interdisciplinary Conference*. Ed. by C. Rico and C. Attucci. Newcastle upon Tyne, England: Cambridge Scholars Press, pp. 23–31.

Derrida, J. (1976). *Of grammatology*. Delhi: Motilal Banarsidass.

Gaur, A. (1992). *A History of Writing*. New York: Charles Scribner's.

Gelb, I. (1963). *A Study of Writing*. Chicago: The University of Chicago Press.

Gnanadesikan, A.E. (2009). *The writing revolution: Cuneiform to the internet*. Malden, MA: Wiley-Blackwell.

———— (2017). "Towards a typology of phonemic scripts." In: *Writing Systems Research* 9.1, pp. 14–35.

Goody, J. (1968). *Literacy in Traditional Societies*. Cambridge: Cambridge University Press.

Goody, J. and I. Watt (1963). "The Consequences of Literacy." In: *Comparative Studies in Society and History* 5.3, pp. 304–345.

Günter, H. and O. Ludwig (1994). *Schrift und Schriftlichkeit / Writing and its Use. Ein interdisziplinäres Handbuch internationaler Forschung*. Berlin: De Gruyter.

Halliwell, A.I. (1945). "Sociopsychological Aspects of Acculturation." In: *The Science of Man in the World Crisis*. Ed. by R. Linton. New York: Columbia University Press, pp. 171–200.

Halverson, J. (1992). "Goody and the implosion of the literacy thesis."
    In: *Man* 27, pp. 301–317.

Harris, R. (1995). *Signs of Writing*. New York: Routledge.

Havelock, E.A. (1976). *Origins of Western Literacy*. Toronto: Ontario Insti-
    tute for Studies in Education.

—————— (1982). *The literate revolution in Greece and its cultural consequences*.
    Princeton: Princeton University Press.

Houghton, G. and M. Zorzi (2003). "Normal and impaired spelling in
    a Connectionist dual-route architecture." In: *Cognitive Neuropsychology*
    20.2, pp. 115–162.

Jeffery, L.H. (1990). *The Local Scripts of Archaic Greece*. Oxford: Clarendon
    Press.

Kress, G. and T. van Leeuwen (1996). *Reading Images: The Grammar of Visual
    Design*. New York: Routledge.

Lambert, E. and P. Quémart (2019). "Introduction to the special issue
    on the dynamics of written word production: methods, models and
    processing units." In: *Reading and Writing* 32, pp. 1–12.

Law, S.P. (1994). "The structure of orthographic representations of Chi-
    nese characters: From the perspective of the cognitive neuropsycho-
    logical approach." In: *Bulletin of Institute of History and Philology* 65, pp. 81–
    130.

Marazzi, M. (2016). "Le relazioni fra lingua e scrittura nelle civiltà dello
    spazio iscritto [Relations between language and writing in ancient
    literate societies]." In: *Actes sémiotiques* 119, pp. 1–21.

Martinet, A. (1955). *Économie des changements phonétiques. Traité de phonologie
    diachronique*. Bern: Francke.

Meletis, D. (2018). "What is natural in writing? Prolegomena to a Natural
    Grapholinguistics." In: *Written Language and Literacy* 21.1, pp. 52–88.

—————— (2020). *The Nature of Writing. A Theory of Grapholinguistics*. Vol. 3.
    Grapholinguistics and Its Applications. Brest: Fluxus Editions.

Michalowski, P. (1993). "Tokenism." In: *American Anthropologist* 95, pp. 996–
    999.

Monsell, S. (1987). "On the relation between lexical input and output
    pathways for speech." In: *Language perception and production: Common
    processes in listening, speaking, reading and writing*. Ed. by D.A. Allport et
    al. London: Academic Press.

Morin, O. (2016). *How Traditions live and dies*. Oxford: Oxford University
    Press.

Morpurgo-Davies, A. (1986). "Forms of writing in the ancient Mediter-
    ranean world." In: *The Written Word. Literacy in Transition*. Ed. by G. Bau-
    mann. Oxford: Oxford University Press, pp. 55–77.

Nickels, L., D. Howard, and W. Best (1997). "Fractionating the Articula-
    tory Loop: Dissociations and Associations in Phonological Recoding
    in Aphasia." In: *Brain and Language* 56, pp. 161–182.

Nottbusch, G. (2008). *Handschriftliche Sprachproduktion: Sprachstrukturelle und ontogenetische Aspekte*. Tübingen: Niemeyer.

Ong, W. (1982). *Orality and Literacy: The Technology of the word*. New York: Methuen.

Orioles, V. (2008). "Premessa [Introduction]." In: *Lingue in contatto [Languages in Contact]*. Ed. by U. Weinreich. Torino-Novara: Utet, pp. ix–lxxiv.

Paillard, J. (1990). "L'écriture: le cerveau, l'œil et la main, *Actes du colloque international du Centre National de la Recherche Scientifique, Paris, Collège de France 2, 3 et 4 Mai 1988*." In: *Bibliologia* 10, pp. 23–51.

Passy, P. (1890). *Étude sur les changements phonétiques et leurs caractères généraux*. Paris: Firmin-Didot.

Rapp, B. and A. Caramazza (1997). "From graphemes to abstract letter shapes: Levels of representation in written spelling." In: *Journal of Experimental Psychology: Human Perception and Performance* 23.4, pp. 1130–1152.

Rapp, B. and D. Kong (2002). "Revealing the component functions of the graphemic buffer." In: *Brain and Language* 83, pp. 112–114.

Rotman, B. (1995). "Thinking Dia-Grams: Mathematics, Writing, and Virtual Reality." In: *South Atlantic Quarterly* 94.2, pp. 389–415.

Schmandt-Besserat, D. (1992). *Before Writing: From Counting to Cuneiform*. Austin: University of Texas Press.

Sweet, H. (1888). *A history of English sounds from the earliest period*. Oxford: Clarendon Press.

Ullman, B.L. (1934). "How old is the Greek alphabet?" In: *American Journal of Archaeology* 38.3, pp. 359–381.

Vendryes, J. (1939). "Parler par économie." In: *Mélanges de linguistique offerts à Charles Bally*. Genève: Georg & Cie, pp. 49–62.

Waal, W. (2018). "On the "Phoenician letters": The case for an early transmission of the Greek alphabet from an archaeological, epigraphic, and linguistic perspective." In: *Aegean Studies* 1, pp. 83–125.

———— (2020). "Mother or sister? Rethinking the origin of the Greek alphabet and its relation to the other "western" alphabets." In: *Understanding Relations Between Scripts II. Early Alphabets*. Ed. by P.J. Boyes and P.M. Steele. Oxford: Oxbow Books, pp. 109–124.

Weekes, B. et al. (2006). "The cognitive neuropsychology of reading and writing in Chinese." In: *Language and Linguistics* 7.3, pp. 595–617.

Weinreich, U. (1953). *Languages in contact*. New York: Linguistic Circle of New York.

Willi, A. (2008). "Cows, Houses, Hooks: The Graeco-Semitic Letter Names as a Chapter in the History of the Alphabet." In: *The Classical Quarterly* 58.2, pp. 401–423.

Zipf, G.K. (1949). *Human Behavior and the Principle of Least Effort*. Cambridge, MA: Addison-Wesley.

Mutable Imagination:
Typography and Textual Space
in Print and Digital Layouts

Dalma Véry

Abstract. The paper aims to investigate the issue of mediality in terms of typography and textual space. The adopted approach is that of phenomenology, which allows for existential considerations concerning the appearance and perceptual significance of the sign. The idiosyncrasies of digital and print layouts are explored with the help of examples chosen to highlight how the sign as a graphic character can manifest its self-referentiality depending on the medium it is intertwined with. The different directions textual design can take depending on the medium becomes apparent by way of the respective characteristics and possibilities. Divergent modes of experiencing time and emphasis on different facets of self-manifestation mark the graphic layout in virtual and print versions, with the unavoidable phenomenality of the sign invariably becoming apparent and insightful to the viewers.

Sign, Perception, Interpretation

Whenever an issue of typography or textual space is to be considered, the sense and significance of the sign as such is also reckoned with, even if this does not become explicit. Typography makes it apparent that the sign is not merely a reference to something else, it can refer back to itself in the particularities of its manifestation. Jean-Gérard Lapacherie elaborates the equivocal status of the sign as the typographic character.

> Typographic signs […] are signs in the ancient sense of the word "aliquid pro alique" [one thing which stands for another]. They lack autonomy since they represent the letters of the alphabet, thus corresponding to the phonetic uses of the language. […] But these signs are not transparent as is a pane of glass which the eye crosses without noticing […]. In other words, they are not mere referential signs, nor empty ones […]. Characters are indeed drawings, sometimes beautiful unto themselves. (Lapacherie, 1994, p. 64)

Dalma Véry   [iD] 0000-0002-1653-0132
4 Páskomliget u., 1156 Budapest, Hungary
E-mail: dalmavery@gmail.com

Typographic characters can refer back to themselves, i.e., they can become "eminent" (Gadamer, 1993, p. 248) signs in the specificities of their appearance: in the way they are construed as typefaces and in the manner they relate to other graphic shapes within the textual layout. This also means that typographic characters have to be seen before they are read, for they are created as graphic images. "Understanding an image presupposes visual shapes (gestalts) and integrating them to create meaningful signs [...]." (Stöckl, 2009, p. 208) Potentially self-referential graphic relations build the typeface as a collection of shapes associated with the letters of the alphabet, but not restricted to their representation. As graphic images, characters can stand for letters but they can also become self-sufficient phenomena. "Typographic characters are [...] signs which are contiguous to their object. Characters are superposed on letters; they cover them up without making them disappear [...]." (Lapacherie, 1994, p. 65) The typographic character presents itself to perception in its graphic correlations, making referential and self-referential interpretations equally possible.

How do these possibilities of interpretation come about, though? What makes a sign self-referential if it was designed to be referential only? In what does its dual nature lie? To make an attempt at unfurling this issue, the sign has to be considered from a phenomenological perspective, as phenomenology allows one to explore the various existential modalities of the sign itself, functionality being only one of these. As Günter Figal formulates it, "[...] das einzelne Zeichen [läßt] einen Zusammenhang kenntlich werden."[1] The correlations inherent in a sign reveal themselves on more than one horizon. The perceptually constituted relations of the sign as an assortment of graphic characteristics is the very modality by way of which it can create associations. "Understanding an image presupposes seeing visual shapes (gestalts) and integrating them to create meaningful signs." (Stöckl, 2009, p. 208) The sign unfolds itself in its perceptional relations, hence opening up other relations of perception and those of sense in their various existential facets. "Zeichen [...] selbst [bilden] einen Zusammenhang; nur so schließen sie einen Zusammenhang auf."[2] Signs orient one in the everyday facets of existence in this way, thus "geben sie die Möglichkeit, sich auf den Zusammenhang, in dem man sich vorher bewegte, zu beziehen."[3] Inasmuch as graphic signs refer to something, they also manifest themselves,

---

1. "[...] [t]he single sign allow[s] for a correlation to reveal itself." (Figal, 2018, p. 246) [When not indicated otherwise, translations of quotations from German-language texts are mine.—D. V.]

2. "[S]igns [...] *constitute* correlations in themselves, only thus can they *reveal* correlations." (ibid., p. 246) [Italics mine—D. V.]

3. "provid[ing] the possibility to *relate* to the context in which one was oriented earlier." (ibid., p. 247) [Italics in the original.]

thus also becoming capable of revealing their own existence. All appearances available to perception can become signs of something and signs of themselves, i.e., phenomena. "Alles, was in der Lebenswelt begegnet, läßt sich selbst als Zeichen nehmen."[4] Whether the sign manifests itself in its referential or self-referential modality bears significance with respect to its existential character.

In *Being and Time,* Martin Heidegger makes the following distinction pertaining to the existential modalities of the "appearance":

> [T]he expression 'appearance' itself can have a double signification: first, *appearing,* in the sense of announcing itself, as not-showing-itself; and next, that which does the announcing [das Meldende selbst]—that which in its showing-itself indicates something which does not show itself. And finally one can use 'appearing' as a term for the genuine sense of 'phenomenon' as showing-itself. (Heidegger, 2001, p. 53) [Italics in the original—D. V.]

The first two modalities elaborated upon by Heidegger are further exemplified by the symptom and the index respectively. While the symptom *stands for* something other than itself, the index *refers to* something other than itself. This distinction is fundamental when the ontological status of the sign is considered. Symptomatic appearances *standing for* something other than themselves involve a metonymic relation to their referents. One may also say that the sign is part of, or is directly related to the referent itself. Indices are metaphorical in their relation to their referents, not being directly related to them, but associated with them mostly by way of conceptual relations. The sign, as a self-referential graphic character, is neither merely metonymic in its visual appearance, nor only metaphorical in the conceptual relation to its referent—the letter. Its existential modality may also be that of the phenomenon, casting the idea of mere association with something else and thus becoming self-referential in its perceptual relations as an assortment of graphic characteristics. The sign as a phenomenon is symbolic. It refers back to itself *as* it partakes of the appearance of its referent and/or as it is associated with its referent conceptually, but it is not restricted to these functions. Differently put, the sign is symbolic in the way it presents its referent, and the manner of its presentation becomes self-presentation hence. According to Gadamer, "[d]as Symbolische verweist nicht nur auf Bedeutung, sondern läßt sie gegenwärtig sein: es repräsentiert Bedeutung. […] Das Repräsentierte ist […] selber da und so, wie es überhaupt da sein kann."[5] A national flag is a symbol inasmuch as it partakes of the concept of the nation in the way it displays its visual characteristics.

---

4. "Everything we meet in everyday life can become a sign." (ibid., p. 247).

5. "[t]he symbolic does not merely refer to meaning, but grants it presence; it represents meaning. […] The represented is […] present in itself, and in a way in which it can be present as such." (Gadamer, 1993, p. 46)

Ein Symbol also verweist nicht nur, sondern es stellt dar, indem es vertritt. Vertreten aber heißt, etwas gegenwärtig sein lassen, was nicht anwesend ist. So vertritt das Symbol, indem es repräsentiert, das heißt, etwas unmittelbar gegenwärtig sein läßt. [...]. Symbole wie das religiöse Symbol, die Fahne, die Uniform, sind so sehr stellvertretend für das Verehrte, daß es in ihnen da ist.[6]

(Gadamer, 1993, S. 159)

The typeface is symbolic of a letter of the alphabet. It directs attention to its own characteristics as a sign insofar as it grants presence to the letter. Such self-manifestation of the sign as a symbol is not independent of its mediality.

According to Wilhelm Dilthey, it is not conceptual abstraction the aesthetic experience necessitates, but the medium itself, which is the primary experience of all aesthetic reception (Kulcsár-Szabó, 2004, p. 19). Correspondingly, the futurists and the Dadaists sought to reinforce "the physiological perception of typography" (Hausmann and Cullars, 1998, p. 72). In their works they sought to foreground the phenomenality of the graphic character in this way.

The futurists and especially the Dadaists recognized that reading [...] could only be effected visually. It was in certain typographical pages produced around 1919 that this physio-optical principle was realized for the first time in a coherent fashion. One reason for the invention of the phonetic poem was supported by an optical typography of a new kind. (ibid., p. 72)

Works of such art presented defamiliarizing relations not in terms of sense relations only, but also in the manner graphic characters presented themselves on the page. Type was not to be ignored anymore as the mere transmitter of sense, but was to be reinterpreted as an entity of visually conceived relations which make sense in themselves as an image.

By refusing congeniality, Tzara 'desyndicalize[s]' typography. He takes away its conventional significations. What is important is not the codified meaning of typography, or even the text to be printed, but the type in itself, as a form, its design, thickness, height, pure graphic signifiers [...].

(Lapacherie, 1994, p. 71)

The possibilities of visual manifestation inherent in a typeface or a single graphic character is invariably determined by the modality of the "medium" it is entwined with. Type in print involves different possibilities of manifestation than type in digital layouts due to the characteristics of the respective media. It is common to both modes of visual

---

6. "The symbol hence does not only refer to, but also presents something else, inasmuch as it stands for it. Standing for something, in turn, means granting presence to something that is absent. In this way does the symbol stand for something, when it represents it, that is, it grants immediate presence to this thing. [...] Symbols, such as the religious symbol, the flag, the uniform stand for the object of reverence so much so that it is present in them."

design, however, that the graphic character is arranged, situated and associated with other characters within a shared, jointly shaped textual space. "The physical fact of the text, with its spatial appearance on the page, requires visual apprehension: a text can be seen, must be seen, in a process which is essentially different from the perception of speech" (Bernhardt, 1986, p. 66). The space of writing which we orient ourselves in throughout the process of reading is the visual surface of textual space itself. Dieter Breuer elaborates the spatial or visual facet of the literary text as encompassing all the following relations:

> Schriftart, Schriftgrad, Buchstabenabstand, Mittel der Wortabtrennung, Zeichensetzung in engerem Sinne, Zeilenabstand, Zeilenanordnung (Zeilenblock, Strophenschemata), Seitenspiegel, farbliche Mittel, Randleisten, Vignetten, Papierart, Papierfaltung, Einbandart u. ä. Visuelles Wirkmittel im engeren Sinne ist das sogennante 'Bild' […].[7] (Breuer, 1990, S. 124)

The image of graphic space created by characters in a layout is the space of the text itself. Although a work of literature may appear in various editions with different typography, typesetting, page size and binding, it invariably creates a textual space of letters, lines and punctuation marks (or the lack of the latter), the visual paths of which the reader explores so as to uncover the diverse strains of speech, to trace the links of contextual correlations, and to discover the various potential threads of sense. The space of the text can thus be marked by its conspicuous, written locations of sense as it is shaped by textual relations and terrains in which the interpretive process orients the reader visually. It is not by chance that one cannot point out a particular location of the text easily if one is not familiar with its layout, i.e., with the typesetting of the text presented in a specific edition. A different layout exposes the textual space of the work itself differently from that we are familiar with, so that we have to adapt our perception to this difference of textual space in order to find the specific location we are searching for. Our knowledge of textual space develops throughout the process of (re)reading and yields a map of textual paths and locations which (re)orient us visually within the fabric of sign and sense. Günter Figal elaborates on this aspect of the literary work of art in the following way:

> Daß Bücher Orte sind, wird nicht zuletzt deutlich, wenn man, eine Stelle in einem literarischen Werk meinend, auf das Buch weist: Hier steht es. […] Mit der Ausgabe, auf die man sich bezieht […] hat [man] sich für sie und ihre Einrichtung des Werkes entschieden, weil sie das Werk auf eine bestimmte Weise sich zeigen läßt. […]

---

7. "Font type, font size, letter spacing, segmentation, punctuation in a narrow sense, spacing of lines, arrangement of lines (block of lines, strophe schemes), page size, colouring devices, margins, book covers, paper type, manner of folding, binding, etc. Visual devices in the narrow sense comprise the so-called 'image' […]."

> Die phänomenalen Räume, die Kunstwerke sich zeigen lassen, sind im allgemeinen mehrfach bestimmt: als optische, akustische und hermeneutische Räume […]. […] [L]etztlich hat jedes Kunstwerk seinen eigenen Raum […]. Das dieser Raum zum Kunstwerk selbst gehört, läßt vermuten, daß ein Kunstwerk nicht nur einen Raum einräumt, sondern selbst in sich räumlich ist.[8]
>
> (Figal, 2010, S. 249–250)

As the work of art manifests itself in its genuine self-referentiality, the graphic character is also awarded the possibility to assert its phenomenal nature. However, the phenomenality of the graphic character is not restricted to art. Digitally conceived and functional layouts may also reveal that the typographic character, as an assortment of graphic relations, bears significance in its own appearance. Printed and digital surfaces manifest the self-referentiality of the sign in different modalities and manners, which underscores the versatility of their perceptional options in making sense. Digital layouts offer the possibility for characters to become variable within the same design, besides allowing for motion and interactivity within a virtual space of three dimensions. Without these options, digital design can only be the mere reproduction of print layouts on a screen. In print, characters are fixed within the design, their space is non-virtual and not interactive in a perceptional manner. The layout in print invests the page with an order of conceptual irregularities inherent in framed, fixed groups of signs. The reader is hence called upon by the design to unfurl its variability and its possible correlations without facilitating a virtually interactive relation or the changing appearance of graphic characters. In other words, readers must adapt themselves to a static design in an unchangeable frame, so that they may surpass their preconceived ideas and familiar conceptions, gaining hitherto unexperienced insight thereby. The printed page rules, and by ruling shapes the perception and the thinking of the reader, who must make an effort at finding sense in a layout that questions them, but provides no conclusive answer. Digital layouts display their genuine characteristics inasmuch as they allow the readers themselves to shape the design, to change it and interact with it, gaining insight by way of their own modifications of type in a virtually conceived textual space. In terms of digital layouts, then, readers are urged to put questions, but the answers also have to be provided by them in the course of their di-

---

8. "Not least does it become clear that books are locations when one, referring to a textual location in a literary work, points at the book: Here it is. […] With the edition one opts for […], [one] has already decided in favour of it and its layout of the work, since it allows for the self-manifestation of the work in a specific manner […].

The phenomenal spaces exposed by works of art are generally determined in multiple ways: they are both visual, acoustic, and hermeneutic spaces […]. […] [A]fter all, every work of art has its own space. […] That this space belongs to the work of art itself instigates the supposition that a work of art does not only organize space, but is in itself spatial."

alogue with virtual type. Thus, while print design requires a mutable imagination for making sense of it, digital layouts necessitate a mutable imagination for virtual perception. In the coming two sections, the paper aims to explore the diverse facets and manners the different kinds of layouts may manifest themselves in in terms of typography and textual space, and the significance this may bear on the principles of perception.

Transition, Motion, Interaction

The idiosyncratic facets of digital typography and textual space unfold themselves in terms of virtual graphetics. Virtual graphetics can be considered visual graphetics determined by the digital medium it is entwined with. "Visual graphetics investigates the graphic design features of written signs, including the geometric shapes of which they are composed […]" (Coulmas, 2006, p. 177). Virtual graphetics encompasses the digitally available design options inherent in the possibilities unfurled by visual graphetics. It involves size, scaling and orientation options of type unavailable in print design, as the latter is restricted to the static representation of the three dimensions. Accordingly, virtual typography not only allows for, but also requires more flexible and dynamically adjustable typefaces, as these must adapt themselves to the volatility of the screen environment. Screen-based communication "encompasses computer screens and television screens, but also less obvious devices such as mobile telephones, personal digital assistants (PDAs) and car navigation systems" (Hillner, 2009, p. 36). Facilitating many different purposes and available in various sizes, the digital screen necessitates the virtual (re)presentation of movement, which is also one of the signalling features of virtual typography and the corresponding textual space. The virtual (re)presentation of movement allows for the creative realization of motion typography and transitional typography. While motion typography constitutes moving type, transitional typography presents gradually changing characters.[9] As we shall see, in most cases, transitional typography also involves movement, thus these two aspects will be considered jointly.

   The television title sequence *Profile*, created by the Why Not Associates design group[10] exemplifies how motion and transitional typography can be fused on the screen. "The animation, produced for BBC4 in 2002, uses the rotary motion of typographic fragments to achieve its visually intriguing effect" (ibid., p. 107). Various typographic fragments rotate while moving on the screen and via this rotational motion

---

9. This distinction is drawn by Matthias Hillner (2009, p. 36).
10. This example is described and illustrated by Matthias Hillner (ibid., pp. 106–107).

assemble themselves into legible characters constituting the title "Pro-file" itself. Thus, while rotating, the fragments gradually become type. The pieces move, and while moving, transition into something they simultaneously are and are not. In this case, it is not an artistic installation which makes typography conspicuous by nature of its inherent self-referentiality, but a commercial design which calls attention to the mediality of type by way of motion and transition. Differently put, the typographic elements become capable of referring back to themselves solely on account of the digitally construed characteristics of their virtual design. Graphic characters can also undergo changes in their appearance however, if their location is fixed on the screen. Even without movement within its own textual space, transitional type allows for change in the way it manifests itself. All the more so, as transition may be the very aesthetic principle which allows for a typeface to become self-referential. Tomi Vollauschek and the FL@33 design agency created an animated typeface called *Unfolded* in 1999, which constitutes virtually animated transition from geometrical shapes into graphic characters and the other way round. "The type evolves from diamond-shaped graphic elements which virtually unfold into squares, then into lines, and finally into letter shapes. The end result is a simple pixel font" (Hillner, 2009, p. 41). This pixel font recedes back into the geometrical shapes it unfurled from as soon as it manifests itself in its entirety.[11] The self-referentiality of *Unfolded* is also rooted in a virtual design principle of the digital medium itself indeed. The typeface constitutes the transition from non-typographical shapes into graphic characters, revealing and revelling in the versatility and mutability of its appearance.

Besides transition and motion, digital type also allows for virtual interaction with the viewers, thus enabling them to shape textual space on the screen in an idiosyncratic, continuously changing manner.

> 'The whole' remains unchanged when people look at static typography because the relationship between the typographic elements remains static. With virtual typography, 'the whole' changes constantly. The need for the continuous reinterpretation of the changing information requires the viewer to constantly adjust the mode of perception. (ibid., pp. 64–65)

As viewers are called upon to adjust their mode of perception to the changing relations of textual space and the varying appearance of typefaces, the peculiar mediality of typography in screen design also becomes noticeable. John Maeda and his Aesthetics & Computation Group were among the first to seek the possibilities of virtual typography in the light of programming, which also allowed for exploring potential

---

11. To view the animation, visit the homepage of FL@33 at `https://www.flat33.com/` and navigate to AAT—Animated, Acoustic Typefaces within the Typography category.

interaction with the screen. Maeda's work entitled *Flying Letters* (1996) offers the viewer the chance to create diverse, but always temporary typographic arrangements in nine possible layouts on the computer screen by way of moving the cursor (Maeda, 1996). In this manner, the virtually conceived textual space of graphic characters is in continuous evolution, shaped by the viewers themselves and thus explored. Type becomes a mutable phenomenon, revealing its versatile mediality on the digital screen, and manifesting its capability to bend the relations of its ever-transforming space. Viewers shape the spaces of the text by moving the cursor, but they also become entangled in the spaces they create thereby. This dynamic interaction yields the self-referentiality of virtual type in Maeda's work. The graphic characters assume volatile appearance and exhibit changeable spatial relations simultaneously, enabling the screen environment to demonstrate the perceptional uniqueness of type that surfaces in a textual space of an essentially undefinable order. Hence does Maeda's work offer the aesthetic experience of graphic characters on the screen.

Flying Letters Copyright © 1996 John Maeda, DIGITALOUGUE Co., Ltd
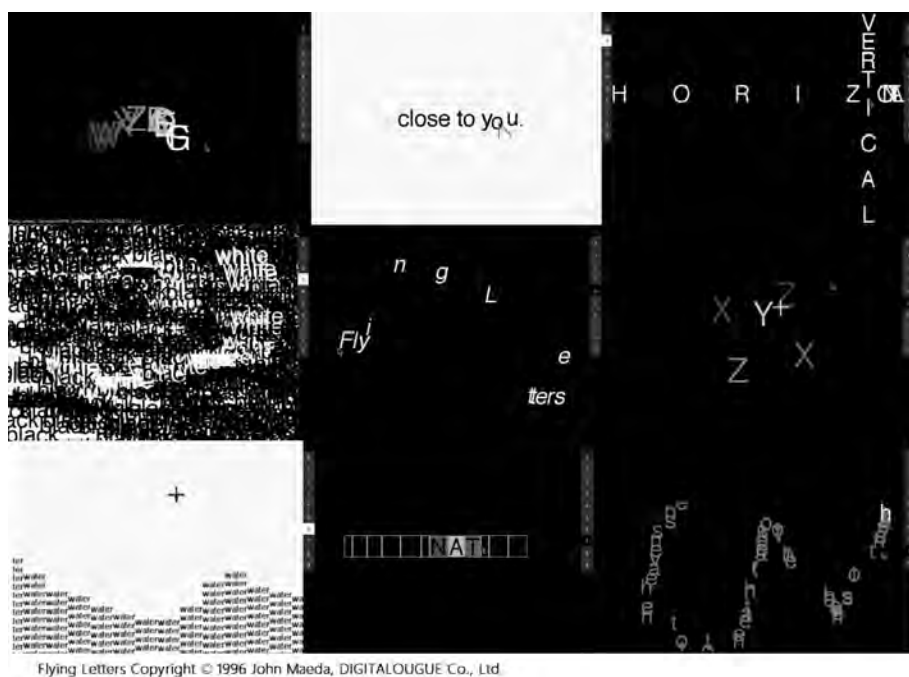
FIGURE 1. Nine screenshots from Flying Letters by John Maeda (A video demonstration of interacting with *Flying Letters* was retrieved from `https://vimeo.com/37550568` on 29 July 2020).

The interactive exploration of the three dimensions in terms of the virtual space of the text is yet another mode of experience only the digital surface of the screen can offer the viewers. David Small's 1999 *Talmud Project* exposes these spatial dimensions of texts' virtual terrains by a software which allows the viewer to spatially relate passages from the Torah and the Talmud in English and French translations.[12] "The blocks of text can be arranged interactively to shape walls through which the reader can navigate. Different text connections can be made according to the reader's preference" (Hillner, 2009, p. 44). The introduction of sacral texts to the digital screen reveals the potential for incorporating further sense relations into their interpretation by construing additional perceptional orders with the help of the three virtual dimensions. In such a digital environment, readers can establish virtual terrains of the text which may bear potential meaning and significance only to them. In this manner, it is not only the sacredness of the holy text which calls attention to itself, but also the spatial dimensions in which its passages can be arranged to reveal meaningful relations hitherto unthought of. Textual space refers back to itself by way of its virtual extension to three dimensions within the framework of a digital design.

Virtual type demonstrates the perceptional versatility inherent in typographic layouts designed for the screen. Transitional and motion type, interactivity and the changeable dimensions of textual space offer design options with inherent mutability and variability. The graphic character, thus, manifest itself as a phenomenon on account of the unique medial characteristics it exposes. Screen design demonstrates that the medium is inseparable from the sign and that the typeface does not merely stand for something else, but can also stand for itself, necessitating the viewers' mutable imagination to live up to the volatility of its perceptional relations.

Structure, Gesture, Dialogue

The layout of the printed page does not offer the virtual variability of type and textual space in the manner digital surfaces do, and interacts with the reader differently than virtual design does. Type in print is static from a perceptional point of view, but this also allows for the creation of visual structures and textures which can be explored by the reader *over time*. The time the interpretation of the perceptional and sense relations involved in a piece of print design takes is not determined by the time of motion, but by the sensibility of readers. As such, type in

---

12. The City. Tian' Thesis Project. Spring 2013. Parsons MFA Design and Technology. Retrieved from `https://tianxiethesis.wordpress.com/2013/03/06/reference-talmud-project/` on 29 July 2020.

print can never be confined to the (re)presentation of motion as is often the case with transitional and motion typography. Print design is a static perceptual structure manifesting its order in a fixed frame. Accordingly, it can refer back to itself by virtue of its statically conspicuous typographical arrangements and the diverse inherent relations of sense. Differently put, it is in the perceptual relations between graphic characters and the potential interpretations embedded into these relations that the self-referential character of typography manifests itself in print. Entwined with the print medium, type can reveal what else it might be besides a referential sign over the time of interpreting its fixed perceptional relations on the page. The digital screen can and must overstep the confines of the printed page in order to reveal the essential character of virtual typography, and its imaginative complexity reveals facets different from the ones characteristic of fixed, print design layouts. While print design does not aspire to become virtual, digital layouts are not merely virtual recreations of printed pages. As pointed out before, in art, the particular manner in which typography draws attention to its visual idiosyncrasies can become apparent, for the sign is not restricted to its referential status. Literature as poetry allows for the self-manifestation of typographic specificities both in verse and in prose. Visual poetry can create shapes of words in verse, but it is not confined to picture poems. The textual space of the printed novel may also involve visual cues and arrays which divert attention to the layout, to type and to thus, to the page itself. The visual ordering of text in a layout of prose thus may also allow for print to become a phenomenon.

In Laurence Sterne's novel entitled *Tristram Shandy* (1760–1767)*,* the placement of typographic characters within a spread and the orders of textual space allow for the sign to call attention to itself as a written symbol. By way of the self-referential state of specific signs, the space of the text can engage the reader in a different manner from a layout that is designed merely for the sake of making a text accessible. Sterne "saw that [the] printed page implied a visual rhetoric" (Holtz, 1970, p. 81). The printed page addresses the reader with its visually self-referential cues of typography, its spatial arrangements of text and its non-textual elements. In Sterne's work, one "is confronted with pages that are black, or mottled, or blank, and is constantly jerked to attention by a pointing finger […]" (Iser, 2008, p. 63). Apart from these visual phenomena and self-referential cues, typographic markers such as varying numbers of asterisks, dashes of diverse length, brackets of diverse types and sizes, changes in typeface, and non-textual elements such as "wriggly lines" (Holtz, 1970, p. 84) of different kinds appear on the spreads of the book. According to William V. Holtz, "in the word *gesture* we seem to come closest to understanding the visual and kinaestehtic effect of Sterne's dash and some of his other devices" (ibid., p. 84) [Italics in the original— D. V.]. In fact, all visual constructions in *Tristram Shandy* serve as gestures

to call attention to unconventional horizons of sense, and, simultaneously, refer back to themselves as the visual manifestations which give rise to these horizons. Sterne weaves symbols into the text while creating the text itself as a symbol, and thus allows for the page and for type to be foregrounded in its printed characteristics.

The design of print layouts is oriented on the spread when books are concerned, and the significance of the spread manifests itself in terms of typography and textual space. The sections entitled "Slawkenbergius's Tale" and "Excommunicatio" manifest peculiar layouts in the sense that they are printed in Latin and English versions on facing pages. In this way, the pages seem to mirror each other in terms of the narrative, but in a typographical sense, they constitute divergent sets of graphic characters and paragraphs of different lengths. In addition, "Slawkenbergius's Tale"—the curious story of a gentleman with an enormous nose—renders the Latin version of the text in *italics*, while the corresponding English "translation" is presented to the reader in Roman type. Such an unconventional textual order calls attention to the significance of typographical self-manifestations in the course of interpreting the narrative. The reader oscillates between the facing pages, tracing relations and potential differences of sense between the two versions on the basis of typographical cues and arrangements of the layout. The Latin version of the religious excommunication in the eleventh chapter of Book 2 is not rendered in italics, but manifests conspicuous leading, as recurring characters and syllables are interpolated between the lines, above specific words. In addition, the passages in English attributed to the characters themselves are not rendered on the facing pages in Latin. Omitting unholy remarks and prosaic digressions, the reader must face blanks in the Latin version text of the excommunication, which is an undeniable source of Shandean humour.

In both of the mentioned sections, therefore, the reader has to make sense of the idiosyncrasies of type and textual space to be able to interpret the narrative. Spreads frame the spatial orders of the facing pages, confining the oscillatory movement of perception and interpretation to a visually fixed field of print. It is no wonder thus, that the Gutenberg Project version—rendering the text in HTML format—provides lengthy explanations for changes in layout as compared to the print version. In this HTML layout, character speech in English is not "mirrored" by blanks in the Latin version of the excommunication, neither is it preserved within the boundaries of the page. The narration and utterances of characters are extended typographically over the entire length of the screen, overreaching the "parallel columns"[13] which replace the facing

---

13. The Project Gutenberg EBook of *The Life and Opinions of Tristram Shandy, Gentleman,* by Laurence Sterne. Retrieved from `https://www.gutenberg.org/files/39270/39270-h/39270-h.htm` on 12 August 2020.

118 THE LIFE AND OPINIONS OF

Textus de Ecclesiâ Roffensi, per Ernulfum Episcopum.

Cap. 11

Excommunicatio

Ex auctoritate Dei omnipotentis, Patris, et Filii, et Spiritus Sancti, et sanctorum canonum, sanctaeque et intemeratae Virginis Dei genetricis Mariae, –

– Atque omnium coelestium virtutum, angelorum, archangelorum, thronorum, dominationum, potestatuum, cherubin ac seraphin, & sanctorum patriarchum, prophetarum, & omnium apostolorum & evangelistarum, & sanctorum innocentum, qui in conspectu Agni soli digni inventi sunt canticum cantare novum, et sanctorum martyrum et sanctorum confessorum, et sanctarum virginum, atque omnium simul sanctorum et electorum Dei, –

             vel os   s   vel os
Excommunicamus, et anathematizamus hunc furem, vel hunc male-
    s
factorem, N. N. et a liminibus sanctae Dei ecclesiae sequestramus, et
          vel i   n
aeternis suppliciis excruciandus, mancipetur, cum Dathan et Abiram, et
cum his qui dixerunt Domino Deo, Recede à nobis, scientiam viarum
                      vel eorum
tuarum nolumus: et sicut aquâ ignis extinguitur, sic extinguatur lucerna
       n   n
ejus in secula seculorum nisi resipuerit, et ad satisfactionem venerit.
Amen.
        os
Maledicat illum Deus Pater qui hominem creavit. Maledicat illum Dei
                      os
Filius qui pro homine passus est. Maledicat illum Spiritus Sanctus
            os
qui in baptismo effusus est. Maledicat illum sancta crux, quam
Christus pro nostrâ salute hostem triumphans ascendit.

TRISTRAM SHANDY 119

Chapter 11

'By THE AUTHORITY of God Almighty, the Father, Son, and Holy Ghost, and of the holy canons, and of the undefiled Virgin Mary, mother and patroness of our Saviour.' I think there is no necessity, quoth Dr Slop, dropping the paper down to his knee, and addressing himself to my father – as you have read it over, Sir, so lately, to read it aloud – and as Captain Shandy seems to have no great inclination to hear it – I may as well read it to myself. That's contrary to treaty, replied my father: – besides, there is something so whimsical, especially in the latter part of it, I should grieve to lose the pleasure of a second reading. Dr Slop did not altogether like it, – but my uncle Toby offering at that instant to give over whistling, and read it himself to them; – Dr Slop thought he might as well read it under the cover of my uncle Toby's whistling – as suffer my uncle Toby to read it alone; – so raising up the paper to his face, and holding it quite parallel to it, in order to hide his chagrin – he read it aloud as follows – my uncle Toby whistling *Lillabullero*, though not quite so loud as before.

'By the authority of God Almighty, the Father, Son, and Holy Ghost, and of the undefiled Virgin Mary, mother and patroness of our Saviour, and of all the celestial virtues, angels, archangels, thrones, dominions, powers, cherubins and seraphins, and of all the holy patriarchs, prophets, and of all the apostles and evangelists, and of the holy innocents, who in the sight of the Holy Lamb, are found worthy to sing the new song of the holy martyrs and holy confessors, and of the holy virgins, and of all the saints, together with the holy and elect of God – May he' (Obadiah) 'be damned' (for tying these knots) – 'We excommunicate, and anathematise him, and from the thresholds of the holy church of God Almighty we sequester him, that he may be tormented, disposed, and delivered over with Dathan and Abiram, and with those who say unto the Lord God, Depart from us, we desire none of thy ways. And as fire is quenched with water, so let the light of him be put out for evermore, unless it shall repent him' (Obadiah, of the knots which he has tied) 'and make satisfaction' (for them) 'Amen.'

'May the Father who created man, curse him. – May the Son who suffered for us, curse him. – May the Holy Ghost, who was given to us in baptism, curse him (Obadiah) – May the holy cross which Christ, for our salvation triumphing over his enemies, ascended, curse him.

FIGURE 2. The first spread of the "Excommunicatio" (Sterne, 1996, pp. 118–119)

pages. Blanks in the Latin text standing for the untranslated passages within the print layout and the framing role of spreads disappear, while the irregular leading and the columns replacing the facing pages create new, narratively unaccountable blanks in the English HTML version layout. The disruption of the printed order illuminates the significance of the spread: it orients the reader within the textual space of the print layout, framing two pages, but also allowing for irregularities in typesetting and typography to manifest themselves in their self-referentiality by localizing them for the eye within a raster grid spanning an area of equal proportions. This also makes it apparent once again that print type and textual space cannot and do not seek to manifest themselves in a manner of perceptional mutability, like virtual design does. The print layout calls upon readers to create and recreate complex associative relations within the statically perceptual order of print. In this ever-developing process of interpretation, the typeface is not only a sign but also a phenomenon, a perceptional location of self-reference yielding invisible associations that extend and transform imaginative horizons in many possible directions.

The same principle of visual orientation winds through Sterne's work, sometimes on a smaller scale, but with all the more frequent manifestations. Besides the asterisks, dashes and brackets referred to before, Gothic type also surfaces in the text of *Tristram Shandy.* This typeface calls attention to itself and its graphic characteristics as it appears five times within a spread of a marriage contract, and hence recalls the ancient word of the law in mockingly associative terms. Small capitals of more than two lines also segment several pages within the book, often highlighting some seemingly insignificant thought, banality, or emphasizing a particular, potentially recurring verbal formulation. In this way, small capitals not only give relevance to the inconsequential and the erratic, as food for thought, but also manifest the importance of typographic phenomena in the order of the textual structure.

The visual idiosyncrasies of textual space reach beyond the possibilities of typography in *Tristram Shandy,* however, when "the impulse toward gesture surges beyond the bounds of punctuation" (Holtz, 1970, p. 85). The aforementioned "wriggly lines" illustrate the manners of conscious digression in Tristram's narrative. Elsewhere, corporal Trim's flourish made with his stick is meant to demonstrate the freedom of bachelorhood.

The pointing finger is yet another non-textual element besides the "wriggly lines" (and the linear line on the facing page below) that directs attention to the spatiality of the graphic structure merely by way of its appearance. Non-textual elements establish perceptually orienting and implicitly associative relations with the text, thus foregrounding the framing page in itself. That is, these elements offer the insight that reading occurs in terms of the visual as such and its various markers like the framing page and the spread. Non-textual elements also refer back to the sense and significance of their own visual appearance and the relations they create with and within the page, shedding light to the way in which a typo*graphic* layout can incorporate "merely" *graphic* shapes into its design. The interaction of the textual and the non-textual in *Tristram Shandy* reveals how the statically complex perceptional relations of a fixed print design create multiple, mutable relations and horizons of sense. Thus, already in the second half of the 18th century, Laurence Sterne recognized the possibilities inherent in the print medium. Type and textual space in Sterne's terms are not mere tools to present narrative and its relations of sense, but bear significance in the way they are arranged, ordered and appear on the page. In this way do they become self-referential symbols of hitherto unimagined possibilities of insight.

"Whether printed or running across the screen, writing itself possesses a visual dimension, which the German term *Schriftbild* aptly captures" (Stöckl, 2009, p. 208). Stöckls formulation highlights that the written character has a visual facet, which allows for the sign to become a phenomenon in some typesetting designs and is merely referential in
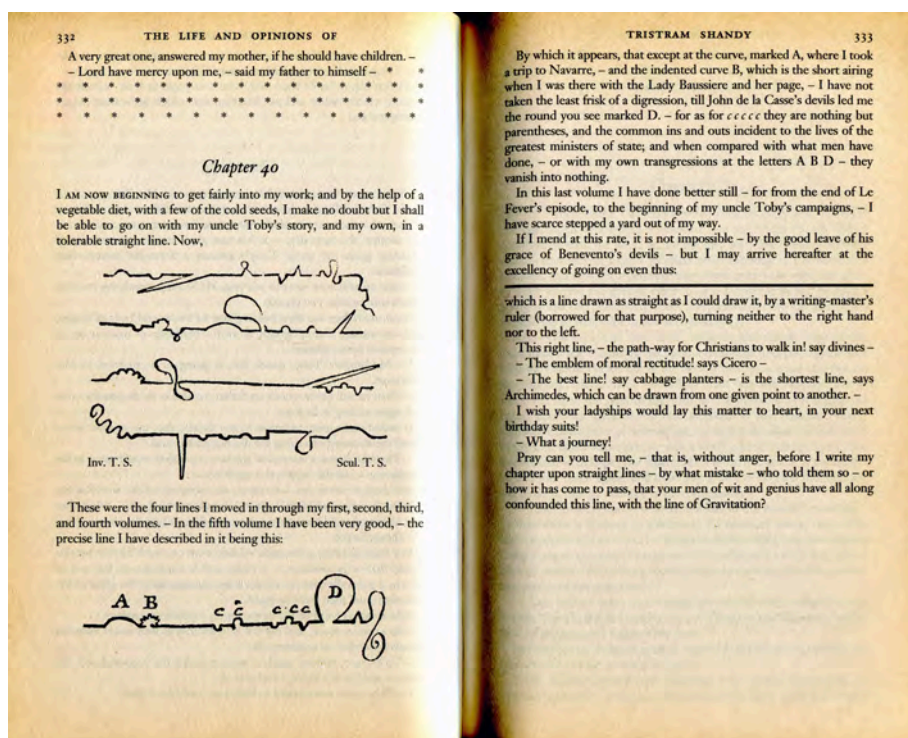
FIGURE 3. The paths of narrative in Tristram Shandy (Sterne, 1996, pp. 332–333)

others. Even if the employed typefaces and the textual space of a particular layout are restricted to the mere referentiality of the sign, the potential is always inherent in them to become self-referential and thus to manifest their phenomenal character. The digital screen and print layouts present different directions in foregrounding the visual facet of typography and textual space. The digital screen relies on virtually construable transition and movement to reveal how the appearance of the graphic character is intertwined with its medium, while print design can only resort to a fixed perceptional order, which does not expose time in the way it appears, but in the way it unfurls the potentially inherent relations of sense and horizons of interpretation. Thus, the fixed perceptional order of print design is unique in the way it calls upon the reader to make perceptional associations and associations of sense within the static layout of shapes and graphic characters. Whichever mode of mediality the viewers or readers encounter, it is invariably the sign which orients them in its characteristic mode of appearance and by its interaction with the surface of the particular layout. "Signs mark the texture

in diverse respects, in varied thickness and make thus clear the interrelatedness of motifs and connections. […] The thickness of the texture is structured by the sign; the texture is *articulated,* so that one can traverse it in a particular manner" (Figal, 2010, p. 248) [italics in the original—D.V.].

References

Bernhardt, Stephen A. (1986). "Seeing the Text." In: *College Composition and Communication* 37.1, pp. 66–78.

Breuer, Dieter (1990). "Vorüberlegungen zu einer pragmatischen Textanalyse." In: *Rhetorik. Erster Band: Rhetorik als Texttheorie*. Ed. by Josef Kopperschmidt. Darmstadt: Wissens. Buchgesellschaft, pp. 91–128.

Coulmas, Florian (2006). *The Blackwell Encyclopedia of Writing Systems*. Malden, MA and Oxford, UK: Blackwell.

Figal, Günter (2010). *Erscheinungsdinge: Ästhetik als Phänomenologie*. Tübingen: Mohr Siebeck.

————— (2018). *Gegenständlichkeit: Das Hermeneutische und die Philosophie*. Tübingen: Mohr Siebeck.

Gadamer, Hans-Georg (1977). *Die Aktualität des Schönen: Kunst als Spiel, Symbol und Fest*. Stuttgart: Philipp Reclam.

————— (1990). *Gesammelte Werke 1: Hermeneutik I. Wahrheit und Methode: Grundzüge einer Philosophischen Hermeneutik*. Tübingen: Mohr Siebeck.

————— (1993). "Philosophie und Literatur." In: *Ästhetik und Poetik I: Kunst als Aussage*. Vol. 8. Gesammelte Werke. Tübingen: Mohr Siebeck, pp. 240–257.

Hausmann, Raoul and John Cullars (1998). "Typography." In: *Design Issues* 14.3, pp. 71–73.

Heidegger, Martin (2001). *Being and Time*. Trans. by John Macquarrie and Edward Robinson. Oxford, UK and Cambridge, USA: Blackwell.

Hillner, Matthias (2009). *Basics Typography 01: Visual Typography*. Lausanne, Switzerland: AVA Publishing SA.

Holtz, William V. (1970). *Image and Immortality: A Study of Tristram Shandy*. Providence: Brown University Press.

Iser, Wolfgang (2008). *Laurence Sterne: Tristram Shandy*. Trans. by David Henry Wilson. Cambridge, UK: Cambridge University Press.

Kulcsár-Szabó, Ernő (2004). *"Az'immatertális' beíródás: az esztétikai tapsztalat medialitásának kérdéséhez." Az esztétikai tapasztalat medialitása. ["The 'Immateriality' of Inscription: On the Issue of the Mediality of Aesthetic Experience." The Mediality of Aesthetic Experience.]* Ed. by Zoltán Kulcsár-Szabó and Péter Szirák. Budapest: Ráció.

Lapacherie, Jean-Gérard (1994). "Typographic Characters: Tension between Text and Drawing." In: *Boundaries: Writing and Drawing*. Trans. by Anna Lehmann. Vol. 84. Yale French Studies. Yale, NH: Yale University Press, pp. 63–77.

Maeda, John (1996). *Flying Letters*. Tokyo: Naomi Enama, Digitalogue Co., Ltd.

Sterne, Laurence (1996). *The Life and Opinions of Tristram Shandy, Gentleman*. Ware: Wordsworth Editions Limited.

———— (n.d.). "The Life and Opinions of Tristram Shandy, Gentleman. The Project Gutenberg EBook." URL: https://www.gutenberg.org/files/39270/39270-h/39270-h.htm (visited on 12 August 2020).

Stöckl, Hartmut (2009). "The Language-Image-Text: Theoretical and Analytical Inroads into Semiotic Complexity." In: *AAA: Arbeiten aus Anglistik und Amerikanistik* 34.2, pp. 203–226.

"The City. Tian' Thesis Project. Parsons MFA Design and Technology" (2013). URL: https://tianxiethesis.wordpress.com/2013/03/06/reference-talmud-project (visited on 29 July 2020).

Graphemic and Graphetic Methods
in Speculative Fiction

Yannis Haralambous · Frédéric Landragin · Kenichi Handa

Abstract. In this paper we define a model of literary prose text, in terms of an ontology: concepts, relations and rules. This ontology contains both concepts related to abstract linguistic entities and to material/geometric notions. Rules are included in order to modelize the conventions of orthotypographic tradition. Once the model established, we define "graphemic and graphetic methods" as transgressions to these rules and investigate the use of such methods in speculative fiction texts, based on a 20th-21st c. international corpus. We also investigate, whenever possible, to what extent and in what way graphemic and graphetic methods have been translated into and/or adapted to other languages.

1. Introduction

According to Nina Nørgaard (2009, p. 141) "there is a general tendency in literary criticism to disregard the semiotic potential of typography in literature by focusing monomodally on word-meaning only". This is even more true when meaning is created not only by the traditional methods of typography and layout, but also by transgressing the underlying rules. Breaking rules governing book design, whether these are written (in specialized manuals) or unwritten (observed in corpora), provides authors with a virtually unlimited potential of methods (graphemic or graphetic) and meaning layers to choose from.

Yannis Haralambous   0000-0003-1443-6115
Département Informatique, IMT Atlantique & UMR CNRS 6285 Lab-STICC, Technopôle Brest-Iroise, CS 83818, 29238 Brest Cedex 3, France
E-mail: yannis.haralambous@imt-atlantique.fr

Frédéric Landragin   0000-0002-0030-7200
CNRS, Lattice laboratory, ENS, PSL Research University, Sorbonne Nouvelle University, France
E-mail: frederic.landragin@ens.psl.eu

Kenichi Handa   0000-0002-2717-8971
Cyber Physical Security Research Center National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan
E-mail: handa.kenichi@aist.go.jp

We will study these methods and the intentions behind them. In order to do so, we will not turn to general literature (the cases being infrequent), but rather to science fiction, fantasy, and unclassifiable novels which have in common that they leave a large part to the imagination. These works of fiction can be grouped under the term "literature of the imagination," or "speculative fiction," a term we will use in this article. We will thus cite novels and authors from the golden age of American science fiction, authors who are now classics in the field of fantasy, as well as authors from the new generation of speculative fiction. The works cited are dear to us: in parallel to our research, all three of us are great readers of speculative fiction, and it is even a field in which some of us have already published (Landragin, 2015; 2018; 2020a,b,c; Landragin and Lehoucq, 2019; Landragin, Steyer, and Lehoucq, 2017; Landragin, Lehoucq, Robinson, and Steyer, 2019). We feel an immense fascination and respect for these works, for their authors, and for the imagination they have shown. Therefore, we will pay close attention to their graphic innovations, by using a descriptive and explanatory approach. We will thus focus on the graphemic and graphetic methods used by the authors we have selected in our corpus of study. We will describe in detail the characteristics of these methods, and will propose a formal model for them, which will enrich the existing models based on "standard" text.

Our longer-term objective is to better understand, better characterize, and increase awareness of this exceptional corpus produced by speculative fiction. In short, our starting point was initially the writing systems invented by science fiction authors and scientists to communicate with aliens, assuming that they exist and are able to understand our messages. Imagining communication with an alien is indeed an effective way to become aware of the difficulties posed by language and writing. It is well known that scientists have already sent messages to aliens—if they exist, of course (Oberhaus, 2019). There are the famous examples of the Pioneer plaques, the Voyager golden records, the Arecibo message, then the Eupatoria messages ("Cosmic Call 1" in 1999 and "Cosmic Call 2" in 2003) with the related research on a universal language that can be understood by everyone—aliens included, of course. This research led to *LinCos*, that is the *lingua cosmica*, and efforts are currently being made to develop a better LinCos. The aim is to communicate with extraterrestrial intelligence, and an important point here is that speculative fiction writers have imagined a wide variety of communication situations, long before the real scientific attempts. It is the study of these various situations that led us to constitute our corpus of study.

Before detailing this corpus (which will be the main subject of this article), let us take advantage of this introduction to take a look at some famous speculative fiction novels dealing with communication and language—the rest of the article will then focus on grapholinguistic aspects. First of all, we can cite *The Embedding* (1973) by Ian Watson (1943−) and *To-*

tal Eclipse (1974) by John Brunner (1934–1995), two examples among others illustrating Noam Chomsky's ideas. According to Chomsky (1965), we are born with the ability to handle language, and therefore certain structures should be innate. Chomsky focused on syntax, but many writers of speculative fiction have understood the main idea, and applied it, not only to syntax, but in fact to all aspects of language, and not only to humans, but also to aliens (Barnes, 1974; Bould, 2009; Meyers, 1980; Watson, 1975; Westfahl, 1993). Another theory that proved highly influential in speculative fiction is the Sapir-Whorf hypothesis, namely that the structure of a language affects its speakers' world-view or cognition, and that people's perceptions are thus relative to their spoken language. We call Edward Sapir's and Benjamin Lee Whorf's theory *linguistic relativism*. According to this theory, our language influences the way we perceive the world (e.g., time or colors). For many speculative fiction writers, the temptation to exceed the limits of the original idea was too strong. Thus, they moved easily from the weak hypothesis to the strong hypothesis, i.e., to *linguistic determinism*, according to which our language determines even our mental structures. Consequently, these mental structures are changed when we learn a second or third language. Linguistic determinism is an interesting idea, with many potential applications. In *The Languages of Pao* (1958) by Jack Vance (1916–2013), the rulers of a society that is losing a war force the population to change its language. The new language, more aggressive, especially in its morphology, is intended to encourage a reversal of the situation. In *Babel-17* (1966) by Samuel Delany (1942–), a civilization receives coded messages from extraterrestrials. But is it really a code? It is in fact a language, which, according to linguistic determinism, transforms those who learn it and turns them into traitors—a quite innovative version of the alien invasion trope. This way of forcing people to learn a language in order to have them think in a certain way is a facet of totalitarianism. This is the message of *Nineteen Eighty-Four* (1949) by George Orwell (1903–1950), and, long before that, of *We* (1924) by the Russian author Eugene Zamiatin (1884–1937), which describes a society where people have to think collectively and are therefore forbidden to use the first person singular, and may refer to themselves only in the plural form.

Closer to our concerns about the ways in which speculative fiction writers have played with words and metatextual aspects, let us take three final examples, which we will not describe in our article, but which are part of prior and necessary common knowledge for the present study. Among the most notorious fantasy texts are Tolkien's novels, in which a fictional family of languages, "Elvish languages," are described. The French author Frédéric Werst (1970–) went even a step further and invented *fictional bilinguism*, in his *Ward* novels (2011, 2014), in which left-hand pages are written in the Wardwesân language, which he imagined in Tolkien's way, and right-hand pages are their translations into French, easier to read for readers not knowledgeable of the fictive lan-

guage. The second example, which is also an extreme case, is *Book from the Ground* (2014) by Xu Bing (1955–). The entire novel is written using pictograms. There is no use translating, as we are very close to the long-sought *universal writing system*—even though it is universal for humans rather than for aliens. Universality is a vast question. It should be noted that in France, research on universal language (as well as on the origin of languages) was banned as early as 1866, as stated in the Société Linguistique de Paris's founding statutes (Gauthier, 2008, p. 2)—new research has been happening for several decades now, but it is much more multidisciplinary in its approach and much more careful, too. The third example is *Arrival* (2016), a movie by Denis Villeneuve based on the novella *Story of your Life* (1998), by Ted Chiang (1967–). The linguist Jessica Coon (keynote speaker at the *Grapholinguistics in the 21st Century conference*) was the linguistic advisor for this great movie. Let us just note that the film brilliantly deals with the ideas of Chomsky (whose portrait can also be seen in the main character's office), with the Sapir-Whorf thesis (at its extreme interpretation, otherwise nothing would happen to Louise Banks) and, in fact, with everything that can turn speculative fiction into linguistic speculative fiction—or "linguistic fiction".

Now that we have given the general context of our corpus of study, let us move to specifically grapholinguistic aspects. We will begin by describing in detail a model which takes into account both graphemic and graphetic aspects (Section 2).

2. A Model of Literary Text Using an Ontology and Rules

The goal of this paper is to list and classify graphemic and graphetic methods encountered in speculative fiction. We have chosen this specific genre because of its inherent innovative character that reflects on various linguistic strata, including graphemics and graphetics.

As we are looking for *nonstandard* methods and as we aim to classify them, we first need to provide a model of literary text in its *normality*, and more specifically of the novel or short story genre, as these are the most representative in the speculative fiction sphere (i.e., we will not deal with poetry, theater, etc.).

Such a model should include all components of literary text, from its smallest element to its largest superstructure (a book, a book series), considered both as abstract linguistic entities and as visual/material entities.

It seems that a formal ontology with TEI semantics is in the works (Ciotti and Tomasi, 2016–2017), but not yet available. But even if it existed it would not be suitable for our purposes because, although TEI covers both abstract linguistic elements (morpheme, word, sentence, etc.) and visual elements (glyph, line, block, etc.), it provides them not as *standard components of the book*, but rather as special cases: glyphs

and blocks are defined for the representation of primary sources (manuscripts, etc.) (TEI Consortium, 2020, §11.4–5) and linguistic elements are defined for linguistic annotation of corpora (ibid., §15.4).

Furthermore, an ontology is necessary for formalizing the relations between various components of literary text. These relations are essential features of its structure: in languages having the notion of word, whether straight or curved or taking strange shapes, a "line" is always an ordered collection of "words" (with potentially a "word segment" at its beginning and/or end, because of word hyphenation).

In order to model the "standard" behavior of the text's components in such a way that nonstandard methods can be identified, described and classified through it, we will use *rules*: for every relation between concepts we will define attributes (numeric values or geometric dimensions) and we will state the basic orthotypographical "rules," that is the standard logical and/or visual properties of the text.

Once the rules are given, describing a nonstandard graphemic/graphetic method amounts to listing the rules that are broken, as well as the narrative intention of the method.

Rules also allow us to predict potential graphemic/graphetic methods not yet encountered.

In the graphical representation of our ontology (Fig. 1), we use the left side for abstract linguistic elements (grapheme, morpheme, etc.) and the right side for visual/material elements (graph, word segment, word, etc.). As some of these elements are homonymous, to avoid confusion we will add a γ prefix in front of visual/material elements, e.g., "γ-word" stands for graphical word while "word" stands for the linguistic notion of word (that occurs in some writing systems).

In the following we will describe our literary text ontology starting with its concepts, its relations and the corresponding rules. In Fig. 1 we have used the following convention:

- bold arrows represent "is-part-of" (meronymy) relations: the element at the destination of the arrow contains an ordered collection of elements at the origin of the arrow;
- all "is-part-of" relations are labeled by circled numbers, which will be used in the description of relations and rules;
- arrows marked by the letter "R" are representation or reification relations, e.g., a graph represents a basic shape, which represents a grapheme, etc.
- dashed arrows represent simple inclusion: the element at the origin of the arrow is included (at most once) in the element at the destination of the arrow;
- we have drawn elements from top to bottom so that upper elements are nested in lower elements and elements of approximately the same complexity are drawn at the same level (e.g., the concept "page num-
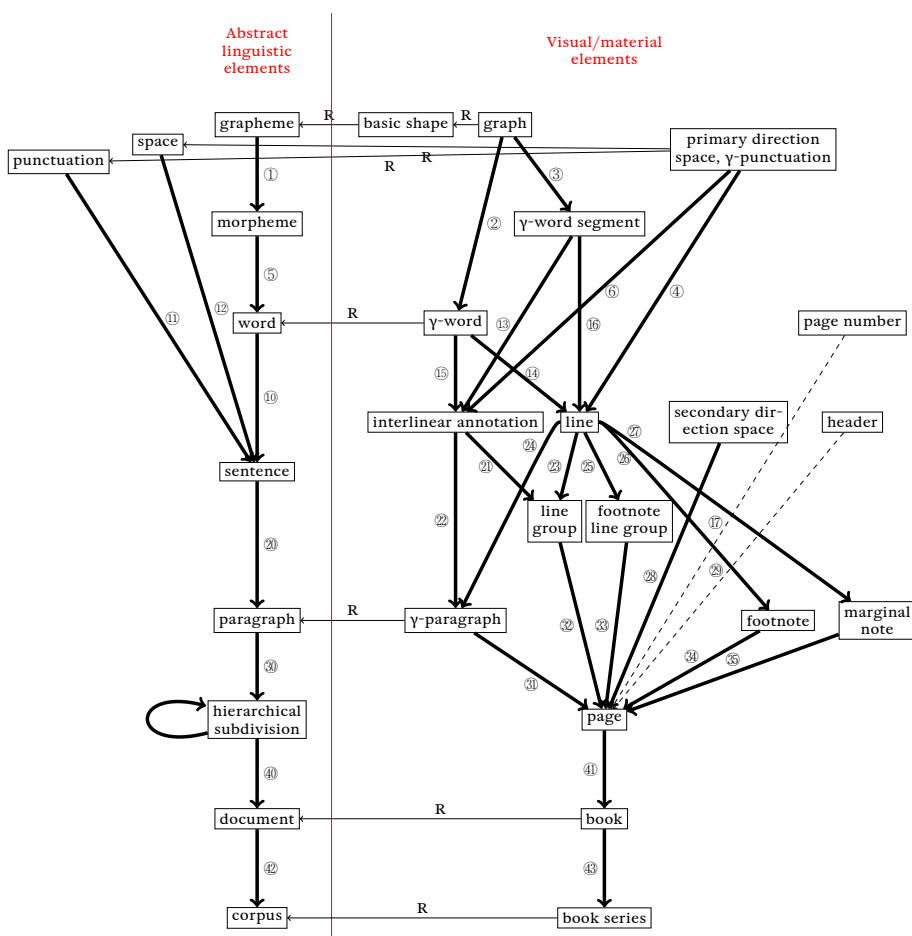
FIGURE 1. Graphical representation of the literary text ontology

ber" is at the same level as "γ-word," while "header" is at the same level as "line").

2.1. Concepts

On the left side of the graphical representation in Fig. 1 we have placed the following abstract linguistic elements:
- "grapheme": the elementary unit of graphemics used in 2nd articulation to obtain (written) morphemes;
- "punctuation": called *topograms* by Jacques Anis, these graphemes *ensure legibility and contribute to meaning production* (Anis, 1988, p. 116);

- "space": a grapheme with empty graph[1];
- "morpheme": *the minimal distinctive unit of grammar* (Crystal, 2008, p. 313); in our case: a minimal sequence of graphemes that carries sense;
- "word": *a unit of expression that has universal intuitive recognition by native speakers, in both spoken and written language* (ibid., p. 521); in our case: in languages using writing systems containing that notion, sequences of morphemes separated by spaces or punctuation;
- "sentence": in linguistics, it is *the largest structural unit in terms of which the grammar of the language is organized* (ibid., p. 432). For us it is also the meeting point between legacy linguistics and the document structure theory by Power, Scott, and Bouayad-Agha (2003), in which it is called "text-sentence" (level 2);
- "paragraph": an ordered collection of sentences, level 3 for Power, Scott, and Bouayad-Agha (ibid., p. 224);
- "hierarchical subdivision": a chapter, section, subsection, etc. (We do not include titles of hierarchical subdivisions in the ontology and consider them simply as paragraphs.) Power, Scott, and Bouayad-Agha (ibid.) call these L_N for $N > 3$. Hierarchical subdivisions have a physical order (which is linear order for subdivisions of equal level and depth-first search order for subdivisions of different levels), and in some cases also a logical order (which is given by graphemically explicit numbering);
- "document": the highest L_N in Power's approach, together with a set of metadata (title, author, publisher, etc.) as formalization of a material "book";
- "corpus": an ordered set of "documents," formalizing a "book series".

On the right side of the graphical representation we have placed visual/material elements. The "primary" and "secondary" directions depend on the script, e.g., for Roman, primary is horizontal left-to-right and secondary is vertical top-to-bottom; for Arabic, primary is horizontal right-to-left and secondary is vertical top-to-bottom; for vertical CJKV, primary is vertical top-to-bottom and secondary is horizontal right-to-left; and for Mongolian, primary is vertical top-to-bottom and secondary is horizontal left-to-right.

- "graph": as defined in Meletis (2015, p. 123), a graph is a shape representing a grapheme;
- "basic shape": as defined in Meletis (ibid., p. 47), a basic shape is an intermediate notion between graphs and graphemes, identifying a family of graphs;

---

1. We argue that spaces are graphemes since their presence can change meaning as in the following example: <intolerant communities> vs. <in tolerant communities>.

– "primary direction space and γ-punctuation": these graphs represent spaces and punctuation (the notion of direction exists only in graphetics);
– "γ-word": a graphical word, that is a 1-dimensional sequence of graphs surrounded by horizontal spaces or punctuation and representing a "word";
– "γ-word segment": this concept is necessary because of word hyphenation. As we wish to describe the elements that constitute a line, we need to take into account:
  1. word segments located at the beginning of the line that belong to a word of the previous line, which has been hyphenated,
  2. word segments followed by a hyphen, located at the end of the line, and belonging to hyphenated words of the current line;
– "page number": the page number is part of a page and occurs at most once in a page (in some styles, the first or the last pages of a chapter have no page number):
– "line": typically a concept that has no linguistic counterpart, a line is an ordered collection of γ-words, potentially starting and/or ending by a γ-word segment and separated by horizontal spaces and punctuation. A line normally has a standard width, except for (potentially) the first line of the paragraph, which can be indented, and the last line of the paragraph, which can be shorter than the standard width;
– "interlinear annotation": these are lines in smaller type placed between standard text lines;
– "secondary direction space": secondary direction space is sometimes inserted between paragraphs, especially when they play the role of titles;
– "header": in some book styles every page has at most one header, made of a single line of text;
– "γ-paragraph": an ordered collection of lines, representing a paragraph;
– "line group": as with γ-word segments, we had to introduce this notion, intermediate between lines and paragraphs, because sometimes paragraphs are broken between pages, so that we may have an initial line group on one page, potentially followed by complete pages (with no paragraph change), and ending by a final group of lines;
– "footnote": a footnote is a line thread that is parallel to the standard line thread, but is set in smaller size and placed at the bottom of the page. A footnote can be broken between pages, and that is why we introduce the next notion:
– "footnote line group": part of a footnote contained on a given page;
– "marginal note": one or more paragraphs in smaller size and placed in one of the two margins. As marginal notes are never broken between pages, we don't need an intermediate structure for γ-paragraphs and footnotes;

- "page": a 2-dimensional area repeated on both sides of each sheet of a book;
- "book": a material book or a visual simulation of a material book on a computer monitor;
- "book series": a material sequence of books belonging to a book series published by the same publisher and sharing the same visual/material properties and a common theme.

2.2.   Geometrical Parameters

All visual/material elements have a geometric reality and therefore occupy space on the page area. We introduce Euclidean coordinates and measure the geometric/physical location of a point x by functions $h(x)$ and $v(x)$, where:

- h denotes projection on an axis parallel to the primary direction of a given script (horizontal for horizontal scripts, going from left to right for Latin, Greek, Cyrillic, etc. and from right to left for Arabic, Hebrew, etc.; vertical and going from top to bottom for vertical CJK and Mongolian);
- v denotes projection on an axis parallel to the secondary direction of a given script (vertical and going from top to bottom for horizontal scripts, horizontal and going from left to right for vertical CJK, horizontal and going from left to right for Mongolian).

Various units have been defined for h and v (points, Didot points, etc.) but we will use, in our rules, only the unit "em" (an "em-space") that is relative to the current font body size.

Elements graph, γ-word, γ-word segment, interlinear annotation and line contain an (invisible) primary direction line called *baseline*.

Visual/material elements occupy 2-dimensional space. We will consider that they are included in (not necessarily minimal) boxes (see Fig. 2) which we call *abstract baselined boxes*. We define functions $h_{\min}$ and $h_{\max}$ as the minimum and maximum value of the primary dimension of an abstract box, $v_{\min}$ and $v_{\max}$ as the minimum and maximum value of the secondary dimension of the box, and v_{bas} as the value of the secondary dimension of the element's baseline, when available. For most of our rules we will use equalities between the values of these functions.

2.3.   Relations and Rules

There are two types of rules on elements in our model. The first type, *constitutive rules*, are those that define a given element and breaking them invalidates membership of an instance to the given concept. For example, to be a marginal note, a paragraph has to be contained in the page margin: a paragraph that does not satisfy this rule is *not* a marginal note.

(a) To seek out new life and new civiliza-tions. To boldly go where no man has gone before!

(b) To seek out new life and new civiliza-tions. To boldly go where no man has gone before!

(c) To seek out new life and new civiliza-tions. To boldly go where no man has gone before!

(d) To seek out new life and new civilizations. To boldly go where no man has gone before!

FIGURE 2. Abstract baselined boxes for (a) graphs, (b) γ-words and γ-word segments, (c) lines, (d) γ-paragraph.

The second type of rule are *optional rules*: for example, the rule according to which graphs of a word have to be on the same primary-direction baseline (which we call RULE②-1, see below) is satisfied in the vast majority of cases, and breaking it becomes a graphetic method used by authors for specific purposes.

In the following, we set the description of constitutive rules in regular text and that of optional rules in boxes. The latter are numbered RULE⊗-*n*, where "⊗" is the number of the relation on which the rule is applied and "*n*" is a number.

To distinguish various levels of constitutive rules, we will structure this section by sub-sections referring to the target of the relations described: words (§2.3.1), lines (§2.3.2), paragraphs (§2.3.3), pages (§2.3.4), and the book *per se* (§2.3.5).

2.3.1.   The Target of the Relation Is a Word, a γ-Word or a γ-Word Segment

Relation R①

Morphemes are represented by ordered collections of graphemes. When a script is phonographic or used in phonographic mode, this relation corresponds to second articulation, where meaning emerges from the identification of patterns of contiguous graphemes.

| RULE①-1 | The grapheme sequence belongs to the part of the language's graphemic solution space (Neef, 2012, p. 223) that is used by the orthographic component of the language. |

If we consider case as a graphemic property (so that, e.g., <A> and <a> are different graphemes) then non-standard casing is a nonstandard graphemic method:

| RULE①-2 | For cased scripts, in a given morpheme, cases of graphemes belong to one of the three folllowing cases: (a) all graphemes in lower case, (b) all graphemes in upper case, (c) first grapheme in upper case and the remaining in lower case. Proper names and brand names are not taken into account. |

Relation R⑤

In languages containing the notion of word, words are ordered collections of (bounded and/or free) morphemes.

| RULE⑤-1 | In a given word, graphemic representations of morphemes are concatenated in a given, fixed order. |
| RULE⑤-2 | In a given word, graphemic representations of morphemes are concatenated either without a separator or using a standard (language-dependent) separator. |

For the Latin script, examples of standard morpheme separators are the dash (as in <up-to-date>) and the apostrophe (as in <aujourd'hui>). See Haralambous and Dichy (2019) for examples of separators used for gender-neutral writing. If we consider acronyms as words and their constituents as "morphemes," then the abbreviation dot is the corresponding standard separator.

Relation R②

γ-words are built out of the concatenation of graphs. Let g and g' be two consecutive graphs.

RULE②-1	Graphs of the same γ-word are concatenated according to the primary direction (i.e., $h_{\max}(g) = h_{\min}(g') + \varkappa(g,g')$, where $\varkappa$ is the kerning operation).
RULE②-2	Graphs of the same γ-word share the same straight primary direction baseline (i.e., $v_{\mathrm{bas}}(g) = v_{\mathrm{bas}}(g')$).
RULE②-3	Graphs of the same γ-word share the same size.
RULE②-4	Graphs of the same γ-word share the same style.
RULE②-5	Graphs of the same γ-word share the same font family.
RULE②-6	When two graphs of the same γ-word represent the same grapheme, then the same allograph is used to represent them.

Relation R③

γ-*word segments* are parts of γ-words that appear when a γ-word is hyphenated. Left γ-word segments appear at line end and their last graph is a hyphen, right γ-word segments appear at line beginning (without indentation).

Rules RULE③-1 to RULE③-6	Similar to RULE②-1—RULE②-6.
RULE③-7	The frontiers of γ-word parts inside a line are hyphenation locations according to hyphenation rules specific to the current language (as well as region, historical period and/or publisher).

2.3.2. The Target of the Relation Is a Sentence, a Line or an Interlinear Annotation

Relations R⑩, R⑪ and R⑫

Sentences are built out of words and punctuation. Spaces are included to separate words.

RULE⑩-1	In a sentence, words and punctuation must conform to the syntax of the current language.
RULE⑩-2	In a sentence, words and punctuation belong to the script of the current language.

Relations R④, R⑭ and R⑯

A line starts by a right γ-word segment or a primary direction space (called *indentation*) or γ-punctuation or a γ-word. It contains zero, one or more γ-words, γ-punctuation graphs and primary direction spaces. It ends with a γ-word segment, a γ-word, γ-punctuation or primary direction space.

RULE④-1	Primary direction interword spaces have the same width, which is of approx. 0.25−0.4 em. In some languages this width is greater after a sentence full-stop.
RULE⑭-1	γ-words in a line share the same primary direction baseline.
RULE⑭-2	γ-words in a line share the same size of graphs.
RULE⑭-3	γ-words in a line share the same font family.
RULE⑭-4	When two graphs of the same line represent the same grapheme, then the same allograph is used.

Relations R⑥, R⑬ and R⑮

Interlinear annotations behave like lines, with the particularity that the size of their graphs is smaller than that of graphs in lines of main text.

A specific kind of interlinear annotation is Japanese rubi, where morphemes (often in kanji sinographs) are annotated by smaller-size graphemes (in kana).

| RULE⑬-6 | Japanese rubi annotation provides phonetic realization of sino-graphs. |
| RULE⑬-7 | Besides the specific case of Japanese rubi, annotation is not used in fiction. |

2.3.3. The Target of the Relation Is a Paragraph, a γ-Paragraph, a Line Group, a Footnote, a Footnote Line Group, or a Marginal Note

Relation R⑳
When moving from the concept of sentence to that of paragraph, we leave the traditional realm of linguistics, even though, in one of the few linguistic publications on the subject, Zadrozny and Jensen (1991) suggest that "the paragraph is a grammatical and logical unit [...] and the first reasonable domain of anaphora resolution and of coherent thought about a central topic". We could use these two criteria as rules if only they weren't broken so often in fiction, due to literary artistic freedom.

Relations R㉔ and R㉓
A γ-paragraph is a rectangular block of lines, visually identified by three phenomena: the first line is indented (in some orthotypographic traditions this is not the case for the first γ-paragraph of a hierarchical subdivision or after a secondary direction space), the last line is incomplete and, in some cases, there is additional secondary direction space before and after the γ-paragraph. An initial line group is the first part of a γ-paragraph, it has to be the last γ-paragraph of the page (besides footnotes), an intermediate line group is a block of lines covering a complete page (besides footnotes), and a final line group is the last part of a γ-paragraph, placed at the top of the page.

RULE㉔-1	γ-Paragraphs and line groups are rectangular blocks, i.e., if ℓ and ℓ' are consecutive lines then $h_{\min}(\ell) = h_{\min}(\ell')$ and $h_{\max}(\ell) = h_{\max}(\ell')$; if ℓ is indented then $h_{\min}(\ell) = h_{\min}(\ell') + \text{indent}$; if ℓ' is final, then $h_{\min}(\ell) = h_{\min}(\ell')$ and $h_{\max}(\ell) \geq h_{\max}(\ell')$.
RULE㉔-2	All lines in a γ-paragraph or line group are filled by γ-words and interword spaces (with the exception of the first and last line, as in the previous rule).
RULE㉔-3	Lines in a γ-paragraph or in a line group are located at a fixed secondary direction distance, called "leading," i.e., if ℓ, ℓ', ℓ are arbitrary consecutive lines of the same γ-paragraph or line group, then $v_{\text{bas}}(\ell') - v_{\text{bas}}(\ell) = v_{\text{bas}}(\ell) - v_{\text{bas}}(\ell')$.
RULE㉔-4	Lines in a γ-paragraph or line group share the same size of graphs.

RULE㉔-5	Lines in a γ-paragraph or line group share the same font family.
RULE㉔-6	For cased writing systems and unless the γ-paragraph is a title, lines in a γ-paragraph or line group use lowercase with occasional uppercase letters at γ-word begin.

A paragraph can be split (according to the primary direction) into several columns. Columns of a γ-paragraph or line group behave like γ-paragraphs with respect to shape, baseline skip, graph size, and font family. We have the following additional rules:

RULE㉔-7	Columns of a γ-paragraph or line group are of equal width.
RULE㉔-8	In a multi-column context, reading order is by column (first the entire first column, then the second, etc.).

Relations R㉕, R㉖ and R㉗

Footnotes, footnote line groups and marginal notes behave like γ-paragraphs and line groups, so they are subject to the same rules as RULE㉔-1 to RULE㉔-8. Footnotes, footnote line groups and marginal notes use graphs of smaller size than γ-paragraphs.

2.3.4. The Target of the Relation Is a Hierarchical Subdivision or a Page

Relation R㉚

The lowest-level hierarchical subdivision (L_4 for Power, Scott, and Bouayad-Agha, 2003) consists of a title (which can be considered as a paragraph) followed by an ordered collection of paragraphs. Beyond that level, hierarchical subdivisions L_N ($N > 4$) consist of a title (a paragraph) followed by an ordered collection of subdivisions L_{N-1}.

The notion of *page* exists neither in linguistics nor in the document structure of Power, Scott, and Bouayad-Agha (ibid.). Relations R⑰, R㉘−㉙ and R㉛−㉟ contribute material to the page area.

Relation R⑰

Page numbers are unique numeric identifiers of pages in a book[2]. In some orthotypographic traditions, first and/or last pages of chapters do not carry page numbers (even though they participate in numbering).

RULE⑰-1	Page numbers of consecutive pages are consecutive integer numbers in increasing order.

---

2. This is true for literary texts—in other genres, such as critical editions, pairs of pages containing text and translation carry the same page number.

Relation R㉙
Headers are optional single lines of text that act as thematic descriptors of pages (often they are abbreviated versions of hierarchical subdivisions of the book). They are placed at the top (relative to the secondary direction of the script) of the page. First pages of chapters generally do not carry headers.

Relations R㉛–㉟
Contrary to technical or scientific books, in fiction, paragraphs on the same page share characteristics:

RULE㉛-1	γ-paragraphs on a page share the same color.
RULE㉛-2	γ-paragraphs on a page share the same size of graphs.
RULE㉛-3	γ-paragraphs on a page share the same font family.
RULE㉛-4	γ-paragraphs on a page use the same allograph of a given grapheme.

As already mentioned, a final line group is always placed at the top of the page (under the header), followed by γ-paragraphs and potentially an initial line group. Underneath the last γ-paragraph or the initial line group (relative to the secondary direction of the script) are placed footnotes and footnote line groups (again we have initial and final footnote line groups behaving similarly to regular line groups). Marginal notes are placed in the secondary direction margin of the page, and they are not broken between pages. Footnotes and marginal notes are uncommon in fiction, the former occurring mostly in translations to provide comments by the translator.

RULE㉞-1	In fiction, footnotes occupy significantly less area than the main text.

2.3.5. *The Target of the Relation Is a Document or a Book*

Relation R㊵
Hierarchical subdivisions L_N ($N > 4$) are nested, the highest level $L_{N_{\max}}$ being the document. Often L_N subdivisions ($4 < N < N_{\max}$) start with a paragraph functioning as a title. The document has metadata (title, author, publisher, ISBN, etc.) that can be part of its contents, in which case they are called *paratext* (Genette, 1997).

Subdivisions can be ordered in two ways: by *physical* order, which is the order of subdivisions as parts of the (physical) book and by *logical* order, which is the order given by explicit numbering in the text.

RULE㊵-1	Whenever logical order is given, physical and logical order coincide, with the exception of special subdivisions (preface, introduction, epilogue, etc.) that are generally not numbered.

Relation R④

A (physical) book is made of sheets, the two sides of which are pages. As such, pages have the geometric characteristics of 2-dimensional objects (while sheets, and therefore also the book per se, have a third dimension: thickness).

RULE④-1	Graphs in pages share the same color.
RULE④-2	Pages share the same background color.
RULE④-3	Graphs in pages share the same size of graphs.
RULE④-4	Graphs in pages share the same font family.

Even though it seems obvious, we include a rule to prevent blank pages:

RULE④-5	No blank pages are allowed in the body of a book, except for potential even pages necessary to have highest-level subdivisions start at odd pages.

After having described concepts, relations and rules we turn now to the main topic of the paper: graphemic and graphetic methods in speculative fiction that break the rules of our ontology.

3. Breaking Rules

3.1. Breaking RULE①-1: Eye Dialect and Nonstandard Spellings

Bowdre (1964, p. 1) defines *eye dialect* as "words and groups of words which for any one of a number of possible reasons have been spelled in a manner which to the eye is recognizably nonstandard, but which to the ear still indicates a pronunciation that is standard". As Baroni (2013) mentions, "[an] important aspect of Eye Dialect is that it is nonstandard as regards the graphic appearance of the word but is still regular as regards the relationship between phonemes and graphemes". For this reason, eye dialect has been, ever since the early 19th century, a graphemic method used to attach non-linguistic information (such as regional origin or education level) to the transcriptions of utterances of fictional characters.

In the following we will describe three nonstandard eye dialect cases.

3.1.1. Lost Memory

The short story *Lost Memory* (1952) by British author Peter Phillips (1920–2012) appeared in the magazine *Galaxy Science Fiction*. The story is about a civilization of robots founded centuries earlier by a computer

that taught the robots English but erased all words related to humans and human activities. When a human crashes with his starship on this planet, the robots communicate with him, but do not understand parts of his vocabulary and this has dramatic consequences for him as he ends up dying burnt alive. To mark the words that fail to be recognized by the robots and hence allow the reader to identify shortages in communication between robots and the human, Phillips uses eye dialect. Interestingly, the communication is multimodal: one robot, capable of receiving and analyzing sound waves interacts orally with the human, and transmits the dialog to the others in computer-internal form (which, again, is presented to the reader as written form).

The short story has been translated into German (1958), French (in 1954 and 1974) and Japanese (in 1957 and 1962). The translating challenge was to misspell, in a plausible way, the same words as in the original English version. Here are the most important misspelled words in the various versions (translated words with an asterisk have *not* been misspelled in the translations, "NT" means "not translated"):

Original (1952)	French (1954)	Japanese (1957)	German (1958)	Japanese (1962)	French (1974)
mann	omm	* 人間	mensch	* 人間ン	omm
seks	sekse	* 性	Geschlekt	性の区別	seks
ogod	odieu	NT	ogot	NT	ôdieu
wumman	famm	* 女	frau	〈おンな〉	fam
deth	more	* 死	*Tod	し	mor
blud	san	* 血	Blud	ち	san
wor	*guerre	NT	Krig	せんそウ	guère
zoot	skafandre	NT	anzuck	宇宙服 ズート	skafandre
burds	oisos	* 小鳥	*Vögeln	* 小鳥たち	oisos
feeld	chan	NT	Felt	野はラ	chan
fethers	plumms	NT	*Federn	〈羽毛〉	plumms
brest	mamell	* 胸	*Brust	〈胸〉	mamèle
erth	terr	* 大地	*Erde	〈地球〉	tère
Total: 72	56	0	49	26	59

The 1957 Japanese translation contains no misspelled words whatsoever, but nevertheless, four words that should be written in kanji have been written in hiragana. Using characters such as <人> ("man"), <女> ("woman") or <鳥> ("bird") in the first Japanese translation leads to logical contradictions: if these characters are unknown to robots, how can they establish the connection between phonetic and logographic representation? This has been corrected in the second translation, at least for <女>, which is replaced by its phonetic transcription: 〈おンな〉. The word "suit" misspelled as <zoot> is translated by the annotated <ズート>, where the rubi 宇宙服 have the meaning of "spacesuit" (probably a

translator's hint to the reader) and the base characters are the phonetic transcription of /zuuto/, the original English misspelled word <zoot> in Japanese phonemic space.

Phillips manages to introduce a Shakespearean quotation into the text, uttered by the human: <who is silv-ya what is shee that all her swains commend her>, translated as <wer ist silvja, das alle menner sie so preisen> in German (all lowercase!), omitted in the 1954 French translation, and translated as <qui est silv-ya-que tous ses amants couvrent de louanges> in the 1974 French translation (where one may wonder how robots could manage to keep the word <amants>, "lovers," in their de-humanized vocabulary).

Using eye dialect as an indicator of the lack of semantic information is an innovative idea, but the realization leaves the demanding reader wanting, e.g., the spelling <plumms> is not part of the French graphemic solution space and its phonetic realization is not /plym/ (for the correct *plumes*) but /plʌm/. It seems that translators have chosen improbable phonetic representations to keep the text accessible to the average reader, unfamiliar with IPA notation. On the other hand, the spelling <skafandre> may not be part of the French graphemic solution space either, but is very close to IPA notation: /skafɑ̃dʀ/.

3.1.2. Flowers for Algernon

The novel *Flowers for Algernon* (1966) by the American author Daniel Keyes (1927–2014) is one of the most popular speculative fiction books and has been translated into 27 languages (Hill, 2004).

In the story, a mentally disabled person, Charlie Gordon, undergoes an operation that increases his IQ dramatically until, at the end, he regresses again into his former condition. The novel consists of a collection of progress reports and the eye dialect method is used to connote the evolution of Charlie's IQ. Here is an excerpt of the very first report:

> Dr Strauss says I shoud rite down what I think and remembir and evrey thing that happins to me from now on. I dont no why but he says its importint so they will see if they can use me. I hope they use me becaus Miss Kinnian says mabye they can make me smart. I want to be smart. My name is Charlie Gordon I werk in Donners bakery where Mr Donner gives me 11 dollers a week and bred or cake if I want.

We notice that misspelled word or syntagms are either homophones (<rite>, <importint>), or missing apostrophes (<dont>, <its>), or letter permutations (<mabye>). Here is a polynomial fit of the number of errors per report (we have covered only the period March 4th–April 8th and November 1st until the end, as in the intermediate period Charlie produces no misspelled words):
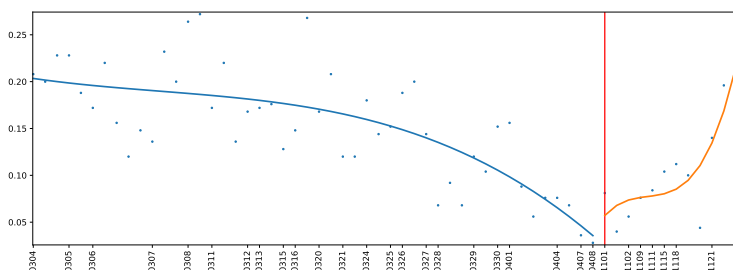
The German translation (1970) of the same excerpt:

> Dr Strauss sagt fon nun an sol ich aufschreiben was ich denke und woran ich mir erinere und ales was ich erlebe. Wiso weis ich nich aber er sagt es ist wischtisch da mit sie sen ob sie mich nemen könen. Ich hofe sie nemen mich weil Miss Kinnian sagt fileich könen sie mich Intelgent machen. Ich möchte gern Intelgent sein. Mein name ist Charly Gordon ich Schafe in der Bäckerei Donner Mr Donner gibt mir 11 dollers die woche und brot und Kuchen wen ich wil,

introduces additional elements: first of all a strong regional accent (<wischtisch> for "wichtig") and a lack of knowledge of the German graphemic indicators of long and short syllables (e.g., in the spelling <hofe>, the first syllable is long while the verb "hoffe," "to hope," has a short first syllable), so that many of the misspelled words are not homophones of the correct versions.

The French translation (1972) of the same excerpt:

> Le Dr Strauss dit que je devrez écrire tout ce que je panse et que je me rapèle et tout ce qui marive à partir de mintenan. Je sait pas pourquoi mais il dit que ces un portan pour qu'ils voie si ils peuve mutilisé. J'espaire qu'ils mutiliserons pas que Miss Kinnian dit qu'ils peuve peut être me rendre un télijan . Je m'apèle Charlie Gordon et je travail à la boulangerie Donner. Mr Donner me donne 11 dolar par semène et du pain ou des gâteau si j'en veut

is strictly homophonic. Errors are manifold: merged pronouns with verbs (<marive>, <mutilisé>), wrong conjugations (<je devrez>, <ils mutiliserons>), split words (<un portant>, <un télijan>), missing dashes (<peut être>), missing plural suffixes (<11 dolar>, <des gâteau>), etc.

In the Japanese translation (1978) of the same excerpt:

> ストラウスはかせわぼくが考えたことや思いだしたことやこれからぼくのまわりでおこたことわぜんぶかいておきなさいといった。なぜだかわからないけれどもそれわ大せつなことでそれでぼくが使えるかどうかわかるのだそうです。ぼくを使てくれればいいとおもうなぜかというとキニアン先生があのひとたちわぼくのあたまをよくしてくれるかもしれないといたからです。ぼくわかしこくなりたい。ぼくの名まえわ

チャーリイゴードンでドナーぱん店ではたらいててドナーさんわ一周かんに11どるくれてほしければぱんやけえきもくれる。

we find 202 hiragana, 19 katakana, and 11 kanji, that is a distribution of (87%, 8%, 5%) while the standard distribution in Japanese is rather of (44%, 7%, 49%), which shows that kanji are significantly underrepresented. The difficulty level of the kanji used in the translation is quite low: among them, five (大, 先, 生, 名, 一) are of school level 1 (age 6), three (考, 思, 週) are of school level 2, two (使, 仕) are of school level 3 and one (周) is of school level 4 (age 9).

In the excerpt above we also see four places where katakana text is written in hiragana: <パン> instead of " ぱん " (twice), <ドル> instead of " どる " and <けえき> instead of " ケーキ "—in the last case we have an additional error: instead of " え," Charlie should have written a prolonged sound mark <ー>. This is not the only error typical of the lack of knowledge of Japanese morphology—we also encounter the following: <わ> instead of " は " for the topic marker particle, missing small " っ " signs (<使て>, <いた>), etc.

In addition to the graphemic methods described above, the translator of *Flowers for Algernon* into Japanese (1992), Fusa Obi (1932−), also uses a graphetic method specific to sinographic characters, namely an innovative type of eye dialect based on the choice of sinographic character components and invention of new component combinations:

English syntagm	Misspelled	Correct
<reeding>	読	読
<keep reckerds>	録	録

The first misspelled character occurs 14 times and the second once. In both cases the phonetic component (on the right) is correct, so that phonetic realization is appropriate, while the semantic component (on the right) is wrong. The (intended) semantics of both characters belong to the domain of intellectual activities (reading, keeping records, in the sense of writing down data), as if Charlie insisted in using a kanji for those two activities because they are related to script, and failed in doing so. Since neither of the two characters actually exists, the reader has to undergo the mental process of identifying the correct semantic component out of a set of homophones, given by the phonetic component.

In the postface to the translation, Fusa Obi recalls the intellectual and technical difficulties of the task:

As a translator, I have always tried to be faithful to the original, but I have found that I can't always be faithful to the original in Charlie's writing. First of all, the reader has to understand and be able to get into the story smoothly.

> I also thought about replacing a misspelled word with a misprint—a kanji that doesn't exist. The editorial department told me that it would take a lot of time and effort to make each type because it was a letterpress printing at the time.

The method of re-combining sinographic character components in order to create non-existing sinographic characters was used abundantly by Xu Bing, in his *Book From the Sky* installation (1988).

3.1.3. Feersum Endjinn

The novel *Feersum Endjinn* (1994) by the Scottish author Iain M. Banks (1954−2013) consists of 10 chapters, each one of which (with the exception of the last) is subdivided into four sections, corresponding to four characters evolving in a cyber-fantasy universe. The character of the fourth recurrent section, Bascule, the only (one who is a) narrator, writes in eye dialect and even confesses that he does so because of a "weird wiring in his brain":

Original (1994)	German (2000)	French (2013)
[…] but unlike evrybody els I got this weerd wirin in mi brane so I cant spel rite, juss ½ 2 do evrythin foneticly. Iss not a problim cos u can put eny old rubish thru practikly anyfin evin a chile's toy computir & get it 2 cum out speld perfictly & gramatisized 2 & evin improvd 2 thi poynt whare yood fink u waz Bill bleedin Shaikspir by thi langwidje. (p. 98)	[…] abba bei mir kömmd hinzu waz bei andren nüch der fall = nehmlich daz isch so 1e obschkure elekdrohnik im göhirn hab die bewirkd daz isch nüch richtich schreim kann + bei mir allez schrifdliche irndwie fonetisch wird. Darin = k1e schwierichkeit zu sehn weil man praktich jeden blöden schrifdlichen kwatsch vom kompjuter selbzd m schpülzeuch-kompjuter in völlich korrekt göschriehmnen + auch in der grammattik richtichen tekzd umwanneln lazen kann + er wird sogar ferbesserd biß die schprach so gud = daz man denkd man wär leibhafftich der aldie Schäksbier.	[…] mè kontrèreman o zotr personn jé anéfé kelkö choz de kuriözman branché dan lö servo, ski fè kö jö ne pö pa ékrir normalman. Tou skö jékri sor an fonétik. Sö né pa z1 problem étan doné kon pö tou kolé pratikeman dan ninport kel machinn, mèm 1 ordinatör pour anfan & sa vou sor le tou remi an bon nanglé avek lortograf & la gramèr & mèm dé zaméliorasion & du kou on a kazi linpresion kö C sö fichu Bil Chékspir ki vou zékri.

Interestingly, Banks's phonetic transcription uses the phonetic values of digits and logotypes (<&>, <@>, <+>, <=>) in a way similar to

what would become SMS language a few years later—indeed, the novel appeared in the same year as the first SMS-enabled mobile phone, the Nokia 2010. But contrary to SMS language, which is usually rather informal, Bascule uses educated language strewn with cultural references (like the reference to <Shaikspir> in the excerpt above[3]).

Once the reader is well-trained in reading Bascule's eye dialect, Banks provides additional challenges by introducing new characters with specific accents and vocal tics. For example, there is lisping sparrow:

So thare u r Mr Bathcule, ithnt it ol tewwibwy, tewwibwy interethtin? I think tho 2—o look, i think i juss thaw a flee on yoor leg thare; may I preen u? (p. 87)	Ja alzo würglich mr. Baskül = daz allez nüch göwaltich schrekklich intressant? Isch findz auch … Ach hörn Sie x isch glaab grat hab isch auf Ihrem b1 1e milbe gösehn daaf isch Sie lauzen?	& donk voila Mr Bafkul, fé dloeman intéléfan, tou fa non? Fé byin fe kö je panfè. O mè kefkö je voi? Unn vièlenn puf fui votlö pat. Je pö vou fèl la toilèt, Mr Bafkul?

where the English text uses transformations <s>→<th> and <r>→<w>, the German one transformations <i>→<ü>, <ch>→<sch>, and the French one transformations <s>→<f> and <r>→<l>.

The /s/ in "Bascule" can be used both for a lisping /th/ and for a hissing /sh/ tic. This happens through a hissing sloth:

I qwite undirshtand yoor angwish, yung Bashcule […] But itsh not yoor folt shertin pershinsh r tryin 2 pershicute u. […] Zhat woz zhe impreshin I formed from what I overherd Zhey did not sheem 2 b intereshtid in eny ov ush. Zhey were lukin 4 shumbody elsh zhey shuspected ush ov harberin. (p. 216)	Isch ferschdeh total waz du m1zd Baskül junker froind […]. Abba ez = ja nüch d1e schultt daz göwize persoonen hintern dir her sünd. […] Nach allem waz isch göhörd hab = daz m1 1drukk […]. Ez hatte gantz den ansch1 daz se an unz gar nüch intressiet warn. Sie suchden wen fon dem se d8en daz er bei unz ferschdekkd =.	Jönn Bachcule, jö konpran for byin votr agoich […] Mè chi chertèn perchonn écheye de vou perchékuté, chö né pa de votre fot. … Ché byin linprechion kö mon doné 1 chertin nonbre de lör propo […] Aparaman, il nö chintéréchè pa du tou a nou zotr. Il cherché kelk1 kil nou chuchpektè déberjé.

In the English and French texts Banks and his translator use the <s>→<sh> transformation, while the German translation has more difficulties in distinguishing the sloth's accent from the sparrow's accent.

---

3. According to Drakakis (1997), "explicit allusion to literary figures such as Shakespeare destabilizes the traditional boundaries between high and popular culture," which is certainly the goal here.

While Kincaid (2017) suggest that "Bascule's broken speech is often used to express the commonsense views of the author," Corbett (2012) qualifies his eye dialect as an "anti-language":

> An anti-language is the means of realization of a subjective reality: not merely expressing it, but actively creating and maintaining it. Bascule's anti-language identifies him as a member of a subculture that stands apart from mainstream society and its linguistic conventions. Ultimately, Bascule's anti-language constructs him as that most alien of creatures, a young teenager.

3.1.4. The Two-Timer

The British author David I. Masson (1915−2007) studied English Language and Literature at Oxford. In the SF domain he published only ten short stories, all of them masterpieces. The short story *The Two-Timer* (1968) is written in a pastiche of 17th-century English, as it is the narration of accidental time travel of a 1683 gentleman into 1964. Here is the incipit of this story in the original, as well as its German translation (1984):

... I was standing, as it chanc'd, within the shade of a low Arch-way, where I could not easily be seen by any who shou'd pass that way, when I saw as it were a kind of Dazzle betwixt my Eyes and a Barn, that stood across the Street. (p. 62)	... ich stund, da's sich begab, im Schatten eines niedren Tor-Weges, darin ich nicht ohne weiteres gesehen werden kunnte von jemand, der vorüberwallen mochte, da erblickte ich wohl etwas gleich einem Geflimmre zwischen meinen Augen und einer Scheuer am jenseitigen Rande der Straße. (p. 70)

When the main character encounters 20th century people, he is at first unable to understand their utterances and represents them in eye dialect:

He: *Lowgh. Naugh dwenthing foyoo?* (With a kind of Questioning voice.) Myself: *Prithee, Sir, do you converse in English?* At this he frown'd, and turn'd back thro' his Door, but left it open, for I heard him in speech with another, as follows.	Er: *H'llou. Kannich irndwih hälfn?* (Das sprach er in einer Art von Frage-Tonfall.) Ich: *Um Vergebung, Sir, conversiret Ihr engeländisch?* Darauf schnitt er ein sauersichtig Miene und entschwund hinter die Türe, nicht ohne jedoch sie offen zu belassen, denn ohnverzüglich hört ich ihn und eine andre *Person* die folgenden Worte wechseln.

He: *Chappea lux lau ikthtauon crauea.
Now enthing bau ootim? Caun honstan za-
klay wottee sez.*
The Other: *Nowoulman. Nopmaugh pid-
gen enwaya. Prapseez thatfla caimea mon
thcow. Breezdin breezdaught. Weo tav
moce curetay.* (p. 67–68)

Er: *Da's 'n Kähl dä sieht us wie 'n Ausruh-
fer. Kännen Se den? Konntnich gnau vas-
teen wasser sacht.*
Jener: *Neeh alde Jong. Sowieso nich mein
Bihr. Flaicht der Buhsche wofor eim Mo-
naht hihrwar. Kahm rin unn is wier weck.
Wihr solltn hihr meer Sichrheitsforkeerun-
gen hahm.* (p. 77)

It is interesting to note that Masson's eye dialect is much more re-
alistic than those by Keyes or Banks thanks to his use of meaning-
independent segmentation, e.g., when he writes <mon thcow> for
"month ago," he attaches the <th> digraph to the second word (the Ger-
man translation uses standard word segmentation).

Translating a short story written in 17th-century English is a *tour de
force* and it is not surprising that, as far as we know, besides the German
translation by Horst Pokullus, there has been no translation in any other
language.

3.2.   Breaking RULE①-1: Nonstandard Casing

Person names such as <MacArthur> or <DeForest> and brand names
such as <FedEx> or <AugEyez> frequently use nonstandard casing,
the former for historical reasons and the latter as syllabic abbrevia-
tions or portmanteaus, therefore we do not consider them to be special
graphemic methods. Here are two cases of innovative use of nonstan-
dard casing:

3.2.1.   The Flight of the Dragonfly

Robert L. Forward (1932–2002) was an American science-fiction writer
and physicist specialized in the theory of gravity and working at the
research labs of Hughes Aircraft. In his novel *The Flight of the Dragonfly*
(1984), he describes a very intelligent but non-technological species,
the Flouwen, who start communicating with human visitors on their
planet, through an AI platform. Humans initiate communication with
the Flouwens through simple arithmetic operations:

"Two TIMES Three equals Six!" said Jill, almost triumphantly.

SsSsSsIiIiIiXxXxXx! said the red cloud, enunciating each trill and over-
tone with exaggerated care.

"SSSsssIIIiiiXXXxxx," said Jill, its electronics still stumbling over the
acoustic nuances of the word.

zzzzzzzzt!! exploded the red cloud. Jill tried again.

"SsSsSsIiIiIiXxXxXx," said Jill's sonar finally.

Similarly, a few pages farther:

> *Two plus Two is...* continued the alien.
> $TtWwOoooo$ came the reply, and the high-pitched scream startled the humans again.

Alternating upper and lower case is an astute method of representing a screamy sound, while keeping the underlying word recognizable.

3.2.2. Embassytown

China Miéville (1972–) is a British science-ficton author and political activist. In his novel *Embassytown* (2011), he describes a civilization of aliens, the Ariekei, communicating orally by using not one, but two speech organs emitting simultaneously (see also §3.19.3). Ariekei perceive utterances as being language only when sounds originate from two synchronized sources. To communicate with them, humans have therefore genetically engineered monozygotic twins sharing the same mental processes and therefore speaking simultaneously. These twins appear and act always together and their names are systematically bisyllabic, each syllable representing one of the two individuals (<MagDa> for individuals <Mag> and <Da>, etc.).

In coherence with the logic of considering a pair of twins as a single entity (that is, in the way they are perceived by Ariekei), Miéville uses plural number when bisyllabic names are in subject position:

Original (2011)	German (2012)	French (2016)
I liked MagDa: they were one of the Ambassadors who hadn't treated me differently since my falling out with CalVin. (p. 69)	Ich mochte MagDa: Sie waren einer der Botschafter, die mich nach meinem Zerwürfnis mit CalVin nicht anders behandelten als zuvor.	Derrière eux, MagDa m'ont souri. Je les aimais bien : elles comptaient parmi ceux qui ne me traitaient pas différemment depuis ma brouille avec CalVin.

To show the importance of the bisyllabic structure and to increase symmetry between the human twins, Miéville capitalizes both syllables. Here are the names obtained through this method, most of them reminiscent of bisyllabic (human) given names:

> EzCal (138 occurrences), EzRa (133), MagDa (102), YlSib (90), CalVin (83), JoaQuin (21), DalTon (16), EdGar (15), MayBel (11), XerXes (9), AgNes (5), JasMin (5), WilSon (5), LeRoy (4), PorSha (4), RanDolph (4), ArnOld (3), BenTham (3), EsMé (3), HenRy (3), KelSey (3), LeNa (3), SecStaff (3), AnDrew (2), CharLott (2), FeyRis (2), GaeNor (2), LoGan (2), and hapaxes:

BrenDan, DagNey, EzLott, HerOt, LuCy, OgMa, RedRag, ShelBy, SibYl and SidNey.

3.3.   Breaking RULE②-1: Change of Primary Direction

Primary direction can be inverted in three ways:
(1) by keeping the standard shape of graphs (no rotation, no mirroring): <noitcerid yramirp>;
(2) by rotating graphs by 180° (no mirroring): <uoıʇɔǝɹıp ⅄ɹɐɯıɹd>;
(3) by mirroring graphs (no rotation): <noitɔɘɿib ⅄ɿɒmiɿd>;
(there is no fourth way because if we both rotate and mirror graphs, we return to primary direction). We have encountered occurrences of all three primary direction inversion types:

3.3.1.   The Neverending Story

Michael Ende (1929−1995) wrote his most important work, *The Neverending Story* in 1979. Being the son of a surrealist painter, Ende frequently uses symbols in his writing and, in particular, mirrors (which he cherished to the point of writing a collection of short stories entitled *The Mirror in the Mirror*). *The Neverending Story* is an initiatory epopea in which the main character, Bastian Balthazar Bux, travels to an imaginary world (Fantastica), lives various adventures and finally returns to reality, back to his loving father. The initiation starts with Bastian's entrance into a bookstore, where he discovers and borrows the (auto-referential) book of *The Neverending Story*. The novel starts a bit earlier, in the bookstore, before Bastian's entrance, so that the first paragraph of the novel displays the shop's inscription from the inside, i.e., mirrored (inversion type 3):
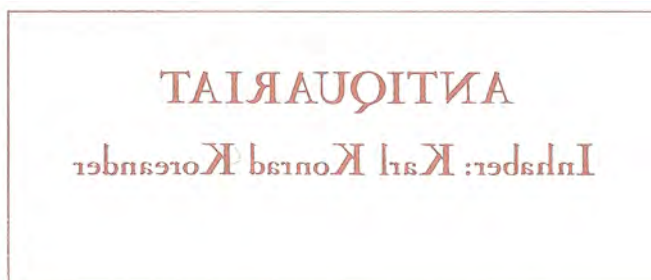
Diese Inschrift stand auf der Glastür eines kleinen Ladens, aber so sah sie natürlich nur aus, wenn man vom Inneren des dämmerigen Raumes durch die Scheibe auf die Straße hinausblickte.[4] (p. 5)

---

4. ƧʞOOꓭ ꓷ⅃O\\ꓤƎꓷИAƎꓤOꓛ ꓷAꓤИOꓛ ⅃ꓤAꓛ

When approaching Bastian's transition to the imaginary world, which is the first climactic event of the novel, and in order to convince Bastian that Fantastica is real, a monk-like figure called the "Old Man from the Wandering Mountain" starts reading *The Neverending Story* anew, a narration through which Bastian realizes that he has become part of the story he is reading. But as the story narrated by the Old Man matches exactly the text of the novel, it begins with the inverted inscription, this time in oral mode, that is with standard graphs (inversion type 1):

> Dennoch waren ihm die ersten Worte, die der Alte sprach, unverständlich. Sie klangen etwa wie »Tairauqitna rednaerok darnok lrak rebahni«.[5] (p. 212)

Illustrating the perfect formal symmetry of the novel, the inscription reappears on its last page, from a point of view opposite to the initial one: this time, Bastian is inside the bookstore, looking outside to his father, who stands on the other side of the road. He opens the door and exits the bookstore heading towards his father, so that the return to reality is complete:

> Herr Koreander begleitete ihn bis zur Tür. Als sie darauf zugingen, sah Bastian durch die spiegelverkehrte Schrift der Glasscheibe, daß der Vater auf der anderen Straßenseite stand und ihn erwartete. Sein Gesicht war ein einziges Strahlen.
>
> Bastian riß die Tür auf, daß die Traube der Messingglöckchen wild zu bimmeln begann, und rannte auf dieses Strahlen zu.[6] (p. 486)

The inverted inscription is a structuring beacon of the novel, in which it is mentioned thrice: (a) in the incipit it is displayed as an image, (b) in the center it is given in text form, and (c) at the end of the novel it is referred to as "reversed writing on the glass pane".

(Interestingly, the French 1984 translation leaves the second occurrence in German language (p. 221):

> C'était quelque comme «Tairauqitna rednaerok darno lrak rebahni.»

We don't know whether this was a conscious choice or an omission by the translator. It has been corrected in the 2014 revised edition of the book.)

This inscription could be seen on the glass door of a small shop, but naturally this was only the way it looked if you were inside the dimly lit shop, looking out at the street through the plate-glass door.

5. Yet he did not understand the first words the Old Man said. They sounded like: "Skoob dlo rednaeroc darnoc lrac."

6. Mr. Coreander took him to the door. Through the reversed writing on the glass pane, Bastian saw that his father was waiting for him across the street. His face was one great beam. Bastian opened the door so vigorously that the little glass bells tinkled wildly, and ran across to his father.

3.3.2. Bâtons, chiffres et lettres

The great French novelist and co-founder of the Oulipo, Raymond Queneau (1903–1976) is the author of *Bâtons, chiffres et lettres* (1950) ("Sticks, digits and letters"), a collection of stories and essays, including an essay entitled *Délire typographique* ("Typographical delirium"). This essay deals with a 19th-century typographer called Nicolas Cirier (1792–1869) (Aouillé, 2001), author of the book *L'Apprentif Administrateur*, in the title of which the second word is inverted by rotation (inversion type 2). Queneau mentions the book title twice, and in both cases performs the same operation:

> insigne (je ne l'ai jamais vu figurer sur un cata-
> logue de libraire et je crois bien qu'il n'est jamais
> passé en vente publique) [1] : *L'apprentif sıuımpⱯ*
> *ɹnǝʇɐɹʇ* (1840).

on page 289 and

> contre la gastronomie. Dans aucune de ces pro-
> ductions, on ne retrouve le prote déchaîné de
> *l'Apprentif ɹnǝʇɐɹʇsıuımpⱯ*. Nicolas Cirier mourut,
> croit-on, en 1869.

on page 291. Besides the difference in capitalization between the two titles, we notice that on page 289 Queneau has to break the word and uses the fundamental principle of bidirectional typesetting (Haralambous, 2007, p. 135), namely that a block in the opposite direction is broken in parts according to the primary direction, and inside each part, inverted primary direction is used. As we can see in the example, the word <ɹnǝʇɐɹʇsıuımpⱯ> is broken into <sıuımpⱯ>, placed on the upper line and <ɹnǝʇɐɹʇ>, placed at the beginning (left side) of the lower line, so that the eye has to move to the end of the upper line, read the first part, go the lower line, move to the right until the beginning of the second part, read the second part, and then move again to the beginning of <ɹnǝʇɐɹʇ> to read the rest of the line. Probably to avoid confusion (Queneau was a perfectionist and wouldn't allow for such an error to remain in his text) Queneau used no hyphen at the end of the first part of the word.

3.3.3. "REDRUM"

The word "REDRUM" is probably the most famous anagram in history. It is the type 1 inversion of the word "MURDER" and is famous for having been used by Stephen King in his novel *The Shining* (1977). It appears 32 times in the novel, as follows:

1. 4 times as <Redrum>, in Chapter 8 (when Danny is glimpsing at the Overlook hotel while still in the car), in Chapter 9 (when thinking of it while talking with his father), in Chapter 16 (when he has an epileptic attack), and in Chapter 37 (in the ballroom),
2. 6 times as <redrum>, always when others are uttering the word: in Chapter 16 (when the doctor talks with Danny's parents), in Chapter 25 (when Danny is sitting outside Room 217 and is hearing voices), and in Chapter 29 (when Danny quotes Tony mentioning it),
3. 22 times as <REDRUM>, in Chapter 4 (when Danny sees the word written on the mirror in green fire), in Chapter 7 (when Danny, under his blanket, imagines the word flashing in red) as the last word of Part I, in Chapter 16 (when visiting the doctor), in Chapter 21 (when thinking of it while in the hotel), in Chapter 37 (when he sees it mirrored in the ballroom's mirror and realizes it is the anagram of "MURDER") and finally as the title of Chapter 50.

We can interpret the three allomorphs of "REDRUM" as follows: <Redrum> when it is used in Danny's speech or verbal thought, <redrum> when it is used in other people's speech, <REDRUM> when Danny visualizes it in reality or in memory.

In Chapter 16, King is emphasizing the ignorance of the anagrammatic nature of "REDRUM" by giving a false hypothesis on its etymology:

> "What things, Danny?"
>
> "I can't remember!" Danny cried out, agonized. "I'd tell you if I could! It's like I can't remember because it's so bad I don't want to remember. All I can remember when I wake up is REDRUM."
>
> "Red drum or red rum?"
>
> "Rum."
>
> "What's that, Danny?"
>
> "I don't know."

This paragraph has been a challenge for the various translations:

French (1979)	Swedish (1980)	Italian (1981)
— Qu'est-ce qu'il t'a montré, Danny? — Je n'arrive pas à m'en souvenir! s'écria Danny, au supplice. Je vous le dirais si je le pouvais! C'est comme si je ne voulais pas m'en souvenir. La seule chose que j'ai retenue en me réveillant, c'est le mot TROMAL.	– Vad då för saker, Danny? – Jag kan inte komma ihåg! skrek Danny plågad. Jag skulle tala om det om jag kunde. Det är som om jag inte kunde komma ihåg för att det är så hemskt. Jag vill inte komma ihåg. Det enda jag kommer ihåg när jag vaknar upp är TEDROM.	«Quali cose, Danny?» «Non riesco a ricordare!» gridò Danny, in preda alla sofferenza. «Se mi ricordassi glielo direi! È come se non riuscissi a ricordare perché è così brutto che non voglio ricordare. L'unica cosa che mi ricordo quando mi sveglio è REDRUM.»

— Trop mal, en deux mots? — Non, TROMAL en un seul mot. — Qu'est-ce que c'est, Danny? — Je ne sais pas.	– Rum eller rom, Danny? – Rom. – Vad är det? – Jag vet inte.	«Red drum o red rum?» «Rum.» «E che cos'è, Danny?» «Non lo so.»
German (1982)	**Spanish (1982)**	**Japanese (1986)**
»Was für Dinge sind das denn, Danny?« »Ich weiß es nicht mehr!« schrie Danny gequält. »Ich würde es Ihnen sonst sagen. Ich weiß es nicht mehr, weil es so schlimm ist, dass ich mich nicht daran erinnern will. Wenn ich aufwache, weiß ich nur noch DROM.« »Was ist das, Danny?« »Ich weiß es nicht.«	— ¿Qué cosas, Danny? — ¡No me acuerdo! — gritó el chico, torturado—. ¡Si pudiera se lo diría! Es como si no pudiera recordarlas porque son tan malas que no quiero recordarlas. Lo único que puedo recordar cuando me despierto es RE-DRUM. — Redrum... Red drum... Red rum... ¿Tambor rojo o ron rojo? — Ron. — ¿Y eso qué es, Danny? — No lo sé.	「どんなものだい、それは？」 「覚えていないってば！」ダニーは悲痛な面持ちで叫んだ。「もし覚えていたら話すよ！覚えてないのは、なんだかあまりいやなものだから、思い出したくないからみたい。目がさめてから思い出せるのは、レドラムって言葉だけなんだ」 「レッド・ドラム、それともレッド・ラム？」 「ラムだよ」 「それはなんだい？」 「わかんない」
Greek (1992)	**Romanian (1993)**	**Portuguese (1999)**
«Τί πράγματα ἦταν αὐτά, Ντάνι;» «Δὲ θυμᾶμαι», φώναξε μὲ ἀγωνία ὁ Ντάνι. «Ἂν μπορούσα θὰ σᾶς ἔλεγα! Ἴσως δὲν μπορῶ νὰ τὰ θυμηθῶ, γιατὶ εἶναι τόσο ἄσχημα ποὺ δὲ θέλω νὰ τὰ θυμηθῶ. Τὸ μόνο ποὺ θυμόμουν ὅταν ξύπνησα ἦταν ἡ λέξη ΣΟΝΟΦ». «Σόνοφ;» «Ναί». «Τί θὰ πεῖ αὐτό, Ντάνι;» «Δὲν ξέρω».	– Nu-mi aduc aminte! strigă Danny chinuit. Ţi-aş spune dacă aş putea! Parcă nu-mi aduc aminte – pentru că e atât de rău, că nu vreau să-mi aduc aminte. Tot ce-mi amintesc când mă trezesc e AMIRC. – A-mirg sau a-rnirc? – Mirc. – Ce-i asta, Danny? – Nu ştiu.	— Que coisas, Danny? — Não consigo me lembrar! — gritou o menino, agoniado. — Se eu conseguisse, eu diria! Acho que não me lembro porque é tão ruim que não *quero* me lembrar. Tudo que me lembro quando acordo é REDRUM. — Red *drum* ou red *rum*? — Rum. — O que é isso, Danny? — Não sei.

We observe four approaches:

1. "REDRUM" remains in English: this is the case of Italian, Spanish, Portuguese and Japanese. In the case of Italian, Portuguese and Japanese neither "REDRUM" nor its pseudo-etymologies are translated. In the case of Spanish, the etymologies are translated into Spanish (<¿Tambor rojo o ron rojo?>) and Danny replies in Spanish (<Ron>).

2. "REDRUM" is translated, but no false etymologies are given: this is the case of German <DROM> and Greek <ΣΟΝΟΦ> where the inversions of word "murder" can hardly be interpreted as any meaningful entity.
3. "REDRUM" is (faithfully) translated and some pseudo-etymology is given: "room or gypsy?" in Swedish, "a-mirg or a-mirc" in Romanian.
4. "REDRUM" is translated by a word different than the anagram of "MURDER": this is the case of French where the word used is <LA MORT> ("death," with a definite article) so that the anagram <TROMAL> is phonetically close to "trop mal" ("too much pain"). When asked by his father, Danny explains that in fact it is a single word, leaving open psychoanalytic interpretations.

It should be noted that the same word, but written <REꓷЯUM>, (or <REꓷЯUM> (in the latter, letters <M> and <U> are inverted as well), it is impossible to distinguish the two as the word is handwritten), a mix of inversion types 1 and 3, is written in blood letters on a door in Kubrick's movie *The Shining* (1980).

"REDRUM" has acquired a word status, has a dedicated Wikipedia page and has been used for a movie title, a rock band, songs, a TV series and even an architectonic project. It is also the title of a French novel, by Jean-Pierre Ohl (1959–).

3.3.4. *Text Inversion on Book Covers*

Here are some examples of text inversion on book covers.
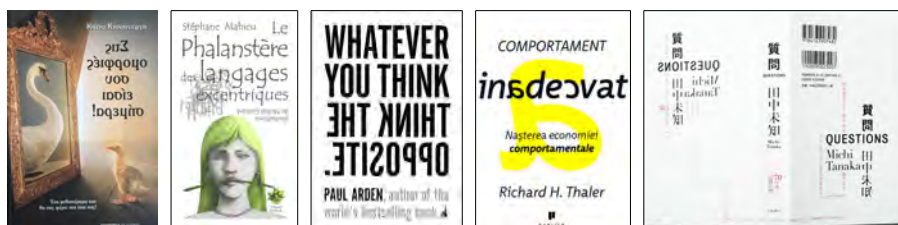
The Greek novel *Στὶς ὀμορφιές σου εἶσαι σήμερα!* (*You are looking beautiful today*) by Katia Kissonergi (1973–), a novel published in 2000 and displaying on the cover a swanling looking at its mirror image as a grown-up swan. On the cover (and on the back), the title is mirrored (inversion type 3).

Le Phalanstère des langages excentriques (2005), an essay on artificial ("excentric") languages by Stéphane Mahieu (1957–), regent for Social and

Culinary Sciences at the notorious Collège de 'pataphysique[7]. On the cover, the illustrator's name is inverted (inversion type 2).

Whatever you think, think the opposite (2006) by Paul Arden, where the second part of the title sentence is inverted to illustrate the notion of "opposite thinking," with a nice visual symmetry of the horizontally aligned words <THINK> and <ꓘNIHT>.

Comportament inadecvat (2015), the Romanian translation of Richard H. Thaler's *Misbehaving* (2015), where two letters of the word "inadecvat" ("inappropriate") are mirrored (inversion type 3). As the word is typeset in italics, the inversion effect is very salient: *<inꙗdeꙟvat>*. The word operates as a metaphor of society, in which some individuals (= letters) misbehave by heading into the opposite direction.

And finally, 質問/*Questions* (2018) which is actually the merge of two versions of the same book (Japanese and English): the Japanese version starts on the left, every left part of a double-page containing a question in Japanese, and the English version starts on the right, every right part of a double-page containing a question in English (for a total of 365 double pages). Each cover (left and right) is the mirror of the other: on the left cover, the Japanese title is written correctly and the English title is mirrored (<質問 ꙄИOITꙄƎUϘ>), the opposite happens on the right cover (<問質 QUESTIONS>) (inversion type 3). If Western and Oriental worlds are "incompatible" as the two covers of this book seem to imply, the book has managed to establish a perfect symmetry between its two languages (the only exception being the barcodes on the right cover, which are mandatory and are placed on what is "back cover" in Japan, namely the right cover).

3.4.   Breaking RULE②-2: Graphs of the Same γ-Word Not Sharing the Same Straight Baseline

3.4.1.   The Demolished Man

Alfred Bester (1913–1987) was an American Science-Fiction author, whose novel *The Demolished Man* (1953) won the first Hugo Award in history. He was probably the author that used the most innovative graphemic and graphetic methods, in particular when representing telepathy or synesthesia. Here is a short example of a γ-word the graphs of which do not lie on a straight line:

---

7. `http://www.college-de-pataphysique.fr/`.   Let us mention the grapholinguistically important fact that the apostrophe in the name of the discipline <'pataphysique>, introduced by Jarry (1911, p. II.VII), functions as a morphological label to distinguish it from the adjective <pataphysique>.

— Étouffe ça, Linc. Ne fuse pas comme ça. Tu es gêné. Voyons si je n'arrivrerai pas à me faufiler à travers son écran mental.
— Écoute...

This example has been taken from the 2007 French translation of *The Demolished Man*, entitled *L'homme démoli* (p. 161), and seems to be an initiative of the French translator Patrick Marcel, since it doesn't appear in the original English text (we have consulted the British edition by Penguin Books, 1966). The word <faufiler> can be translated as "sneaking out" or "dodging," but in this context is the translation of "thread-needling"[8]. The dialog is done in telepathic mode, so we can assume that curving the baseline is a graphetic equivalent to the common gesture of sneaking-out.

3.4.2. Le petit sauvage

Alexandre Jardin (1965−) is a French author. In his book *Le petit sauvage* (*The little savage*) he uses many graphetic methods to illustrate the transformation of the main character, Alexandre Eiffel, who experiences a return to his youth. The first part of the book is typeset in a standard way, using a regular serif font. Once the transformation has occurred, the font switches to sans serif and the text is strewn with graphetic particularities. One of them is the following paragraph (p. 191):

Le catamaran voguait sur la houle qui se creusait. J'étais heureux, pleinement confiant. Il ne me restait plus qu'à me laisser exister avec naturel. Je pouvais remettre une montre à mon poignet, recupérer mes cartes de crédit et racheter une voiture, plutôt que de circuler sur un vélo rouge. L'heure n'était pas aux artifices. Bah... le mal de mer, comme c'est pénible...

describing the main character's journey on the sea and his sea-sickness. While Bester, in the previous example, has imitated a gesture, here Jardin generates a discomfort similar to sea-sickness by requiring the reader read the wavy lines. The method used here is based on what Leeuwen (2006, p. 146) calls the 'experiential metaphor', namely when "a material signifier has a meaning potential that derives from our physical experience of it".

---

8. The original of this excerpt is: "Choke it, Linc. Don't jet off like that. You're embarrassed. Let's see if I can't maybe thread-needle through that mind block.' 'Listen—'" (p. 98 of *The Demolished Man*).

3.5. Breaking RULE②-3: Graphs of the Same γ-Word With Different Sizes

Again in the second part of *Le petit sauvage*, Jardin uses graphs of progressively smaller sizes (p. 205)

while keeping the same (very large) lead-in. The sentence translates as: "But slowly my eyelids close, I don't see anything anymore…". By forcing the reader's eye to progressively switch from extra-large to tiny type, Jardin manages to produce a sensorial effect of tiredness and sleepiness. Part of the method is the switch from all-caps to lower case for the two last words, and then the repeated use of the first letter <r> of the word <rien> indicating both that the act of conscious thought has stopped and that snoring has started.

3.6. Breaking RULE②-4:Graphs of the Same γ-Word With Different Styles

Richard A. Lupoff (1935−) is an American science-fiction author and anthology editor. In his short story *With the Bentfin Boomer Boys on Little Old New Alabama*, he uses several graphetic methods, including style change inside a word: "be*lieve*" (p. 280), "*centi*meters" (p. 285), "*low*cut" (p. 289), "*some*thing" (p. 318), "in*side*" (p. 321), and "*us*ships, *them*ships" (p. 339). We can assume that the switch to italics represents sonic salience.

3.7. Breaking RULE②-5 or 6: Graphs of the Same γ-Word From Different Font Families, or Being Different Allographs of the Same Grapheme

It seems that the concept of word is tightly connected to the uniqueness of font family or allographic representatives, therefore we were not able to find examples of these rules being broken.

3.8.   Breaking RULE③-7: Nonstandard Hyphenation

Hyphenation is handled by editors and typographers at the very last stage of book preparation, just before printing. Therefore most authors do not interfere with it, unless they use a special page layout. This is the case of Claude Ollier's *Fuzzy Sets*. Claude Ollier (1922–2014) was a French writer involved in the Nouveau Roman literary movement. The novel *Fuzzy Sets* (1975) has a different page layout for almost every page (see also Knee (1984)).

Pages 93, 94 and 95 consist of pairs of triangular paragraphs:

Only the upper triangles contribute to the narrative thread of the novel, while the lower ones contain unrelated random text.

The triangular parts of the upper paragraphs consist of a total of 53 lines, 34 of which end with a complete word (or final word part), nine ending with a standard hyphenation (<meu-//ble>, <sor-//tiront>, <é-//clusée>, <dou-//blure>, <lé-//ger>, <cô-//té>, <fer-//me>, <al-//ler> and <ter-rain>), two ending with a standard hyphenation but without a hyphen dash (<aus//si>, <l'é//moi>), two ending with an apostrophe (where line breaking is normally prohibited), and the remaining five ending with broken words *not* respecting hyphenation rules and *not* using a hyphen: <g//râce>, <C//omme>, <d//oivent>, <u//ne>, <n//arrations>. In the latter five cases, words are systematically broken after the first letter.

The graphetic method used here consists in hyphenating in two different ways according to rules or by breaking them. In the first case a hyphen is used, but not in the second.

3.9.   Breaking RULE⑤-1: Nonstandard Morpheme Order

The Curious Incident of the Dog in the Night-Time (2003) is a mystery novel by British author Mark Haddon (1962–). Although not explicitly stated as

having Asperger's syndrome, the main character has behavioral difficulties. When walking alone at the Paddington railway station he faces an anxiety crisis caused by information saturation (p. 208–209):

> and then I took my hands away from my ears and I groaned to block out the noise and I looked round the big room at all the signs to see if this was London. And the signs said:

> But after a few seconds they looked like this

> because there were too many and my brain wasn't working properly and this frightened me so I closed my eyes again

The first image is a series of brand marks and logotypes, with a few (innocuous) pictograms (toilets for men and ladies, information, smoking forbidden), separated by interword spaces and hyphenated (using a hyphen) at line end. The second version is rearrangement of brand mark and logotype parts, interspersed by aggressive pictograms (sculls, bombs, bolts of lightning, the toilet for men pictogram without the ladies counterpart, etc.). There are no interword spaces anymore, and hyphenation is done without a hyphen. But even without interword spaces, fonts are alternating in such a way that parts of brand names and logotypes are still recognizable. Using the method of 'experiential metaphor', Haddon manages to transmit to the reader the feeling of being lost and terrified in a labyrinth of meaning. Probably as a private joke (or as a glimpse into the

main character's soul) at the beginning of the eight line we read <qed> ("quod erat demonstrandum") the acronym that acts as a beacon of salvation to mathematicians since it marks the ends of proofs.

Among the translations of this novel, the Brazilian, German and Italian ones keep the English version of these images, the Dutch, French and Spanish ones adapt them linguistically, and the Portuguese one uses the Spanish adaptation.

3.10. Breaking RULE⑤-2: Nonstandard Morpheme Separators

In one of his early novellas, *Nous rêvions d'Amérique* (2002), the French author Thomas Day (1971−) uses the following title (p. 3 and 5):

<p align="center">N.OUS R.ÊVIONS D'A.MÉRIQUE</p>

In this sharp critique of contemporary America, an aged Hopi Native American, Hoijer, leaves his reservation for a journey to an NRA convention in San Francisco, in order to kill as many participants as possible, as revenge for a mass murder that occurred two years earlier, in which his 5-year old grand-daughter was among the victims.

The title of the novella, "We were dreaming of America," is a common locus for generations of Europeans—nevertheless its nostalgia is disrupted by the "intruder" dots in the title, which unveil the initials "NRA". Combining the acronym method with the regular title is a graphemic method acting in a way similar to ateji (cf. §3.18), as it injects new layers of meaning and establishes a dialog between them. Day's achievement is to have reached this goal without adding any new morphemes, as would be the case in ateji annotation.

3.11. Breaking RULE⑩-1: Nonstandard Syntax

Speculative fiction abounds with cases of nonstandard syntax, starting with the famous Yoda syntax "Found someone, you have, I would say, hmmm?" (*Star Wars*, Ep. 5), which illustrates OSV word order, as in Japanese.

In this paper we are interested in graphemic and graphetic methods, and nonstandard syntax as in Yoda's case is perfectly standard from the graphemic point of view. We will, nevertheless, mention three texts in which nonstandard syntax is combined with graphetic methods.

3.11.1. Sparkie's Fall

The author Gavin Hyde is a complete unknown.[9] His entire œuvre consists of three short stories and *Sparkie's Fall* (1959) is the last among them.

---

9. In Pohl (1960, p. 166) one reads: "A few years back, in Ireland, Ray Bradbury spent some very productive months. Not only did he write the script of one of the best

In this 4-page very short story, a human is forced to land on a planet and his ship is surrounded by two gigantic whale-like aliens. He communicates with them through a device called a "mechanical Translator".

This device writes sentences with explicit intention marking (an exclamation mark at sentence beginning), syntagm variants (in parentheses) and keywords for categories such as NAME and GARBLE.

Here is an excerpt:

> "NAME, I am worried. Could Sparkie (eat) (be nourished by) GARBLE?"

And then the answer: "!, (stop) (cease) (desist from) worrying, NAME. Sparkie is (in admirable condition) (fine)!"

It had taken him twenty years to get "Sparkie" out of his family's vocabulary. And now the first two "people" he met in outer space called him Sparkie.

Just because they were bigger than he was!

After having telepathically scanned Sparkie's memory, the two aliens seem to be very knowledgeable about his condition as they are discussing him like an old married couple:

> "NAME-"
> "?"
> "It is (odd) (strange) (perplexing)."
> "?"
> "I am thinking of Sparkie's mind ... NAME!"
> "I am awake!"
> "Sparkie is so (small) (weak) (defenseless)."
> "(Hm) (Mm) (Mmm)."
> "His mind is like a (piece) (sheet) of GARBLE. We think on the (bases) (conditions) (roots) of our experience, our perceptions which are multiplied by (objects) (things) (forms of matter) which we have sensed. Sparkie must think with the (toys) (playthings) of his earth only. How can he understand us? What does he know of GARBLE, GARBLE or GARBLE for example, this (small) (weak) (defenseless) being? NAME!"
> "! Go to sleep."

---

motion pictures of recent years—Moby Dick was its name—but on a side trip he met a young writer [= Gavin Hyde] who had just turned his hand to science fiction, and persuaded him to let American editors see the results. Star was delighted to acquire two of them" (followed by the titles of two stories by Hyde). According to @Valorum from the scifi.stackexchange.com forum, Gavin Hyde is probably yet another pseudonym of Ray Bradbury, because of the following facts: (1) Bradbury is said to have "discovered him" on a trip to Ireland (which seems unlikely), (2) Bradbury had a history of using pseudonyms, (3) there exists no other biographical information for this quite competent author, and (4) in his texts one encounters repeated uses of chess imagery, something that Bradbury would use often.

The story has a tragic end as Sparkie leaves his vessel to face the aliens and the Translator continues to "spit papers, violently" and "[a] great rocking bellowing sound [is heard] and a smell of sorrow spread skyward".

We don't know whether Hyde was professionaly involved in early versions of automatic translators (after all, it was in the fifties that automatic translation had its first spectacular outburst), but the use of parentheses to annotate variant translations (even for interjections such as Hm/Mm/Mmm) and of capitals for generic syntactic categories must have been quite surprising for an average reader in the fifties.

3.11.2. Silent Brother

Algis Budrys (2931−2008) was the son of the Lithuanian consul general in the US when the Soviet Union occupied Lithuania in 1940 and his family left the diplomatic service and became chicken farmers in New Jersey. It is no wonder that his novels and stories are filled with Cold War fear and suspicion. In his short story *Silent Brother* (1956), which he signs as Paul Janvier, he describes the slow appropriation of the main character's body and psyche by an alien. At some point, a device built by the alien during the main character's sleep emits a beam that blocks his thoughts. Budrys writes the following paragraph to illustrate the main character's mental confusion:

English (1956)	German (1965)	French (1969)	Japanese (1969)
Blink can't *think* blink rhythm I *think* blink trick think *blink* sink blink *wink*— CAN'T *THINK*!	*Blink* kann nicht *denken* blink Rhythmus *ich denke* blink Trick denken *blink* sink blink *wink—kann nicht denken!*	*Paupières* peux pas *penser* paupières pulsations *pense* paupières poisson d'avril penser *paupières* patatras paupières *papilloter*— Peux pas *penser!*	またたきのリズムがおれの考えをまたたかせ、またたき、考え、またたき、トリックがまたたき、おれは考えをまたたこうとして−だめだ！

The lack of syntax, the alternation of roman and italics and the repetitive <ink> suffix motive show the despair of the main characters trying to resist but not able to build a single sentence. The German version is a nearly-identical translation of the English one (even though the word "wink" does not have the same meaning in the two languages), while the French version is based on the repetition of words starting with a <p>. The Japanese version is a standard translation (words "sink" and "wink" have been omitted) where words for "trick" and "rhythm" are in katakana, since they derive from English.

3.11.3. Old Testament

Jerome Bixby (1923–1998) was an American science fiction author who wrote, among other things, a *Twilight Zone* episode and four *Star Trek* episodes. His short story *Old Testament* (1964) is a pun to pseudoarchaeological theories like the ones exposed in Pauwels and Bergier's *The Morning of the Magicians* (1960) and in Charroux's *One Hundred Thousand Years of Man's Unknown History* (1963). In it, a human spaceship visits the Sirius IV planet, avoiding as much as possible being noticed by the indigenous primitive civilization. When the humans leave the planet, they discover a native baby abandoned in a basket. They immediately return and discreetly deposit the baby in the middle of a village. In the second part of the short story, an indigenous narrator gives eir version of the baby's return, where the astronauts have become "good gods" and the child a self-proclaimed prophet, "Messenger of the Good Gods," to which "They" have given a "fragment of the Sun," which is actually a flashlight pen (called "pencil-flash" in the story, p. 103) the child has stolen from the ship:

English (1964)	Italian (1964)	French (1983)

I happy. Everybody like little one. He friend of good gods. Other mothers take care of him. Let him drink. Let other little ones drink. Do for each other, I happy because good gods bring him back
 	
        to His people, and the First Night did ring with rejoicing; for He had returned from the Land Beyond the Sky and He said unto those who waited They are Good Gods, and I am Their Messenger, and lo! They have given to me a fragment of the Sun that I may shed light over darkness and open your eyes to good and gentle ways.
	Io felice. Tutti volere bene mio piccolo. Lui amico di buoni dèi. Altre madri avere cura di lui. Lasciare lui succhiare. Lasciare altri piccoli senza madre succhiare. Servire uni per altre, e io felice perché buoni dèi portare lui indietro…
	
	                    alla Sua gente, e la Dolce Notte risonò di canti; poiché Lui era tornato dalla Terra al di là del Cielo per dire a coloro che aspettavano: Essi sono gli Dèi Benigni, e io sono il Loro Messaggero, e guardate! Essi mi hanno dato un frammento di Sole, affinché io possa spandere la luce tra le tenebre e aprire i vostri occhi sulle cose buone et gentili.
		Moi heureux. Tous aimer petit. Petit ami bons Dieux. Autres mères prendre petit, donner boire petit. Faire les uns pour les autres. Bien. Moi heureux parce que bons Dieux ramener petit
		
		                    à Son peuple, et la Première nuit fut emplie de réjouissances, car Il était revenu du Pays Au-Delà du Ciel et Il dit à ceux qui attendaient qu'ils étaient de bons Dieux et qu'il était leur Messager! Voyez! Ils m'ont donné un fragment de Leur Soleil pour que Je puisse répandre la Lumière dans les ténèbres et ouvrir vos yeux sur ce qui est juste et bon.

In the middle of the narration there is a transition: from syntax-less pidgin language, the narrator switches to a pastiche of Biblical text where all pronouns referring to the astronauts are capitalized, as they are called "Gods". This transition is emphasized by two graphetic methods:

1. the first line of the "Biblical" text starts exactly underneath the location where the pidgin text ends;
2. pidgin text is in roman and "Biblical" text in italics (the styles are reversed in the French version, and in Italian there is no style change because the magazine is set by typewriter).

The story ends when the reader discovers that the "Biblical" text is in fact an excerpt from the "Sirian Bible," which a young Galactic Federation student is reading and wondering where the "Gods" came from, before closing it and moving to the next interstellar Bible.

3.11.4. The End

The American author Fredric Brown (1906–1972) is known for his very short and ingenuous stories. One of them, *The End* (1961), a 105-word story, first published in the 'adult' magazine *The Dude*, is perfectly symmetric with respect to word order: at the climax of the story, when a scientist having invented a machine making time run backwards pushes a button, the entire story is written anew, backwards word-wise, so that it consists of 52 words in standard order, followed by a pivot word (<backward>) and the same 52 words in reverse order.

Here is the central part of the story in three languages (we have underlined the pivot word):

English (1961)	French (1963)	German (1963)
Pushing a button as he spoke, he said, "This should make time run backward run time make should this," said he, spoke he as button a pushing.	Et, tout en appuyant sur un bouton, il dit: «Ceci devrait faire repartir le temps à rebours à temps le repartir faire devrait ceci», dit-il bouton un sur appuyant en tout, et.	Er drückte einen Knopf, während er sprach, und sagte: »Das sollte die Zeit zurücklaufen lassen zurücklaufen Zeit die sollte das«, sagte und, sprach er, während Knopf einen drückte er.

In French, whenever there is an elision phenomenon, the two words are considered as a single one, such as <j'ai>. Even the composite and elided <l'équation-clé> is considered as a single word and hence remains unchanged in the reversed text. In the case of German, the (same) composite word is inverted: <Zeit-Theorie> becomes <Theorie-Zeit>—this only happens because the constituents are separated by a dash, while the

undashed composite word <Schlüsselgleichung> remains unchanged in the reverted part of the story.

The story ends with the inversion of the title: <END THE> (resp. <N.I.F.> in French and <ENDE DAS> in German). In a Whorfian perspective, it raises the question whether it suffices to reverse word order in order to experience time backwards.

3.12.   Breaking RULE⑩-2: Insertion of Fragments in Other Scripts

Introducing non-Latin script text fragments into ordinary Latin-alphabet text is a very rarely used graphemic method—after all, no author or publisher expects eir readers to be able to decypher foreign scripts. We have found two exceptions to this rule.

3.12.1.   Rendez-vous pour amant·e·s égaré·e·s

In the 2018 novel *Rendez-vous pour amant·e·s égaré·e·s* by young French author Éric Abbel, the two main characters O and U are lovers of undefined gender, and thanks to gender-neutral writing (cf. Haralambous and Dichy, 2019), nothing in the novel allows the reader to identify their genders. When introducing a third character, a math professor who interferes in the relationship between O and U, Abbel uses the Russian/Ukrainian word <Одержимый> ("passionate") (p. 40):

> Ce lundi-là comme chaque lundi, O posait pour l'Académie des Arts Appliqués, dans la classe du professeur Одержимый, qui enseignait la perspective dans l'art abstrait.

We notice that more than the half of the graphemes of <Одержимый> (namely <д>, <ж>, <и>, <ы> and <й>) are unrecognizable by the average French reader. The name is used nine times in the novel and it would be interesting to find out what reading strategies readers of the novel apply to render it phonetically.

3.12.2.   Le Voyage de Mao-Mi

French author Lisa Bresner (1971–2007) wrote several children books, in which Chinese characters are inserted into French text to familiarize children with sinographs.

Here is an excerpt of her 2006 novel *Le voyage de Mao-Mi*:

> Mais en voyant une forme à 二 oreilles, 四 pattes, 一 queue
> et 五 moustaches, Fleur Sauvage en mord son chapeau à pleines dents.
> Petit Tang avait raison. Mao-Mi sort de la sacoche et vient vite se réfugier
> dans les bras de sa maîtresse.
> Tandis que Fleur Sauvage caresse son chat, Petit Tang plonge ses mains dans
> le cartable de son amie.
> – Et d' 一 , dit-il. La poudre 黑 de notre ami le Maître du 火 .
> Il cherche de nouveau et en sort un 伞 .
> – Et de 二 , continue Petit Tang. L'invention de notre ami le Maître de l' 水 .
> Il fouille encore et n'en tire rien.

As this excerpt appears towards the end of the book (p. 40), Bresler uses sinographs *instead* of French words (mainly representing numbers), while at the beginning of the book sinographs often *repeat* French words, which are then set in bold face, as here for the word <Bonjour> (p. 8):

> – **Bonjour** 你 好 , Petit Tang, salue
> le papa.
> – 你 好 , dit à son tour Petit Tang,
> avant d'ajouter : 你 好 , Fleur Sauvage,
> en voyant son amie.

3.13.   Breaking RULE④-1: Nonstandard Spaces Between Words

Charlemagne Ischir Defontenay (1819–1856) was a French physician and author. His novel *Star ou Ψ de Cassiopée* (1854) is one of the first science-fiction works in history. Defontenay was discovered by Raymond Queneau, who considered him as yet another "fou littéraire" (literary madman).

Citing Jaccaud (2008),

> As an amazing precursor of modern poetry, Defontenay, seeking to build estrangement, discovers the importance of space between words, the void that generates universes.

Indeed, when narrating the discovery of alien artefacts on the Himalayah, Defontenay uses irregular spacing between words or syntagms to increase the effect of estrangement and of cold. Here is an example of this graphetic method (p. 19):

> I
>
> Malgré mon froid dégoût pour ce hideux spectacle,
> la curiosité   me poussait cependant   à faire l'exa-
> men   de la masse céleste   qui pendant un instant
> avait pesé peut-être   dans la main de Brahma,   ou
> qui du moins au ciel   avait longtemps erré   dans les
> flots supérieurs   de la mer des étoiles.

3.14.   Breaking RULE⑭-1: Words on Nonstandard Base Lines

In §3.4 we gave an example of graphs of a given γ-word not sharing the same straight baseline. Here we deal with γ-words individually set in a standard way but belonging to sentences set in nonstandard way.

The following telepathic dialog appears on p. 24 of Bester's *The Demolished Man*. Bester uses vertical dimension to denote temporality and imaginary base lines as discursive unit identifiers. We have attempted to identify discursive units and display them through colored arrows on the right side:
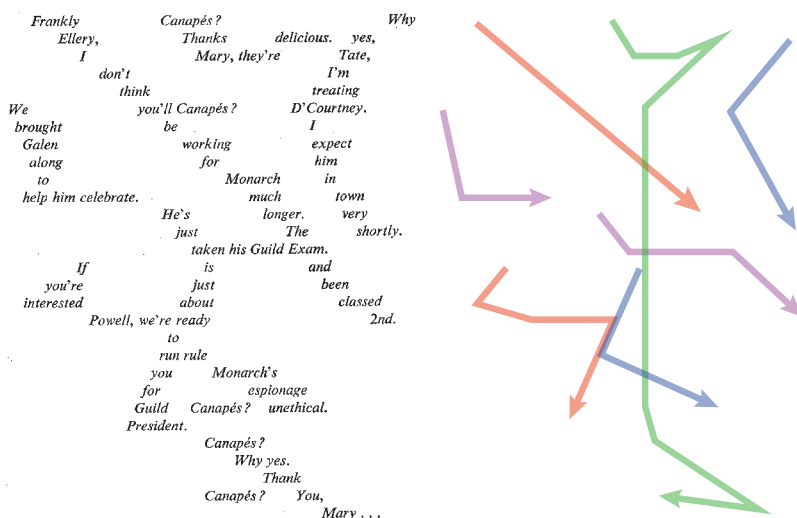
It is interesting to note that these discursive units seem to interfere with each other, for example towards the middle of the time frame, we have, in different sentences, expressions related to time: "very shortly," "much longer," "just about". In particular, there is confusion in the center of the diagram: the sentence "He's just taken his Guild Exam. and been classed 2nd." (violet arrow) occupies the imaginary line of the sentence starting with "Frankly, Ellery…" (orange arrow). If this is the case, then the word "The" on line 13 does not belong to any sentence, and the sentence "is just about ready…" (blue arrow) starts out of nowhere. Bester has brilliantly managed to illustrate both the power and the confusion of telepathic communication, as long as we admit that telepathy uses communicative units equivalent to (1-dimensional) phonemes and not to (2-dimensional) graphemes.

3.15.   Breaking RULE⑭-2: Words in Different Sizes

Changing word size is not very uncommon, as graph size can be associated to sonic salience. To give an example, let us return to Jardin's *Le petit sauvage* (§3.4.2) with the following excerpt from the second (sans-serif) part (p. 238):

> Manon est là, devant moi !
> Je la respire, la devine dans l'obscurité. Sa silhouette se
> dessine devant moi. Je suis **heureux, heureux, heureux,**
> **heureux, heureux.**
> Soudain le courant revient ; la lumière s'allume.

Alexandre illustrates his happiness by repeating the word "happy" with increasing emphasis. The paragraph change after the largest <heureux> word is necessary to avoid having the inverse effect of a "small" word <Soudain> following a large word, which would be interpreted as a negative event, a loss of self-confidence and inspiration.

3.16.   Breaking RULE⑭-3: Words in Different Font Families

Font family change between words is rather rare, for various reasons: (1) the two font families have to be easily identifiable so that an average reader can unambiguously identify them when applied on an arbitrary word; (2) they should carry connotative features that justify the font change.

Here is a case where this graphetic method has been applied. Bester, in his *The Demolished Man*, uses a switch to a blackletter font, in a telepathic dialog (p. 22):

> Instantly came a familiar sensory impact: Snow/mint/tulips/
> taffeta.
> 'Mary Noyes. Come to help the bachelor prepare for the party?
> Blessings!'
> 'Hoped you'd need me, Linc.'

Here the gothic font connotes Christmas atmosphere, as a complementary perception to those of snow, mint, tulips and taffeta. Bester uses a typically American blackletter font (Cloister Black) with short (final) <s> letters, which gives the utterance a sense of conventional modernity (in a traditional setting, the greeting would rather be <Blessings!>). By using a clearly American font in a modern way, Bester avoids confusion with German Fraktur fonts connotating German culture or even Nazism as in the Austrian publicity "Gehen Sie wählen! Andere tun es auch." ("Go vote! Others do it too.") (Haralambous and Dürst, 2019, p. 138).

3.17. Breaking RULE⑭-4: Words Using Different Allographs

3.17.1. Tiger! Tiger!

In his novel *Tiger! Tiger!* (1955), Alfred Bester describes a community of people in a spaceship. This community descends from scientists, therefore they call themselves "Scientific People" and worship a deity called "Holy Darwin". Their names, tatooed on their fronts, all contain a letter <o> that is either replaced by a male symbol <♂> or by a female symbol <♀>. Interestingly, the English edition of the text describes the allographs but does *not* use them:

> Across the brow was tattooed JOSEPH. The <O> in JOSEPH had a tiny arrow thrust up from the right shoulder, turning it into the symbol of Mars, used by scientists to designate male sex. (p. 26)
>
> Three girls appeared before Foyle. Their faces were hideously tattooed. Across each brow was a name: JOAN and MOIRA and POLLY. The <O> of each name had a tiny cross at the base. (p. 27)

On the other hand, the French translation (*Terminus les étoiles*, 2007) keeps the description, but also iconically uses the corresponding allographs:

> Sur le front on lisait le mot: J♂SEPH. Le «O» de J♂SEPH portait une petite flèche en haut et à droite : il devenait ainsi le symbole de Mars utilisé par les savants pour désigner le sexe mâle. (p. 40)
>
> J♂seph fit un geste, et trois filles se rangèrent devant Foyle. Elles avaient le visage hideusement tatoué. Sur chaque front était gravé un nom : J♀AN, M♀IRA, P♀LLY. Le «O» de chaque nom portait une petite croix à la base. (p. 41)

According to Smith (2016, p. 15), Bester is "gently satirizing what he saw as the all-too-common tendency of some science-fiction writers to treat science as a magic talisman and of certain readers to accept it as such".

3.17.2. Les Furtifs

Alain Damasio (1969–) is probably the most famous living French sience fiction author, even though none of his works has yet been translated into English. In his 700-page novel *Les Furtifs* (2019), he collaborated with an École Estienne-graduate font designer and graphic artist, Esther Szac,[10] to massively include allographs in the text. Here is a complete list of the allographs used, as well as their numbers of occurrences in the novel:
– a: |ă| (609 times), |ã| (1), |æ| (1);

---

10. https://www.estherszac.com/

- c: |ċ| (1,457), |č| (830);
- d: |đ| (40);
- e: |ė| (475), |ĕ| (1), |ę| (1), |ẹ| (1);
- f: |ſ| (563);
- g: |ġ| (473), |ğ| (281), |ġ| (248);
- h: |ĥ| (260), |ħ| (21);
- i: |İ/ı| (107), |į| (47), |í| (14), |ĩ| (5);
- j: |ȷ| (549);
- k: |ķ| (1);
- l: |ł| (672), |l·| (459), |ļ| (36);
- n: |ņ| (1);
- o: |õ| (620), |ǫ| (548), |ơ| (430), |θ| (145), |ǒ| (40), |ó| (14), |θ| (8), |ő| (4), |ō| (1);
- p: |Ᵽ| (6), |þ| (1);
- r: |ɼ| (414), |ɾ| (57), |ŕ| (9), |ř| (2), |ŗ| (1);
- s: |š| (218), |ś| (6), |ş| (2);
- t: |ŧ| (215), |τ| (30), |ţ| (1), |ṭ| (1);
- u: |ŭ| (14), |ů| (5), |ū| (1), |ų| (1);
- v: |ṽ| (22).

As can be seen in the list above, allographs have been taken from several Latin-alphabet languages (Romanian, Portuguese, Swedish, Irish, Czech, Icelandic, Polish, etc.) as well as from Greek script: |ǒ|, |τ|, |ṽ| and from Cyrillic script (Ukrainian language): |ɼ|.

The novel uses six characters as first-person narrators. Some of the allographs used are specific to a given narrator, and others are common between more than one narrator:

Narrator	% of paragraphs	Allographs	
		Specific	Common with others
Lorca	38.87%	ĠİōęŲ	óĊċėġLŁſȷo
Sahar	17.66%	ãıņśţū	ċčġL·ɼŭſȷů
Saskia	26.36%	æĂăĞğĤĥřɼ	íóĊċČčėġL·ɼŠůoɼ
Nèr	2.86%	ĐđĦħłŦtΘθϴᎱ	ŁŠ
Agüero	10.88%	ĢġįķlŎơŞŢ	íóL·ɼȷů
Toni	3.37%	þĘęĩőŖštŏŭ	íČſɼ

where the second column gives the percentage of paragraphs narrated by each narrator. As we can see, Lorca, Sahar and Saskia (the three most elaborated characters) use dotted allographs, while Nèr uses mostly allographs with bars, Agüero uses allographs with cedillas or ogoneks and Toni uses, amongst others, the three Greek allographs. To illustrate the use of these allographs for the different characters, here are three typical examples:

Saskia (p. 132):

ʾAğ)üero s'ăvanče,) se déčale. Il tire măintenănt sur lă porte d'entrée de lă măison. Un bruit de boomerănğ hăčĥe l'ăir… Où il est ? Une énième seringüe părt en missile et čontourne lă măison ăvănt de filer vers lă porte où se tient Nèr))) Nèr ă le réflexe de plonğer) trop tărd) il prend lă seringüe en pleine čuisse. Très vite je le vois blănčhir)) il s'effondre, să tête perčutănt le béton du sol.

Nèr (p. 142):

\Słoughi,\ ił incise / ił scie. Décisif Słoughi/décisif ! Đober nøn, Đober bøit/bøîte, Đober ła nique, łe fif ił rit/ił łui pique tøuɫ, ił łe débøîte, łes incisives, ła bøîte à mołaires, ħiħi ! Ła fiłłe fiłłe-fiłłe/se faufiłe/ c'est łe fił. Qui đit ? Qui đit ? Øù ? Ħøuħøu ? Øù đønc qui đit ? Bøxer attend søn ħeure. Bøxer pas d'ħumeur ! Bøxer meurt. Ƥas ła płace đans ma głace. Qui déčħire là-đeđans ?

Toni (p. 654):

˓Ceˤ qui s'esτ passé ? Au Cŏsmŏndŏ ? I don't knŏw. Enfle le flŏu. La flŏuille. L'embrŏuillâme. Ma peau flume, je m'emplume sŏus les brasses, je cŏurs plus, je caⱴole. Tŏni Tŏut-flŏu, ich ! L'hŏmme de brume, hum, ahem, salam aleykŏum, shalŏm !

Notice that the initial ʾ…), \…\ and ˓…ˤ signs are explicit narrator marks, and are used systematically to mark the change of narrator.

The story is based on the discovery of and hunt for a species of beings called "furtives". These creatures hide from the human eye and spontaneously commit suicide when perceived by a human. The density of allographs is quite variable and this has led readers to suspect that allographs occur primarily when a furtive is close to the narrator. We have counted the number of allographs in every slice of 50 words, and here is the result:
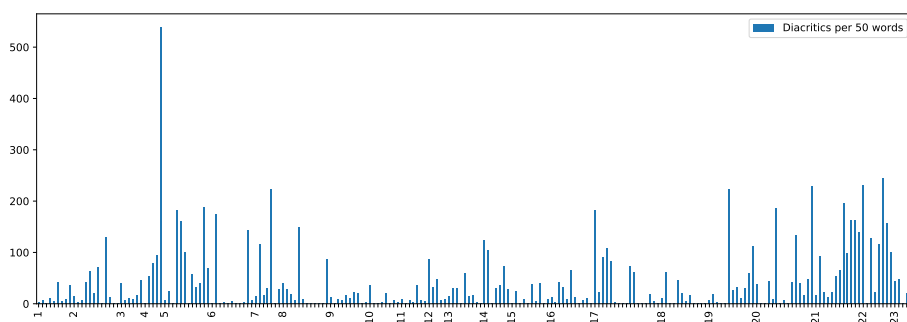
where the *x* axis is labeled by chapters. As can be seen from the diagram, allographs are not distributed equally throughout the book, and they appear grouped (especially in the last chapters). A correlation between the density of allographs and the possibility of presence of furtives near the narrator is a widespread assumption but has yet to be established.

Szac's choice of using already existing glyphs of Unicode characters as allographs raises many issues:

- was this a pure-commodity choice, avoiding having to design new graphs, while hoping that nobody would realize that these graphs existed already?
- is it politically correct to "downgrade" graphs that are graphemes in other languages into simple allographs of French graphemes? Why should <ç> be considered as a full-right grapheme while |ṭ| is merely an allograph of <t>?
- in most cases the phonetic realization of allographs is close to that of the "base" grapheme, but in some cases it is bluntly wrong: |þ|, |ɾ|, |ʃ|, |ʋ̆|, |θ| are not phonetically contiguous to <p>, <r>, <f> and <v>, <o>: is the visual resemblance sufficient to establish a grapheme/allograph relationship?
- Alain Damasio is an anti-globalization activist, but isn't the choice of using these allographs ironically at the opposite of his convictions? He takes graphs from several cultures in the world, downgrades them to purely visual ersatzes of his own language's graphemes, and includes them, without any distinction, into a graphetic soup where their origin is completely dissolved. Isn't that exactly what multinationals are doing with products from third-world countries?

3.18. Breaking RULE⑬-6: Ateji

The traditional function of interlinear annotation in Japanese is to provide reading glosses (furigana) to kanji characters. Ateji in the sense of Lewis (2010) and Melander (2016), is the "pairing of kanji and furigana that has a different meaning". In other words, ateji is a non-standard use of interlinear annotation to produce more meaning than just phonetic information. Melander (ibid.) subdivides the use of ateji into five categories: translative ("where the translation for the spoken word written in the furigana is provided in the kanji"), denotive ("in which a proper noun is given in the kanji while the pronoun actually spoken by the characters is given in the furigana"), constrastive ("when two different Japanese words are combined in order to give rise to new nuances which neither of the words express by themselves"), translative/contrastive ("the words used in the rubi are of foreign descent, but do not exhibit a one-to-one correspondence with the word being glossed") and abbreviative/contrastive ("a means of abbreviating longer words (often terminology) that are too awkward to keep repeating all the time in the story").

The Japanese author Dempow Torishima 酉島伝法 (1970−) uses contrastive ateji in his novel 皆勤の徒 *Sisyphean* (2011).

Here are some examples (we will use letters $A, B, C, \ldots$ to denote kanji characters in order to explore their combinations):

– <製臓物>: If 製臓物 is *ABC*, then *BC* 臓物 has the "entrails" meaning. The rubi せいぞうぶつ /seizoubutsu/ is the phonetic representation of $AB'C$ 製造物 "product". By combining the semantics of $AB'C$ and of *BC* we get "artificially produced entrails".
   In the English translation of *Sisyphean* this syntagm is translated by the neologism *synthorganic*.

– <隷重類>: *ABC* 隷重類 has the "heavily-burdened slave genus" meaning (*A* stands for "slave," *B* for "heavy" and *C* for "genus"). The rubi れいちょうるい /reichourui/ is the phonetic representation of $A'B'C$ 霊長類 "primates" where A' stands for "superior" and B' for "leader". By combining the semantics of *ABC* and of $A'B'C$ we get "slave primate". In the English translation this syntagm is translated by the neologism *subordinape*.

– <皿菅>: No Japanese word can be associated with the reading of 皿菅. The first part of the rubi けっかん /kekkan/ can have the meanings "blood vessel" (血管), "fault" (欠陥) and "missing volume" (欠巻). The second part, もどき /modoki/ has the meaning of "ersatz" or "imitation".
   血管 is graphically close to 皿菅, we can consider the latter as being a "simpler imitation" of the former. Therefore we can consider that the first meaning of けっかん is meant and hence we obtain for 皿菅 the semantics of "an imitation of blood vessel".
   In the English translation the syntagm has been translated by *blood sedge*.

As we see, Torishima goes well beyond contrastive ateji by creating semantic puzzles that the reader has to solve by going back and forth between base characters, their meanings and readings, and rubi.

3.19.   Breaking RULE⑬-7: Use of Interlinear Annotation

Interlinear annotation is very rarely used in fiction. Here are three examples of quite different natures:

1. asymmetric annotation, where the base is main text and where annotation takes the visual form of an exponent and functions as a context marker (§3.19.1);
2. asymmetric annotation, where the base is main text and where annotation is a separate line (in smaller graphs) and functions as a discursive thread that runs parallel to the main text thread (§3.19.2);

3. symmetric annotation, where the base and annotation are equally important, displayed like a mathematical fraction and functioning as simultaneous utterances in an alien language (§3.19.3).

3.19.1. The Demolished Man

Again in *The Demolished Man*, Alfred Bester uses the following graphetic construction:

> 'Hoped you'd need me, Linc.'
> 'Every host needs a hostess. Mary, what am I going to do for Canapés$^{S.O.S.}$?'
> 'Just invented a new recipe. I'll make it for you. Roast chutney &.'
> '& ?'

The $|^{S.O.S.}|$ annotation of the word "Canapés" gives the context of the utterance, namely Linc desperately asking for help. In oral communication this information would have been provided by prosody and in multimodal communication by a gesture. In some sense this type of annotation is very similar to contrastive atejis: a single word is annotated and the annotation contributes to the meaning of the base.

3.19.2. Libro de Manuel

The well-known Argentinian author Julio Cortázar (1914–1984) wrote a political novel, entitled *Libro de Manuel* (1973), which, incidentally, he called "the worst of his books".

In this novel he uses twenty interlinear annotations, concentrated in eight pages and expressing the thoughts of the narrator. These thoughts are uttered simultaneously to the main text but are discursively mostly independent of it.

Here is an example: on p. 130, there is annotation formulating a doubt about the "full moon" (no full moon, or anything related to it, appears yet in the main text):

> ¿Por qué la luna llena?
> para que no se le ocurriera soltar un graznido telefónicamente inquietante
> para el alborotado Oteiza que en cinco minutos arregló

On page 131 the same doubt arises again:

> pensar un poco en eso que estaba esperando en la otra punta, ir poniendo
> ¿Por qué la luna llena?
> desde ya la cara de veterinario consciente de su importante misión

On page 133 the full moon appears at last in the text, while the narrator has changed his mind as "the moon wasn't full in the first place":

<div style="text-align:right">lo mejor no había luna, haría mejor en pensar en el discurso</div>

entre las sombras de una calle llena de agujas y amenazas, aullando histéricas
sin saber de qué, de luna llena y carnaval

This graphetic method is unique in Cortázar's work. He manages to establish a feeling of intimacy, since annotation gives the impression of accessing the narrator's deepest thoughts, while the main text is unfolding. It is also a nice reading exercise, since the reader has to process two discursive threads simultaneously, knowing that the first is formal and well-structured, and the second is spontaneous and impulsive.

3.19.3. Embassytown

In the already mentioned novel *Embassytown*, China Miéville describes the communication attempts between humans and Ariekei, resulting in the humans teaching the Ariekei how to use metaphors and how to lie. To represent the Ariekei language in written form, Miéville uses an interlinear annotation method, where both parts are of equal importance (and hence the same font size). To distinguish the two text flows that are uttered simultaneously, Miéville uses the *notation of mathematical fractions*. Weakland (2015, p. 83) states that this notation is "obviously meant to recall Saussure's graph of the linguistic sign," but we reject this hypothesis: Saussure's drawings (1995, p. 99, 158–162) contain a horizontal line that separates the two sides of the sign, but these sides are of *different natures*: the signified is represented on top and the signifier at the bottom. Furthermore Saussure's notation does not imply temporality in the horizontal direction since phonetic (and hence temporal) realization exists only in the lower part ("image acoustique"). We rather consider this graphetic method as belonging to the general category of interlinear annotations, since it consists of text flows with common temporality.

Miéville uses 159 expressions in Ariekei language notation. At the beginning these are Ariekei words: $\frac{suhaill}{jarr}$, $\frac{kora}{shahundi}$, $\frac{suhaish}{ko}$, etc.; syntagms: $\frac{shoash}{to\ tuan}$, $\frac{du\ kora\ eshin}{u\ shahundi\ qes}$, etc.; or proper names: $\frac{ez}{ra}$, $\frac{bren}{dan}$, $\frac{yl}{syb}$, etc. At the end of book, an Ariekan with the nickname Spanish Dancer starts speaking English:

English (2011)	German (2012)	French (2016)
The Ariekei sifted the datchips, listening with disbelief at how they heard what they heard. That's what I think. Spanish Dancer remained bent, but its eyes looked up at me. Perhaps it knew now, in	Die Ariekei sichteten die Datchips und lauschten ungläubig darauf, wie sie hörten, was sie hörten. Das ist es, was ich glaube. Spanischer Tänzer verharrte in einer gebeugten Körperhaltung, doch seine	Les Ariékans ont passé en revue les datapuces, en s'écoutant avec incrédulité entendre ce qu'ils entendaient. C'est du moins mon avis. Danseuse Flamenca restait penché, mais ses yeux se dressaient vers

ways it could not have done before, that what it heard from me were words. It listened. "Yes," I said, "yes," and Spanish Dancer cooed and, harmonising with itself, said: "$\frac{yes}{yes}$." (p. 364)	Augen schauten zu mir hoch. Vielleicht wusste er nun auf eine Art und Weise, wie er es zuvor nicht vermocht hatte, dass das, was er von mir hörte, Wörter waren. Er hörte zu. »Ja«, sagte ich, »ja.« Und Spanischer Tänzer gurrte, brachte das, was er äußern wollte, in Einklang mit sich selbst und sagte: »$\frac{ja}{ja}$«.	moi. Sans doute savait-il désormais, d'une façon qui lui avait été fermée jusque-là, que ce qu'il m'entendait prononcer était des mots. Il écoutait. — Oui, ai-je dit. Oui. Là, il a émis un roucoulement, puis, en harmonie, a prononcé: — $\frac{oui}{oui}$.

Once the first English word has been duplicated to become perceivable as a linguistic utterance by the Ariekans, Miéville uses the graphetic method to introduce nuances, such as a question that is first uttered as a pure question, and then a question uttered as half a question and half a statement:

Spanish attracted my attention with its giftwing. «$\frac{you\ are\ ready?}{you\ are\ ready?}$» It spoke to me softly. I hesitated and it spoke again. «$\frac{are\ you?}{you\ are}$». (p. 388)	Spanischer Tänzer zog mit seinem Präsentflügel meine Aufmerksamkeit auf sich. »$\frac{du\ bist\ bereit?}{du\ bist\ bereit?}$« Er redete leise zu mir. Als ich zögerte, sprach er erneut. »$\frac{du\ bist\ es?}{du\ bist\ es?}$«	Danseuse a attiré mon attention avec sa donaile. — $\frac{tu\ es\ prête?}{tu\ es\ prête?}$ a-t-il demandé tout bas. J'ai hésité et il a repris la parole. — $\frac{tu\ l'es?}{tu\ l'es}$.

(for some reason the German translation is missing this subtlety). With the help of the main character, Avice, Ariekans learn metaphor use and lying, which was previously a taboo in their culture. The following excerpt illustrates their perception of metaphors:

Sometimes when Spanish Dancer is talking to me in my own language, it doesn't say $\frac{metaphor}{metaphor}$ but $\frac{lie\ that\ truths}{lie\ that\ truths}$, or $\frac{truthing}{lies}$. I think it knows that pleases me. A present for me. (p. 395)	Wenn Spanischer Tänzer manchmal zu mir in meiner Sprache redet, sagt er nicht $\frac{metapher}{metapher}$, sondern $\frac{Lüge\ die\ wahrheit}{Lüge\ die\ wahrheit}$ oder $\frac{wahrheitende}{Lüge}$. Ich glaube, er weiß, dass mir das gefällt. Ein Geschenk für mich.	Certaines fois, quand il me parle dans ma propre langue, il ne dit pas $\frac{métaphore}{métaphore}$, mais $\frac{mensonge\ qui\ dit\ vrai}{mensonge\ qui\ dit\ vrai}$ ou $\frac{vérité}{mensonge}$. Je crois qu'il sait que ça me plaît. Un cadeau qu'il me destine.

In the last pages of the book, Ariekans discover that besides English, there is also French (in the French translation it is Spanish and in the German translation, again French):

THE NEW ARIEKEI were astounded to learn that Terre have more than one language. I uploaded French. "I, je. I am, je suis," I said. Spanish Dancer was delighted. It said to me, « $\frac{\text{je voudrais venir avec vous}}{\text{I would like to come with you}}$ ». (p. 402)	Die Neuen Ariekei waren erstaunt zu erfahren, dass Terre-Wesen mehr als eine Sprache haben. Ich lud Französisch hoch. »Ich, je; ich bin, je suis«, erklärte ich. Spanischer Tänzer war offensichtlich sehr erfreut und sagte zu mir: $\frac{\text{je voudrais venir avec vous}}{\text{ich möchte mit Ihnen kommen}}$.	Les Nouveaux Ariékans ont été stupéfaits d'apprendre que les Terras ont plus d'une langue. J'ai chargé de l'espagnol. — Je, *Yo*. Je suis, *Yo soy*, ai-je expliqué. Danseuse était aux anges. Il m'a lancé: $\underline{\quad}\ \frac{\text{quisiera ir con ustedes}}{\text{je voudrais aller avec vous}}$

In the example above, the Ariekan speaks the two languages simultaneously through its two speech organs. In the last sentence of the novel, not only do Ariekans adopt the English name of Embassytown, but they do it in a vertically commutative way, so that the last word of the book is in fact its title, written in Ariekan duplicate form:

By Embassytown I mean the city. Even the New Ariekei have started to call the city by that name. $\frac{\text{embassy}}{\text{town}}$ they say, or $\frac{\text{town}}{\text{embassy}}$, or $\frac{\text{embassytown}}{\text{embassytown}}$. (p. 405)	Mit Botschaftsstadt meine ich die ganze Stadt. Selbst die Neuen Ariekei haben angefangen, die Gastgeberstadt mit diesem Namen zu bezeichnen. $\frac{\text{botschafts}}{\text{stadt}}$ sagen sie: $\frac{\text{stadt}}{\text{botschafts}}$ oder $\frac{\text{botschaftsstadt}}{\text{botschaftsstadt}}$.	Par Légationville, j'entends toute la cité. Les Nouveaux Ariékans eux-mêmes se sont mis à l'appeler ainsi. $\frac{\text{légation}}{\text{ville}}$, disent-ils, ou $\frac{\text{ville}}{\text{légation}}$, ou $\frac{\text{légationville}}{\text{légationville}}$.

While the English and French versions are symmetric and can be interpreted as "the town of the embassy," or "the embassy of the town," the German one is only partly so because of case: <botschafts> is genitive and <stadt> nominative, so that either way ($<\frac{\text{botschafts}}{\text{stadt}}>$ or $<\frac{\text{stadt}}{\text{botschafts}}>$) the meaning unambiguously remains "the town of the embassy".

3.20. Breaking RULE㉔-1 and RULE㉔-2: Paragraphs of Unequal Width or With Holes

Ollier's *Fuzzy Sets* is full of cases of paragraphs with lines of unequal width that form patterns, or with holes. Here are two consecutive pages (p. 58 and 59):

Redonne vie à l'entreprise : le but est l'impossible
dernier chapitre. Ceux-là te laisseront bien achever :

louvoie de glose   en glose et retro
uve la passe   entre l'écueil
du lire et   celui de la
biffure.   Rassemble
bras et   jambes, a
nnule l'   arithmé-
tique   affreu-
se : c   haque p
artie   de ton c
orps é   gale au
corps e   ntier ! U
n remous   a affecté l
a disposi-   tion des sil
houettes : 1   e grenat du ri
deau bat l'œil,   ce grenat de rayo
nne, agressif, pâli :   « design » de bazar sur
le vaisseau de pointe. De rêve : figures d'un futur
précis. Survis !... L'éveillé solitaire — en position

                    de
                    Ripp
                    van W.
                    — n'a pas
                    fini de re-
                    censer les h
                    iatus. Anachro-
                    nique énergumène !
                    Recycle-toi sans tarder,
            sinon le vrai héros te « coiffe » sur la
        ligne et c'en est fait de ta sinécure. Retraite antici-
    pée indigne. L'abus des pseudonymes a lassé déjà, et ce
            va-et-vient entre Terre et Lunes. Il s
                    uffit d'une fois. Fais
                    ton profit de cet-
                    te mise en « to
                    uche » : null
                    e tâche ne
                    ie requi
                    ert en
                    l'in
                    st

We notice that (a) in both cases the text is complete, so that there is no obfuscation involved, contrarily to §4.1.3, and (b) Ollier's hyphenation method (see §3.8) is applied: when a word is hyphenated according to rules, a hyphen is used (ten cases, with two exceptions: <é//gale> and <in//st(ant)>), otherwise (sixteen cases), no hyphen is used.

3.21. Breaking RULE㉔-3: Paragraph with Varying Leading

The young American author Jonathan Safran Foer (1977−) used many graphetic methods in his novel *Extremely Loud & Incredibly Close* (2005), among which a very impressive decrease of leading over a range of 12 pages, combined with line obfuscation by negative kerning so that graphs are superposed (p. 273−284):
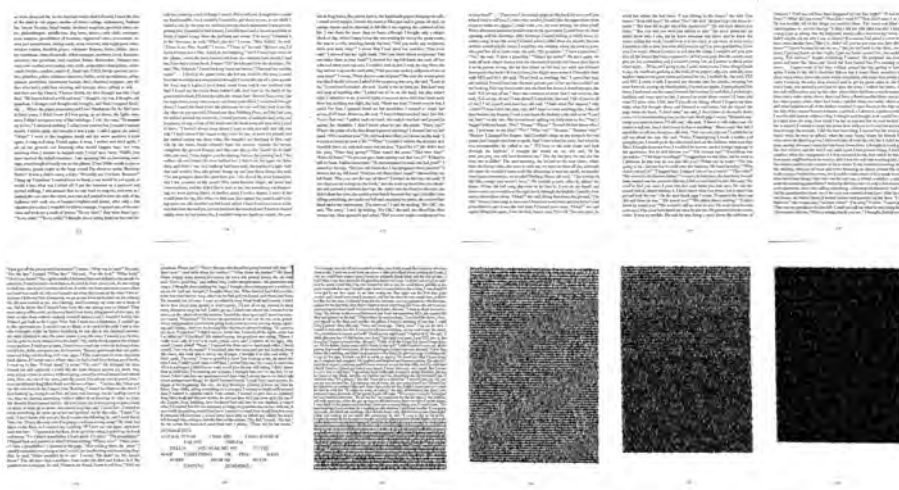
Leading is reduced progressively as follows:

Page	273–274	275	276	277	278	279	280	281	282	283	284
Lines	38	38	40	41	42	42	46	55	73	88	?
Height (in mm)	153	151	150	151	151	149	151	152	146	140	131
Leading (in pt)	11.5	11.3	10.7	10.5	10.2	10.1	9.3	7.9	5.7	4.5	?

Obfuscation starts in the lower sixteen lines of page 281, the first two lines of which are still legible and the rest, until the end of page 284, is only typographic grey evolving to total black.

The text represents the last letter of the main character's grandfather to his son, a 9/11 victim, where he narrates how he met his grandson for the first time and built a relationship with him. This graphetic method is announced on p. 276 (while the leading decrease has already started) when the main character's grandfather asserts that:

> There won't be enough pages in this book for me to tell you what I need to tell you, I could write smaller, I could slice the pages down their edges to make two pages, I could write over my own writing, but then what?

The result is reminiscent of Zeno's Paradox, as this paragraph contains text of an infinite duration of time included in a finite amount of space, so that the repetition of increasingly closer ("incredibly close," as in the novel's title) signs evolves into solid black.

Sadokierski (2010, p. 109) compares page 284 with pages containing a single word (depicting pages from the notebook the mute grandfather is using to communicate):

> The visual juxtaposition between this heavy ink and the whiteness of the single-line daybook entries visualise the complexity of his [= the grandfather's] heartache. The unreadable mess of text represents the devastating experience of facing his family, and their collective heartache, after years in self-imposed isolation. Through this device, we share Thomas senior's anxiety and claustrophobia as his world becomes overwhelmingly emotionally complex.

And Nørgaard (2019, p. 154) underlines the multimodality of the message:

> The visual density is paralleled by a density of meaning, since Thomas virtually tries to explain and make sense of everything in this chapter, and emphasis is provided in that the "same" thing is conveyed through two modes at the same time.

3.22.   Breaking RULE㉔-4: Lines with Different Sizes of Graphs

The novel *Marabou Stork Nightmares* (1995) by Scottish author Irvine Welsh (1958–) uses different graph sizes for dialogs and narrative text (p. 51):

Aye, right.

— Aye, well, so long as youse mind what ma man sais!

— Yes Mrs Strang.

— Tro Roy!

— Cheerio son. Mind son, we'll no lit thaim dae nowt tae ye. Like ah sais . . . cheerio Roy!

CHEERIO YA FUCKIN RADGE.

Nurse Beverley Norton is getting me sorted. Patricia must have finished her shift. Talk to me in your soft Coronation Street accent, Nurse Norton. Just like Dorie's . . . naw, no Dorothy's.

— We've got a visit from Dr Park this afternoon, haven't we, Roy loovey? Got to get you all nice and spruced up for Dr Park.

This example also illustrates font family change (from serif to sans serif). It is interesting to note that this example breaks another typographic rule: although the sans serif font has a significantly smaller size, the leading remains unchanged. The effect achieved by the author is a kind of introvertism: narration visually dominates oral utterances by others, and makes them seem secondary and without importance.

3.23.   Breaking RULE㉔-5: Lines w/ Graphs from Diff. Font Families

The following example is the climax of Jardin's *Le petit sauvage* (p. 179):

Je relève la tête et m'aperçois que je tremble. Mon asthme
se calme. Tout mon corps réclame une étreinte, un ré-
confort physique. Alors, guidé par une force obs-
cure, je progresse vers le fond de la grotte, vers
une nuit plus complète encore. Mondragon
ne me fait plus peur. Les parois se rap-
prochent de mes épaules mais je
poursuis à reculons, dans
un boyau ; je me
trouve bloqué
dans de la
glaise tiède.
La terre m'en-
serre et me
c a r e s s e .
Je sens que
ma voix inté-
rieure est en
train de muer.
Je suis enfin
tendre avec
moi, je vis
au présent...

It is the moment when, during a storm, Alexandre enters the cave (a metaphor of the maternal womb) and is transformed. The change occurs between the sentences "The earth surrounds me and caresses me" and "I feel that my inner voice is coming of age". The 178 pages preceding this location are set in a serif font family, the 79 following pages of the book are set in a sans serif font. We don't know whether the specific choices of serif/sans serif font (Stempel Garamond and Futura Light) have been made by Jardin himself, but these two fonts indeed have a strong historical background: both were designed in Germany during the culturally and ideologically intense Weimar Republic period, Stempel Garamond (1925) as a tribute to Venitian humanist legacy and hence to bourgeois establishment, and Futura (1927) as a revolutionary project in the spirit of Bauhaus, a tribute to freedom and anti-conformism (Haralambous, 2007, pp. 379, 399).

The paragraph takes the shape of the cave/womb, where the vertical direction metaphorically represents both space and temporality: while we read down the page we experience the character moving towards the interior of the cave.

3.24. Breaking RULE㉔-6: All-Caps (or Small-Caps) Lines

Using lines in all-caps or in small-caps is a common graphetic method. We will give three innovative examples of their use.

3.24.1. Sanctuary

In his short story *Sanctuary* (1954), the American author Daniel F. Galouye (1920−1976) describes the torture of being a telepath, unable to block other people's thoughts:

> (. . . *Harry did . . . painless job on that last tooth .   . last assignment, Cuba, was   . .*) She had almost reached the end of the page. (.   . *MISS FARLEY — NAME'S FAMILIAR   be another week before Ann . . . FARLEY — FARLEY — FARLEY . . . new skates for the kid . . . OF COURSE! THAT CRACKPOT GIRL WHO WROTE THE LET-TERS!   .*)
> She stopped writing and looked up at the doctor. "I'm the girl who wrote the letters about me and my father," she said, relieved.
> (.   . *IS THE ONE!   that crazy girl!   . . prize dopes for being roped in on   .*)
> She stood excitedly in the center of the room. "The letters were true! Everything I wrote about was true! The thoughts in my head! I can't stop them!"

Here italics in parentheses denote telepathically perceived thoughts, inside which upper case represents "sonic" salience.

3.24.2.   Journey's End

The great American science fiction author Poul Anderson (1926–2001) wrote the short story *Journey's End* in 1957. Again the main character is a telepath, Norman Kane. He empathically reads other people's minds. Towards the end of the story he receives, for the first time, a signal from another telepath, a young girl. Before meeting physically they communicate telepathically. This communication is set in italics without any upper case letters, as if thoughts need no capitals to be structured. But suddenly, when they finally meet, in a paroxysmal move, they exchange their worst actions and memories, and thereby expose their dark sides to each other. These "unspeakable thoughts" are set in small caps:

> 126   FANTASY AND SCIENCE FICTION
>
> ning to her and she was running too.
>
> *—my name is norman kane & i was not born to that name but took it from people who adopted me because i fled my father (horrible how mother died in darkness & he would not let her have drugs though it was cancer & he said drugs were sinful and pain was good for the soul & he really honestly believed that) & when the power first appeared i made slips and he beat me and said it was witchcraft & i have searched all my*
>
> need for a kiss or even a handclasp . . . not yet. It was the minds which leaped out and enfolded and became one.
>
> —I REMEMBER THAT AT THE AGE OF THREE I DRANK OUT OF THE TOILET BOWL/ THERE WAS A PECULIAR FASCINATION TO IT & I USED TO STEAL LOOSE CHANGE FROM MY MOTHER THOUGH SHE HAD LITTLE ENOUGH TO CALL HER OWN SO I COULD SNEAK DOWN TO THE DRUGSTORE FOR ICE CREAM & I SQUIRMED OUT OF THE DRAFT & THESE ARE THE DIRTY EPISODES INVOLVING WOMEN—

The idyllic situation is broken, the story ends with the antithesis of a Hollywood happy ending: "A boy and girl went hand in hand. The thought hung cold under the sky, a single thought in two minds.—*get out. i hate your bloody guts.*—".

3.24.3.   Everything is Illuminated

Foer used the all-caps method (combined with italic style) in his novel *Everything is Illuminated* (2002) to distinguish narration from synagogue prayers and preaching (p. 19):

> of cleavages below. Black pants became form-fitting, there was more bumping and swaying than ever as those *other parts* protruded in fantasies of *you know what*, and an extra hole was unknowingly inserted in the holiest of prayers: *HOLY, HOLY, HOLY,* HOLEY *IS THE LORD OF HOSTS! THE WHOLE WORLD IS FILLED WITH HIS GLORY!*
>
>   The Venerable Rabbi addressed the disconcerting matter in one of his many midafternoon sermons. *AND WE MUST ALL BE FAMILIAR WITH THAT MOST PORTENTOUS OF BIBLICAL PARABLES, THE PERFECTION OF HEAVEN AND HELL. AND AS WE ALL DO OR SHOULD KNOW, IT WAS ON THE SECOND DAY THAT THE LORD*

In this excerpt the male synagogue attendees are captivated by the view of female attendees sitting underneath them, in the basement of the synagogue and separated from them by a glass floor. The sexually explicit homophone <HOLEY> (the "hole in the holiest of prayers") of the word "HOLY" is emphasized (and hence typeset in roman) to underline its specificity and avoid considering it as a typo. Interestingly, the French translation renders this sentence as <SEINS, SAINT, SAINT, SAINT EST LE SEIGNEUR DES ARMÉES INNOMBRABLES!> without any style change for the sexually explicit homophone word <SEINS>, while the German, Italian and Dutch translations miss Froer's intentions completely by avoiding the use of sexually loaded homophones in the prayer.

3.25.   Breaking RULE㉔-7: Columns of Unequal Width

An example of this method is p. 169 of Claude Ollier's *Fuzzy Sets*, where text is typeset in two columns of unequal width. Only the first column is part of the novel's narration, while the second contains random text in the style of a technical manual:

We can consider the second column paratext of the first, since it supplies a context, probably the reading context of the main character wandering through a space ship, gathering impressions and trying to understand what is going on.

3.26.   Breaking RULE㉔-8: Columns With Independent Narrative Threads

The dystopic novel *Yama Loka Terminus. Dernières nouvelles de Yirminadingrad* (2008) written by French authors Léo Henry (1979−) and Jacques Mucchielli (1977−2011) features a chapter (p. 99−115) that is entirely set

in three equal-width columns, containing three independent discursive threads and describing events and situations occurring simultaneously. Like in a movie scenario, we get three descriptions (called <piste>, "track") of the same event sequence, written in the same pace, so that the time scale is the same for the three columns:

piste 1	*piste 2*	*piste 3*
Aéroport inter-national de Yir-minadingrad. Mercredi 3 mars. 17 h 42. Temps clair. Vent de mer sud-ouest, 14 nœuds. 17 degrés Celsius. Vol 5639 en pro-venance de Petro-grad. Tupolev 360, compagnie Aero-flot. Rogdaï Apoli-nari Stratov. Sexe	…ppelons qu'il est interdit de fumer dans l'en-semble des bâti-ments. Soyez les bienvenus à Yirmi-nadingrad, joyau du Sud, porte de la mer Noire. Votre sécurité est assurée dans cette enceinte par des patrouilles de gardes en civil et un réseau de vidéo-surveillance. Un point taxi asser-menté se trouve	Et, bien sûr, dès que je mets les pieds sur la terre ferme, revoilà la trom-peuse impression de sécurité qui naît du déplace-ment, cette idée absurde qu'Ils aient pu m'avoir oublié, perdu en plein ciel, que leurs dispositifs d'espionnage aient pu tomber en panne. Je dois me reprendre tout de suite, il n'y a qu'une

3.27. Breaking RULEⓄ-1: Page Numbers Running Backwards

In Alain Damasio's novel *La Horde du contrevent* (2004), the first numbered page carries number 700. It is an even page preceded by a numberless chapter page, which we can assume of being page 701. Pages then run backwards until the last page of the book, which, being even, is page 0.

3.28. Breaking RULE㉛-1: Paragraphs of Different Colors

3.28.1. The Neverending Story

Michael Ende's *The Neverending Story* was graphically conceived by de-signer and author Roswitha Quadflieg, who introduced a two-color code for text (see Ende, 1978 and Quadflieg, 2020). The entire book (we are referring to the German 1987 pocket edition), except the book cover, is printed in "rötlich" ("reddish," as mentioned in the text, p. 212) and "blaugrün" ("bluish green," again in the text, p. 208) color (for simplicity we will refer to these colors as "red" and "green"). (In the B&W version of the current article, red color text has been set in bold face, and green

color text in roman face, a compromise already made by the French 1984 Pocket edition.[11])

The red color denotes the "real world" of the protagonist, Bastian, who is hiding in his school's attic to read a book (which is autoreferential of *The Neverending Story*). The green color denotes the action going on in the imaginary world Fantastica.

In the figure below, the reader can see the distribution of red and green text in *The Neverending Story*. The numbers on the horizontal axis denote chapters:
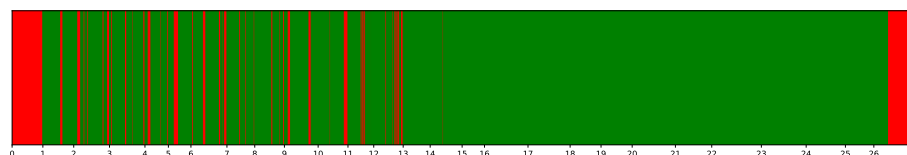
The beginning of the book is printed in red[12] up to the moment when Bastian starts reading the book (p. 18, just before the beginning of Chapter 1).

From then on, the book contents are printed in green and are interrupted by sections in red where Bastian hears the clock in the belfry striking and, for short moments, perceives his real-world situation. Green and red colors are visually separated: they are always used on a paragraph level, additional vertical space is added between paragraphs of different colors, and the paragraph after the additional vertical space is not indented.

Until p. 81, events in real and imaginary space follow two separate narrative threads. Then begins interaction between the two worlds, breaking the stereotype of the passive reader (p. 81):

> Ygramul fühlte plötzlich, daß sich ihr etwas näherte. Sie fuhr blitzschnell herum, und ihr Anblick war entsetzlich: Sie war jetzt nur noch ein riesenhaftes stahlblaues Gesicht mit einem einzigen Auge über der Nasenwurzel, das mît einer senkrechten Pupille voll unvorstellbarer Bosheit auf Atréju starrte.
>
> Bastian stieß einen leisen Schreckenslaut aus.
>
> Ein Schreckensschrei hallte durch die Schlucht und wurde als Echo hin- und hergeworfen. Ygramul drehte ihr Auge nach links und rechts, um zu sehen, ob da noch ein anderer Ankömmling war, denn der Junge, der wie gelähmt vor Grausen vor ihr stand, konnte es nicht gewesen sein. Aber da war niemand.[13]

---

11. And apparently, according to Nørgaard (2009, pp. 141–142), "while still available in the bookshop, most current editions of Ende's novel are set in black type only."

12. With the sole exception of page numbers that are green throughout the book, probably because they belong to paratext.

13. At last Ygramul sensed that something was coming toward her. With the speed of lightning, she turned about, confronting Atreyu with an enormous steel-blue face.

Here the red word <Schreckenslaut> is immediately followed by a green <Schreckensschrei>, denoting the simultaneity of the two events: "cry of fear" in the real world vs. "cry of terror" in the imaginary world, the former coming from the real-world protagonist Bastian, the latter from an origin unknown to the other two characters in the scene, Atréju and Ygramul. This event is the first breach in Bastian's reality.

In the following chapters, interaction between the two narrative levels intensifies until, on page 214, the change of color occurs in the same logical paragraph (but in different γ-paragraphs), bringing the two worlds even closer (p. 214):

> Aber die tiefe Stimme des Alten vom Wandernden Berge fuhr fort, zu erzählen,
>
> und Bastian konnte nichts dagegen tun. Er hielt sich die Ohren zu, aber es nützte nichts, denn die Stimme klang in seinem Inneren. Obwohl er längst wußte, daß es nicht so war, klammerte er sich noch an den Gedanken, daß diese Übereinstimmung mit seiner eigenen Geschichte vielleicht doch nur ein verrückter Zufall war,
>
> aber die tiefe Stimme sprach unerbittlich weiter,
>
> und nun hörte er ganz deutlich, wie sie sagte:
>
> »… Manieren hast du nicht für fünf Pfennig, sonst hättest du dich wenigstens erst mal vorgestellt.«
>
> »Ich heiße Bastian,« sagte der Junge, »Bastian Balthasar Bux.«[14]

where the five graphical paragraphs contain in fact sentences crossing paragraph boundaries and color changes. The intrasentential color switch gives the impression of going back and forth between the two worlds using the commas placed at line ends as switches. It is interesting to note that there is a pragmatic inversion: Bastian hears the voice while in red (in the real world) and speaks while in green (the imaginary world).

Her single eye had a vertical pupil, which stared at Atreyu with inconceivable malignancy.
A cry of fear escaped Bastian.
A cry of terror passed through the ravine and echoed from side to side. Ygramul turned her eye to left and right, to see if someone else had arrived, for that sound could not have been made by the boy who stood there as though paralyzed with horror.

14. But the deep, dark voice of the Old Man of Wandering Mountain went on, and there was nothing Bastian could do about it. He held his hands over his ears, but it was no use, because the voice came from inside him. He tried desperately to tell himself—though he knew it wasn't true—that the resemblance to his own story was some crazy accident,
but the deep, dark voice went on,
and ever so clearly he heard it saying:
'Where are your manners? If you had any, you'd have introduced yourself.' 'My name is Bastian,' said the boy. 'Bastian Balthazar Bux.'

A few paragraphs later, Ende uses ellipsis as a switch between the two worlds (p. 215):

> Und hier fing alles wieder von vorne an—unverändert und unabänderlich—und wiederum endete alles bei der Begegnung der Kindlichen Kaiserin mit dem Alten vom Wandernden Berge, der abermals die Unendliche Geschichte zu schreiben und zu erzählen begann…
>
> …und es würde in alle Ewigkeit so fortgehen, denn es war ja ganz unmöglich, daß etwas sich am Ablauf der Dinge ändern konnte. Nur er allein, Bastian, konnte eingreifen.[15]

Once again we have a pragmatic inversion: the sentence "and so it would go on for ever and ever," which refers to the recursive nature of the narration, is printed in red, probably signifying that Bastian accepts the logical paradox as his own reality.

The tension is growing, and a few lines further Ende uses a very ingenious graphetic method (p. 216):

> Im selben Augenblick geschahen mehrere Dinge zugleich.
>
> Die Schale des großen Eis wurde von einer ungeheuren Gewalt in Stücke gesprengt, wobei ein dunkles Donnergrollen zu hören war. Dann brauste ein Sturmwind von fern heran
>
> und fuhr aus den Seiten des Buches heraus, das Bastian auf den Knien hielt, so daß sie wild zu flattern begannen.[16]

Ende describes a storm wind that starts in the imaginary world (in green), crosses the gate between the two worlds (the book) and blows from the book's pages into the real world (in red). The sentence is broken into two γ-paragraphs (and two colors) without any punctuation, in order to increase the impression of simultaneity. The verb "fahren" ("to drive") used to describe the wind's movement in the real world is unusual, and reminiscent of a verse of a Brahms's Lied: "Der Wind fährt seufzend durch die Nacht" ("The wind goes sighing though the night,"

---

15. At that point the story began all over again—unchanged and unchangeable—and ended once again with the meeting between the Childlike Empress and the Old Man of Wandering Mountain, who began once again to write and tell the Neverending Story…
…and so it would go on for ever and ever, for any change in the sequence of events was unthinkable. Only he, Bastian, could do anything about it.

16. In that moment several things happened at once.
The shell of the great egg was dashed to pieces by some overwhelming power. A rumbling of thunder was heard. And then the storm wind came roaring from afar.
It blew from the pages of the book that Bastian was holding on his knees, and the pages began to flutter wildly. Bastian felt the wind in his hair and face. (The English translation splits the sentence "Dann brauste ein Sturmwind … zu flattern begannen" into two sentences, spoiling the graphetic effect of the original German text.)

poetry by Emanuel Geibel). This is the only place in the book where the change between colors is intrasentential and without punctuation.

The second part of the book is entirely typeset in green, with a single exception (the thin line between labels 14 and 15 in the diagram of p. 320) (p. 240):

> Der Sandhügel, auf dem Bastian gerade stand, war ultramarinblau. Durch ein kleines Tal von diesem getrennt, lag eine feuerrote Düne. Bastian ging zu ihr hinüber, schöpfte mit beiden Händen von dem roten Sand und trug ihn zu dem blauen Hügel. Dann streute er auf den Seitenhang eine lange Linie. Er ging wieder zurück, holte neuen roten Sand und das tat er immer wieder. Nach einer Weile hatte er drei riesengroße rote Buchstaben auf den blauen Untergrund gestreut:
>
> <div align="center">B B B</div>
>
> Zufrieden betrachtete er sein Werk. Dieses Zeichen konnte niemand übersehen, der die Unendliche Geschichte lesen würde. Was auch immer nun aus ihm werden mochte, man würde wissen, wo er geblieben war.[17]

We have here another graphetic method: In the sand, Bastian draws his initials, which belong to the real world and therefore have to be red.

The climactic moment of the book is Bastian's return to the real world, and there again Ende uses an ingenious graphetic method to increase its dramatic effect (p. 475-476):

> Bastian warf sich in sie hinein—und stürzte ins Leere.
> »Vater!« schrie er, »Vater!—Ich—bin—Bastian—Balthasar—Bux!«
> »Vater! Vater!—Ich—bin—Bastian—Balthasar—Bux!«
> Noch während er es schrie, fand er sich ohne Übergang auf dem Speicher des Schulhauses wieder, von wo aus er einst, vor langer Zeit, nach Phantásien gekommen war.[18]

Between his fall into emptiness and the reappearance of the school attic, the transition is given by Bastian's cry, printed in two different colors.

---

17. The sand hill where Bastian was standing just then was ultramarine blue. And separated from it by a narrow cleft there was a fiery-red dune. Bastian crossed over to it, gathered up sand in both hands and carried it to the blue hill. Then he strewed a long line of red sand on the hillside. He went back, brought more red sand, and repeated the operation. Soon he had fashioned three enormous red letters against the blue ground:

<div align="center">B B B</div>

He viewed his work with satisfaction. No reader of the Neverending Story could fail to see his message. So whatever happened to him now, someone would know where he had been.

18. Bastian [...] flung himself into the empty darkness beyond.
"Father!" he screamed. "Father! I—am—Bastian—Balthazar—Bux!"
"Father! Father! I—am—Bastian—Balthazar—Bux!"
Still screaming, he found himself in the schoolhouse attic, which long, long ago he had left for Fantastica.

By writing the same graphemic sentence twice (except for the incise "schrie er," "he shouted"), we can assume that there has been only a single cry, emitted in both worlds simultaneously (as a person experiencing two realities simultaneously when awakening from a dream).

In the first transition (from the real world to Fantastica) the trigger was a storm wind, i.e., a natural element, independent of Bastian's will. The second transition the trigger is Bastian's cry during his fall into emptiness. The change of color gives a dramatic depth to this transition, which sympathetically restores the reader's equilibrium.

The efficiency of color change is acknowledged among other scholars by Nikolajeva (1990), who states in her study of *The Neverending Story* based on Propp's structuralistic theory of morphology of tales (Propp, 1968), that

> Incidentally, […] insertions, marked by a different print color, are much more numerous than most readers would guess. When asked, most people say there are 12-15; there are actually forty-eight of them. I find this fact worth mentioning because it shows how skillfully Michael Ende has interwoven the two seemingly independent stories.

We found two more speculative fiction works using color to make meaning, we will briefly describe them in the following sections.

3.28.2. The Strange Library

The most famous contemporary Japanese author, Haruki Murakami (1949−) wrote a novella for children, called *The Strange Library* (2005). This novella has many points in common with Ende's *The Neverending Story*: again it is a boy who, returning from school, visits, not a bookstore but a library, where three books are given to him to read. In his adventure, he meets a girl, whose "vocal cords were destroyed when [she] was little" (a reference to his most famous novel, *1Q84*) and so she communicates with him "with her hands".

Marakami uses blue color for the girl's utterances (replaced by bold in the B&W version of this paper):

> It's a fine moon, she said to me. Tomorrow it will be the new moon, and the sky will be dark.
> "We must feed the parakeet," I said.
> Didn't you feed the parakeet a little while ago? she asked.
> "You're right, I did," said the me that was Ibn Armut Hasir.
> The girl's silken body glinted in the light of the razor-thin crescent moon. I was spellbound.
> It's a fine moon, she repeated. The new moon will shape our destinies.
> "That would be terrific," I said.

The use of color underlines the boy's supernatural ability of understanding a voiceless girl communicating "with her hands". It is combined by the absence of double-quotes, which can be interpreted as markers of "real speech," while the girl probably communicates telepathically or in some other mysterious Murakamian way. It should be noted that none of the other translations we examined (German, Spanish, French, Italian and Turkish) use blue color like the Japanese and English versions. Instead of color, here is what these versions use to distinguish the narrator's utterances from those of the voiceless girl:

language	narrator	voiceless girl
Japanese (2005)	quotes 「 」	quotes 〈 〉
German (2013)	roman, quotes » «	italics
English (2014)	roman, quotes " "	roman, blue color
Spanish (2014)	roman, em-dash	roman, quotes « »
French (2015)	roman, em-dash	italics, quotes « »
Italian (2015)	roman, em-dash	roman, quotes « »
Turkish (2016)	roman, quotes " "	roman, angular brackets < >

There are 26 segments in blue color, distributed in the following way (numbers denote chapters):
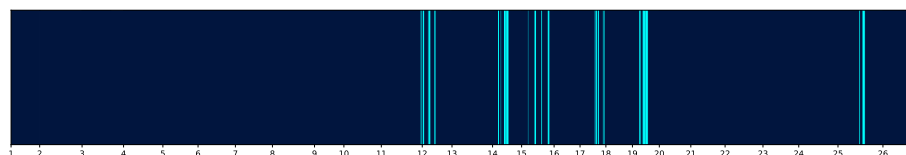
3.28.3.   David Feldts efterladte papirer

As mentioned in Nørgaard (2019, pp. 101–104), in his novel *David Feldts efterladte papirer* ("David Feldt's leftover papers," 1997), the Danish author Mads Brenøe (1968–) uses blue color to represent writings by a second personality of the (schizophrenic) narrator. In this second personality he is a man letting the woman he loves starve to death (blue color represented by bold face in the B&W version of this paper):

Original Danish (1997)	Translation by Nørgaard (ibid., p. 103)
Pennen var usædvanlig god at skrive med. Som forudset gjorde den lille drejning i skaftet, at den nærmest afsig selv føjede sig ind i min hånd. Som var jeg skabt til netop at holde denne pen og ingen andre.	The pen was incredibly nice to write with. As expected, the little curve of the holder made it fit into my hand almost by itself. As had I been made to hold exactly this pen and no other.

Men så læste jeg, hvad der stod på papiret. Håndskriften var min, ingen tvivl om dét, men ordene havde jeg aldrig set før:	But then I read the text on the paper. The handwriting was mine, no doubt about that, but the words I had never seen before:
Vand kan hun tåle, men det er også alt. Kun vand. Da det gik op for mig, tog jeg mine forholdsregler, sørgede for, at hun ikke ved et uheld skulle komme til at gøre sig selv ondt.	Water she can stand, but that is all. Only water. When I realised that, I took my precautions, made sure that she would not harm herself by accident.

In this excerpt the narrator realizes that when he uses a specific golden fountain pen, his other personality is revealed. As Nørgaard (2019, p. 104) concludes:

> The use of the distinctive feature of color for the realization of the two narratives combined with their increasing interrelatedness helps construct a significant aspect of the meaning of the novel, i.e., the possible schizophrenic nature of Feldt's psyche and the likelihood that he is, in fact, the man who kills the woman by starving her to death.

There are 18 segments in blue color, distributed in the following way:
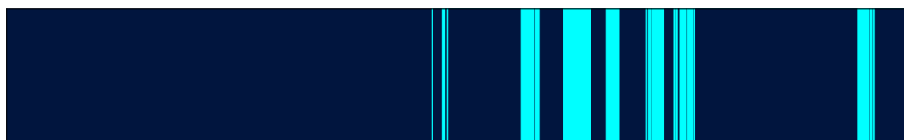
3.29.   Breaking RULE㉛-2: Paragraphs of Different Graph Size

Jardin, in the *Le petit sauvage*, changes font size at the paragraph level to increase the stress of the main character being propelled on scene by a harsh wheel-chaired manager, in front of hundreds of "pairs of eyes" (p. 221):

Here, font size is correlated with perceptual salience (as mentioned in the excerpt: "the projectors blind me and increase the perception I have of my body").

3.30.   Breaking RULE㉛-3: Paragraphs of Different Font Family

In the same novel, Jardin changes font family to underline the difference between two characters in a dialog (p. 222):

> En sortant de scène, je tombe sur Ange ; bouleversé, il me serre les deux mains.
>   — *Câlice ! La grande Lola ! T'as fait un triomphe. Mais qu'est ce qui t'a pris d'aller jusqu'au bout ? C'était pas prévu d'enlever ta petite culotte.*
>   — Je suis **LIBRE**.

While the main character, and narrator, keeps the same Futura Light as elsewhere in the second part of the book, the lines of the other character, a ruthless cabaret manager, are set in Stempel Garamond Bold Condensed Italic. The interjection <Câlice!> is typical of Quebécois French and leads the reader to imagine this line pronounced with Canadian accent, a fact that further justifies the change of font.

3.31.   Breaking RULE㉞-1: Immoderate Use of Footnotes

Footnotes are only sparsely used in fiction: they may be encountered in translations to either give additional information on the cultural background of some excerpt, or to indicate that a given part of the text is originally written in the language of the translation. James G. Ballard (1930–2009), a British novelist known for his car-crash sexual fetishistic novel *Crash*, wrote a 18-word experimental story entitled *Notes Towards a Mental Breakdown* (1976) in which every word carries a footnote mark: the real story is contained in the 18 footnotes. Here is the full story with the first footnote:

> A[1] discharged[2] Broadmoor[3] patient[4] compiles[5] 'Notes[6] Towards[7] a[8] Mental[9] Breakdown[10]', recalling[11] his[12] wife's[13] murder[14], his[15] trial[16] and[17] exoneration[18].

---

1. The use of the indefinite article encapsulates all the ambiguities that surround the undiscovered document, *Notes Towards a Mental Breakdown*, of which this 18-word synopsis is the only surviving fragment. Deceptively candid and straightforward, the synopsis is clearly an important clue in our understanding of the events that led to the tragic death of Judith Loughlin in her hotel bedroom at Gatwick Airport. There is no doubt that the role of the still unidentified author was a central one. The self-effacing <A> must be regarded not merely as an overt attempt at evasion but, on the unconscious level, as an early intimation of the author's desire to proclaim his guilt.

Formally the story has the structure of a scholarly text with commentary footnotes, but in fact, as the text per se is ridiculously short, it is solely through the footnotes that the reader has access to the story line.

The, very Oulipean in nature, rule of assigning a footnote to every word, including grammatical words such as articles, pronouns, and conjunctions, mocks the scholarly processes of annotation and commentary and forces the reader to follow a zigzag reading strategy between main text and notes, constantly turning pages back and forth.

This story inspired Murry C. Christensen, who created a "hyperbook" (a decade before the invention of the Web) based on Max Ernst's and Paul Eluard's *Une semaine de bonté* (a surrealistic collage novel from 1934). It also inspired the Portuguese music group Iurta (dark ambient and industrial act) so that its first album carries the name of the story.

3.32.   Breaking RULE㉛-4: Allograph Variation Between Paragraphs

Gahan Wilson (1930–2019) was an American author and cartoonist, known for his cartoons in *Playboy* and *The New Yorker*. In 1972 he experimented with the use of image as part of text. He called his story <●> (no phonetic rendering of this grapheme is given). Not only does this grapheme appear throughout the story, but its graph actually grows like a living creature. Here are the sixteen occurrences of the grapheme in the story, together with their functions:

(1) p. 12, centered between two γ-paragraphs.

(2) p. 13, centered between two γ-paragraphs and (3) inline, as a noun.

(4) p. 14, inline, as a noun. End of sentence without period.

(5) p. 14 centered between two γ-paragraphs and (6) inline, as a noun.

(7) p. 14 centered between two γ-paragraphs and (8) p. 15, inline, as a noun.

(9) p. 17, centered between two γ-paragraphs, introduced by a colon, and (10) centered between γ-paragraphs but grammatically in the sentence, as a noun.

(11) p. 17, centered between two γ-paragraphs, introduced by a colon, and (12) p. 18, centered between γ-paragraphs but grammatically in the sentence, as a noun.

(13) p. 19, centered between two γ-paragraphs.

(14) p. 20, centered between two γ-paragraphs, introduced by a colon and (15) p. 21, centered between two γ-paragraphs but grammatically in the sentence, as a noun.

(16) p. 22, centered after the last γ-paragraph.

Allograph (16) appears after the following closing line:

"That's right, Archie," he said, the door swinging open, all unnoticed, behind his back. "The thing's a carnivore."

In the Introduction to the story, Ellison (1972, p. 10) gives more information on its origin:

> When it came time to assemble this book, I contacted Gahan and suggested he invent a whole new kind of story, a combination of words and pictures in which one could not survive without the other. A verbalization, as it were, of the peculiarly Gahanoid humor seeping (one might even venture festooned) from his cartoons. I said it could be possibly termed a "vieword" story. Gahan liked the sound of the word, and what he contributed follows.

The author adds the following in the Afterword to his story (p. 23):

> [...] Ellison has coined "vieword" to describe the storytelling technique employed in ⬤, and I suppose that will do (after all, it is his collection) until the literary historians come up with something maybe a little classier. The vieword approach is an attempt to expand the panel cartoon, which is a combination of a visual impact and words. In a panel cartoon the drawing does not illustrate the caption, nor does the caption explain the drawing. They are interdependent parts of one thing. The comic strip is one way of trying to develop the one shot impact of a panel cartoon, the vieword is another.
>
> I have always thought, and I guess my work shows it, that this picture-word medium lends itself to the fantastic grotesque, and ⬤ is nothing if not fantastically grotesque. I enjoyed very much writing-drawing it, and I hope that you enjoyed reading-seeing it.

The "vieword" <⬤> is used both as a syntagm and as a complete centered paragraph. Having allographs to simulate the evolution of a living creature is a unique grapholinguistic curiosity and a nightmare for librarians: ⬤ has not yet been proposed for insertion in Unicode and even if this happens, the odds of it being accepted are thin. In Gahan Wilson's Wikipedia page of Gahan Wilson, the character 0x25CF BLACK CIRCLE is used as an ersatz, since <⬤> definitely lacks the property of being a circle.

3.33. Breaking RULE㊶-2: Pages with Different Background Color

Starting with p. 249, the last 9 pages of Jardin's *Le petit sauvage* are printed as white text on black background. Here is the transition from white to black background (p. 248 and 249):

The goal of this graphetic method is to illustrate the narrator's total blindness, caused by a brain tumor and leading to his death on page 251 (pages 252–256 contain no text and page 257 contains a tombstone inscription: <CI-GÎT LE PETIT SAUVAGE (1962–2001)> ("Here lies Petit Sauvage (1962–2001)").

3.34. Breaking RULE⓯-1: Physical vs. Logical Order of Subdivisions

3.34.1. Nous rêvions d'Amérique

In his novella *Nous rêvions d'Amérique* (2016) (see also §3.10), Thomas Day numbers chapters in inverse order. The text narrates the journey of the Native American Hoijer to San Francisco, culminating with a mass murder at an NRA convention, so that the chapter numbers act as a countdown. The mass murder occurs in Chapter 1, which is not last since the novella ends with an idyllic Chapter 0, in which Hoijer invites all his beloved and friends, living or dead, to a barbecue on "sacred land," probably his last thoughts before his brutal death at the convention.

3.34.2. The Curious Incident of the Dog in the Night-Time

In *The Curious Incident of the Dog in the Night-Time*, Mark Haddon uses prime numbers to enumerate chapters. Chapter numbers range from 2 (the first prime number) to 233 (the fifty-first prime number). This numbering choice is explained in the text (p. 14):

> Chapters in books are usually given the cardinal numbers 1, 2, 3, 4, 5, 6 and so on. But I have decided to give my chapters prime numbers 2, 3, 5, 7, 11, 13 and so on because I like prime numbers.

This quote is followed by a description of Eratosthenes' sieve, and finally the conclusion of the chapter, which is the real explanation of the choice of prime numbers (p. 1):

> I think prime numbers are like life. They are very logical but you could never work out the rules, even if you spent all your time thinking about them.

Interestingly the choice of using the "very logical" prime numbers brings some uncertainty to the fact that "Chapter 2" is necessarily the first chapter: indeed, until about a century ago, it was unclear which one among numbers 1, 2 and 3 ought to be considered as the smallest prime (Caldwell and Xiong, 2012). Fortunately the narrator of the novel, suffering from pervasive developmental disorder, is not aware of this fact that could easily shake his already fragile Weltanschauung.

3.34.3. Dragon

In his novel *Dragon* (2016), Thomas Day goes one step further and uses significantly different physical and logical orders for the 33 chapters of the novel. In the following diagram, the horizontal axis represents pages of the printed book and the vertical axis the logical order of chapters:
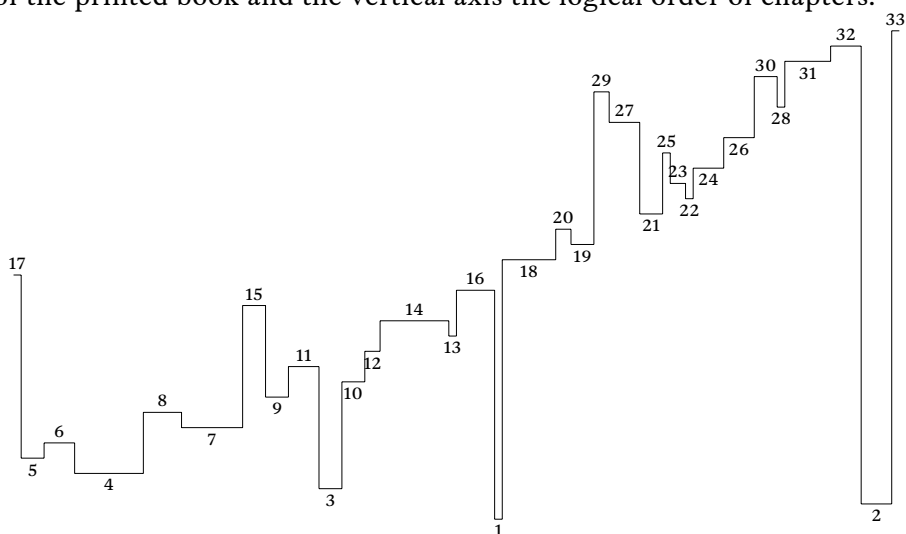
The story is about two individuals: a killer of child-abusers in Bangkok, endowed with invisibility super-powers, and a police detective chasing him—the latter finally taking the place of the former. Chapter 1

(physically in the middle of the book) explains the given name of the detective ("Tannhäuser"), Chapter 2 (physically at the end of the book) is a fairy-tale about dragons the father of the assassin was telling him in his childhood, Chapter 3 is about the sexual preferences of the detective, Chapter 4 about the killer's first attack, and in Chapter 5 the chief of the police calls the detective to inform him about the attack. As we see, the logical order is actually the chronological order of events.

The particularity of this book with respect to other books with alternative reading orders is that, besides the numbers assigned to chapters, no further explanation or instruction is given to the reader.

3.35.   Breaking RULE④-5: Blank Pages

3.35.1. Nudism

An iconic example of the use of blank pages as graphemic method can be found in Jean Cocteau's movie *Orphée* (1950) where "Le Monsieur" (Henri Crémieux) is showing Orphée (Jean Marais) a booklet carrying the title *Nudisme*, a collection of poems by Jacques Cégeste (Édouard Dermit), all pages of which are blank (p. 17):

> ORPHÉE: Je ne vois que des pages blanches.
> LE MONSIEUR. – Cela s'appelle: «Nudisme».
> ORPHÉE. – Mais c'est ridicule…
> LE MONSIEUR. – Moins ridicule que si ces pages étaient couvertes de textes ridicules. Aucun excès n'est ridicule! Orphée… votre plus grave défaut est de savoir jusqu'où on peut aller trop loin.[19]

---

19. ORPHEUS.—Every page is blank.
LE MONSIEUR. – It's called "Nudism."

As states Dworkin (2013), in his excellent analysis of emptiness in art:

> Given the title, Orpheus might have expected a plainspoken or unartificed poetry, something in the style of an unornamented *genus humile* or *genus tenue*, but Cégeste has stripped away not just the rhetoric of a particular mode but any visible language at all. The work lays bare (*mise à nu*) the page itself: the physical facture of the book as an object; the substrate of print, the typical technological support of poetry at midcentury.

Other authors considered *Nudisme* as an attempt to poke fun at the avant-garde, or as a Dadaist joke. Others again see in it the influence of Marcel Duchamp, or the influence of John Cage's *Lecture on Nothing* performance (1948). We consider it to be the most extreme case of graphemic method: the total absence of graphemes.

3.35.2. You Shall Know Our Velocity

In his debut novel *You Shall Know Our Velocity* (2002), the American writer Dave Eggers (1970−) intersperses three empty pages (p. 157-159) into the narration of a big jump of a boat on a stormy sea:

> The boat was skipping and then there would be a larger wave, or we would hit a regular wave a certain way, and the pause between when we became airborne
>
> [3 empty pages]
>
> and *WHACK* when we landed we landed like a cannon and I clenched my teeth—*BAMBAMBAM*—for the aftershocks and I looked to Hand and the old man for a commiserative glance—*what the fu-fu-fuck?*—but no one wanted to share.

156   157   158   159   160
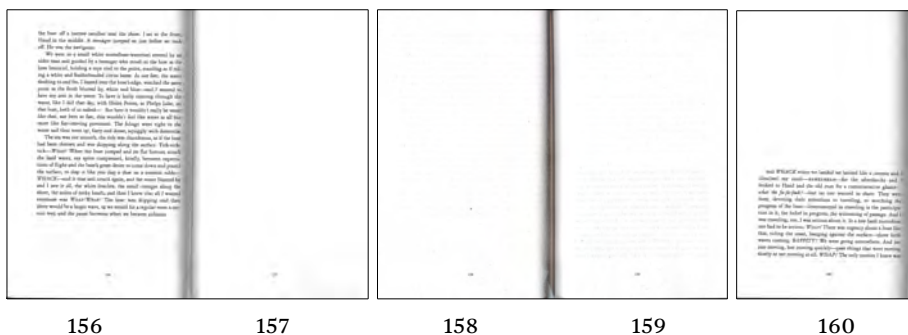
ORPHEUS. − It's absurd....
LE MONSIEUR. − Less absurd than if it were full of absurd writing. No excess is absurd. Orpheus... your gravest fault is knowing how to get away with going too far.

According to Sadokierski (2010, p. 171),

> The execution of this break is particularly effective because it starts toward the bottom of the first page, soars across the facing page, the double page spread, then comes back down to almost where it started. Our eyes are forced to follow the trajectory of the boat. Whether this is a typographic device (an absence of typography) or an illustrative device (a presence of white space) is debatable but irrelevant for the purposes of the argument here—this device allows us to share the velocity of one of the few moments in the novel that Will [the main character] experiences pure exhilaration.

We can add, in the spirit of van Leeuwen's (2006, p. 146) 'experiential metaphor', that it is not only the eyes that follow the trajectory of the boat, but that the movement of rapid page turning (rapid since the intermediate pages are empty) is a dynamic 3-dimensional metaphor of the boat's jump, where the edges of pages becomes crests of the waves. It also produces an impression of acceleration as the reader momentarily increases the reading pace, and this graphemic method is similar to Foer's decrease of leading and blackening of page in *Extremely Loud & Incredibly Close* (§3.21), where time seems to slow down and stop. Graphemic/graphetic methods can act on reading speed, their effect on the reader's physiology and reading experience is a vast domain that still remains to be explored.

4.   Obfuscation

In the previous sections we have defined an ontological model of the literary text (specific to the prose genre) and we have given examples of exceptions to these rules. In this section we will concentrate on a process for which authors have invented many graphetic methods, namely *obfuscation*.

Here is a simplistic classification of graphetic methods used for obfuscation (references 4.1.1, … correspond to examples given below):
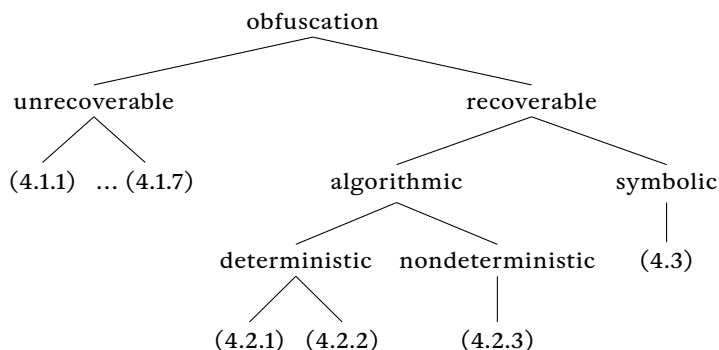
We consider two main categories of methods: *unrecoverable obfuscation*, where information is hidden from the reader, and *recoverable obfuscation*, where the reader can recover the hidden information more or less easily, or where the information is not really hidden and obfuscation is only hinted at. In the following sections we provide examples illustrating the twelve cases from the diagram.

4.1. Unrecoverable Obfuscation

4.1.1. The People of Paper

The American author of Mexican descent Salvador Plascencia (1976−) has used black areas in his fantasy novel *The People of Paper* (2005) to represent a thought-shielding technique used by an infant (Baby Nostradamus) to protect other characters from the influence of Saturn. In the following excerpt, another character, Apolonio, trains Baby Nostradamus to shield thoughts (p. 160):

The blackened-out shape covers exactly the paragraph quoted above. The following consecutive odd pages show the growing effect of Baby Nostradamus's shielding technique (pp. 187, 189, 191):

Thought-shielding is so efficient that on page 191 only the paratextual information providing the narrator names is visible to the reader (and hence also to Saturn).

4.1.2. L'enchanteur

One of the last works of the greatest French science-fiction author, René Barjavel (1911–1985), is the fantasy novel *L'Enchanteur* (1984) based on the saga of the Quest of the Holy Grail. When, towards the end of the novel, Guenièvre and Lancelot finally are about to engage in intercourse, he provides a textual equivalent of the cinematographic trope of a door being closed during a sex scene (p. 342):

> Alors laissons Guenièvre et Lancalot murmurer, balbutier, chanter leur amour, leur folie, leur éblouissement. La porte s'est refermée. Éloignons-nous en silence...[20]

À L'INTÉRIEUR
DE CETTE
PAGE BLANCHE
GUENIÈVRE
ET LANCELOT
S'AIMENT.
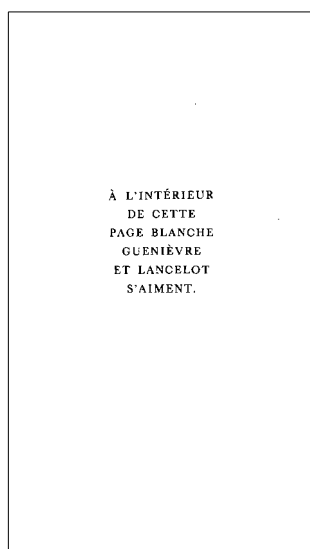
followed by the blank page displayed on the left (p. 343), carrying the inscription "INSIDE THIS BLANK PAGE GUENIÈVRE AND LANCELOT LOVE EACH OTHER." where the French term for "blank page" is actually "white page" (the archaic meaning of "blank") and white is the color of innocence and purity. This is a special kind of obfuscation since the existence of obfuscated text is not even alluded, what is hidden is the action happening during the time the reader would take to read this page. The page is transcended: from surface it becomes volume ("À L'INTÉRIEUR DE CETTE PAGE" literally means "in the interior of this page," suggesting the page is a room, the door of which has just closed, leaving the reader outside). The author could very well end the chapter with p. 342 as the suspension points trigger imagination and information enough has been given about what is happening. But Barjavel has chosen to add this page in order to use a "documentary trope": the sentence is reminiscent of TV reporters reporting events happening in a closed locus behind them, events inaccessible to the spectator but trustworthy since the narrator/reporter is physically close to the location where they are taking place. Documentary

---

20. "Let Guenièvre and Lancelot whisper, stammer, sing about their love, their madness, their amazement. The door closed. Let us silently move away..."

"is still the filmic mode most capable of representing reality" (Brown, 2010, p. 220) and making the Holy Grail saga realistic is clearly one of the novel's objectives.

4.1.3. Fuzzy Sets

In *Fuzzy Sets*, Claude Ollier frequently places two text blocks on the same page, one of which is part of the global narrative thread while the other consists of fragmentary and incoherent sentences. Most often, the block containing the main narrative thread is complete, but in some cases part of the block is missing and information can only partially be inferred from the surrounding text. On other pages, Ollier leaves empty forms inside paragraphs. Here are examples of these methods (pp. 85, 149 and 61):

In the first example (p. 85), the text block containing the main narrative thread overlaps the page boundary, resulting in information loss. Some missing parts can be inferred from the context (e.g., <l'interlocuteur recule d'un pas pour rétablir les//anse et l'intervalle>, etc.) but with no certainty. In the second example (p. 149), the white area inside the text block is hiding the underlying text—once again, little can be inferred from the context. The third illustration (p. 61) is a counterexample: here again a form emerges inside the text block, but text surrounds it and there is no information loss. This shows that Ollier has purposely obfuscated some parts of his text, and not others.

4.1.4. An Ordinary Spy

In his novel entitled *An Ordinary Spy* (2008), the American screen-writer, novelist and former CIA agent Joseph Weisberg (1965–) uses the iconic

blacking-out method to hide named entities and other sensitive information, as if the novel were a declassified CIA report:

> Several months before I was scheduled to leave for ▮▮▮, I was assigned to the ▮▮▮ office in ▮ Division. Depending on scheduling and other bureaucratic considerations, new case officers ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮. In my case, I was shipping out in August, so I would be in ▮ for most of the summer.
> It was a busy time in ▮▮▮, but the officers running country desks liked to handle their own work. They'd give me an occasional name trace to run, or have me coordinate a cable with another division. But I wasn't busy. I'd read the morning traffic—cables from the stations in ▮▮▮▮▮▮▮▮, and whatever ▮▮▮▮▮ traffic was coming in. I'd stop by my friends' offices throughout the building or

Interestingly, the (real-world) CIA has bridged the gap between reality and fiction by reviewing the book on its (real-world CIA) Web site (Ehrman, 2009). The review is extremely negative ("a bitter, failed novel") and criticizes the use of blacked-out text:

> Weisberg's decision to block out text—sometimes just a word or an acronym, other times up to an entire page—with heavy black bars, to give the impression of a redacted official report, makes the text choppy and at times hard to read. [...] Weisberg blacks out the names of the country and city where the story takes place (why not just invent a place?), and all we learn about it is that it is hot, humid, and a fairly long airplane ride from Washington.

4.1.5. *Extremely Loud & Incredibly Close*

In Foer's *Extremely Loud & Incredibly Close*, the main character, Oskar, is listening a discussion between his mother and his therapist behind a closed door (and using a stethoscope). He manages to grasp only snippets of the conversation: "I couldn't hear a lot, and sometimes I wasn't sure if no one was talking or if I just wasn't hearing what they were saying." Jonathan Foer uses primary direction blank space as a replacement for unheard words (p. 204):

> used to be   someone   me a question, and I could say yes,
> or   but   believe in short answers anymore.
>
>
> Maybe   the wrong questions. Maybe   to remind
> there are simple things.
>
> What's simple?
> How many fingers   holding up?
> It's not that simple

This type of obfuscation deals with narrative perspective: as the description of the world passes through the narrator, words that the narrator can not hear are hidden from the reader, but their temporality is preserved by an alignment between characters' width and time units. It is highly probably that the designer of the book had the entire text at hand and was asked to "erase" (by changing their color to void) the parts that are hidden in the printed result. Here is an attempt to fill some gaps by using the same font as in the printed book (Janson Text 56 Italic 9pt condensed 96%):

> *Maybe* *we keep asking* *the wrong questions. Maybe* *it's just* *to remind* *us that there are simple things.*

(where our insertions are in red). Giving specific widths to primary direction spaces (and not uniform ones as in *Star ou Ψ de Cassiopée*, §3.13) results in the deobfuscation of this text being a crossword-like problem, where the possible solution must not only be semantically coherent, but must also typographically fit into the voids left.

4.1.6. Filth

In his novel *Filth* (1999), the Scottish author Irvine Welsh (1958−) describes the life and suicide of a corrupted policeman. Like in Goldoni's *Pinocchio*, the main character has a companion animal that plays the role of his conscience, with the difference that here it is a tapeworm living in the narrator's bowels. The tapeworm has its own narrative thread superposed on that of the main character by the use of text areas included in parentheses and taking the shape of bowels.

At the beginning, the tapeworm's thoughts are quite primitive, it emits only invectives concerning basic actions such as eating. Furthermore, when it is not emitting, the typographic space is filled by zeros (similar to the absence of information in computer memory) (p. 119):

> Which means I have to get my A-R-S-E into G-E-A-R. That's the situ. (0000000000000000)
> The hoor starts w 00eat00000eat0000000 in mind to get a fish supper doon the 0000000eat0000000eat00 while she's away, thank fuck. I pad to 00000000eat0000000eat000 at the Dell, and cram a fistful of del 00000yes00000000yes00000 nd tender white haddock in golden 000000000000000000000 what the doctor,

Progressively, the tapeworm gains in eloquence, becomes the narrator's conscience and tries to guide him (p. 295):

> —Well, if you're gaun by Brattisani's, ah'll take a fish supper, Ray decides.
> — Roger. List [*000000eat000eat00000can you*] in provisions for the microwa[*taste it Bruce? Can you taste the*] ag. These wee pizzas are jus[*filth, the dirt, the oily blackness*] feways in packs ay ten[*of that fossil fuel in your mouth as you*] ...
> [*choke and gag and spit it out? Do you still*]

Finally, when the main character commits suicide, his narrative thread ends and only the one of the tapeworm remains, until it is expelled from his host's body and dies as well (p. 393):

> Carole, I can hear her now too, screaming BRUCE because I care and I've won and beaten the bastards but what price victory
>   STACEY PLEASE GOD BE SOMETHING ELSE SOME-
> ONE ELSE . . . [*000000000000000000000000*
>   *000000000000000000000000*
>   *I feel myself slipping out of my*
>   *Host in a large pile of his excrement*
>   *and sliding down his leg inside his*
>   *flannels. Then I'm away from him.*]

Concerning obfuscation trough the tapeworm, Crosley (2010) writes:

> When the tapeworm speaks, the page becomes illegible. Illegible and brilliant. This is Welsh's clever way out of killing his darlings. Instead he mutilates them beyond recognition, leaving passage after passage as they are but with parasitic thought bubbles that run straight down the page.

4.1.7. The Available Data on the Worp Reaction

Like "Gavin Hyde," "Lion H. Miller" may be a pseudonym and the notorious Gérard Klein, co-editor of *La Grande Anthologie de la Science Fiction* suspected that already in 1975, when he wrote "Cette signature n'apparut qu'une seule fois dans un périodique de science-fiction en 1953: pseudonyme, ou essai unique?"[21] (Klein, 1975, p. 412). But, contrarily to Gavin Hyde we have Miller's dates of birth and death, namely 1908–1987 (source unknown) and we have spotted in a 2009 catalog of signed books,[22] a volume with the inscription "To Lion Miller / winner of the Scripto Award for fiction in the Harrisburg Manuscript Club. With greetings from Conrad Richter 1958," so it seems that Lion H. Miller existed after all. In his (only) story *The available data on the Worp reaction*

---

21. This signature appears only once, in a 1953 Science-Fiction magazine: pseudonym or one-shot writer?

22. https://www.qbbooks.com/images/upload/SignedCatalog.pdf

(1953), he mocks newspaper style by censoring inappropriate words in the utterances of a rather angry character:

> Concerning the aforementioned framework the elder Worp has said, "The thing that got me, was every (deleted) piece he picked up fit with some other (deleted) piece. Didn't make no (deleted) difference if it was a (deleted) bed-spring or a (deleted) busted egg beater, if the (deleted) kid stuck it on another (deleted) part, it stayed there."

Even though the obfuscation method is destructive, we can easily imagine the identity (or at least the nature) of the deleted words.It is interesting to note that the French translation uses the much stronger term <(censuré)> "censored" to translate <(deleted)> and thereby leaves no doubt about the origin of the obfuscation. The Italian <(cancellato)> (1965) is closer to the English original.

Also, the French translation (1954) includes a footnote to the first censored utterance, in order to avoid confusion and to clarify the nature of the censored terms (p. 23):

> Les expressions et qualificatifs utilisés par M. Lambert Simnel Worp dans la conversation étant susceptibles de choquer les personnes délicates et s'accordant peu avec le sérieux de cette communication, l'auteur a jugé bon de censurer certains termes un peu trop... imagés.[23]

This footnote is written as if it were part of the text (it refers to the main text as being a scientific communication), but was in fact added by the French translator.

4.2. Algorithmically Recoverable Information

In this section we will consider cases where information has been obfuscated but can be recovered by some kind of algorithm.

4.2.1. Going Down Smooth

One of the greatest American science-fiction authors, Robert Silverberg (1935–), published a short story entitled *Going Down Smooth* (1968) in the *Galaxy Magazine*. In this story, the narrator is a robot "filthy-mouthed" psychiatrist. After a quote reminiscent of the Shakespearean "Hath not a Jew eyes? Hath not a Jew hands, organs, dimensions, senses, affections, passions?" (from *The Merchant of Venice*), the robot utters the invective "FUCK YOU" in binary ASCII code (p. 45):

---

23. As the expressions and qualifying adjectives used by Mr Lamber Simnel Worp in the conversation would eventually shock sensitive people and be incompatible with the seriousness of this communication, the author has decided to censor certain terms, considering them as too... pictorial.

> Can a person be considered obscene? Am I a person? I am a person. Hath
> not a person hands, organs, dimensions, senses, affections, passions? I have
> all of those things. I have none of those things. I am a person.
> 1000110
> 1010101
> 1000011
> 1001011
> 0100000
> 1011001
> 1001111
> 1010101
> I send an obscenity upon you, as persons do. I suffer. I think. I feel pain
> upon all my terminals. I work. I serve the greater good. I am of society. I am
> a person.

Also, in the closing paragraph of the short story there is again binary code, representing only letter <F> (p. 51):

> 1000110 you. And you. And you. All of you. You know nothing. Nothing.
> At. All.

According to the British Science-Fiction author Langford (1999),

> The swinging 60s were nearly over, but still no rude words were permit-
> ted in *Galaxy*. Then Silverberg got handed one of those odd magazine assign-
> ments, to write some fiction to go with this cover painting showing gigan-
> tic periscopes. Easy—he shoved them into the story ('Going Down Smooth',
> 1968) as one of the hallucinations suffered by an insane computer. A foul-
> mouthed insane computer, that said:
> 1000110
> 1010101
> 1000011
> 1001011
> Victorian obscenity often appeared in what they called the decent obscu-
> rity of a learned language: Latin. It made sense for the dirty bits in Ameri-
> can sf to be concealed in binary ASCII code—which, of course, hardly anyone
> knew in 1968 ...

More than a decade before Douglas Adams's depressed robot Marvin in *H2G2* and eight years before Asimov's *Bicentennial Man*, Silverberg underlines the quest for humanity of the depressed robot psychiatrist by having it/em utter obscenities. Using ASCII was an in-joke and a means to avoid censorship: *Galaxy Science Fiction Magazine* was quite a popular publication with a young audience and no 1968 censor would be able to decypher binary code.

It should be noted that this short story appeared only five years after the first edition of the ASCII standard (ASA, 1963), at a period where personal computing was still more than a decade ahead. Therefore Silverberg can be considered as having been very well informed about computer internals. Also the idea of the robot psychiatrist may have been inspired by the Rogerian psycho-therapeutic program ELIZA, one of the

first chatbots in history, released in 1966 at the MIT Artificial Intelligence Laboratory by Joseph Weizenbaum.

There have been numerous translations of *Going Down Smooth*, but as far as we know only one actually translates the binary part. The 1975 German, 1976 Dutch and 1979 French translations keep the same binary code. In the 1976 French version the letter "F" appears in the title and in the closing line: <Je vous 1000110> ("I F you"); in the German version, the closing line is <1000110 Sie sich> ("F yourself")—in both cases the F letter functions as a verb. In the 1969 Italian version, the binary code is corrupted so that it falls outside the ASCII range (an additional 0 is added between first and second position). In the 1976 Italian version, the closing line is <Sei un 10000110> ("You are an F")—here letter "F" functions as a noun. The 1976 Dutch version leaves the sentence untranslated and takes advantage of the phonetic and graphemic proximity of Dutch and English: <1000110 you. En jou. En jou> as translation of "1000110 you. And you. And you".

The only case, in our knowledge, where the encoded sentence is actually translated, is the 2002 French translation, where <1000110> (letter "F") is replaced by <1001110> (letter "N") in the title: <Je vous 1001110>. The binary code translates as <NlQUE TA RACE>, a racist insult. It is interesting to note that there is an error in the code of the French 2002 translation: instead of a capital <I> letter (code 1001001) a lowercase ell letter (code 1101100) is used. The corresponding graphemes are homographic in many fonts. According to the translator Durastanti (2020), this confusion originates from a look-up error in online ASCII tables.

4.2.2. La horde du contrevent

In his first novel, *La horde du contrevent* (2004), Alain Damasio uses progressive de-obfuscation while repeating the same paragraph in order to create new meaning (p. 703, which is in fact the first page of the book, see §3.27).

The paragraph starts with a quasi-Biblical phrase "In the beginning there was speed," leading us to consider it as a narration of the creation of the universe of the book. In the Bible, humanity (and hence, language) is created on the fifth day—Damasio provides five versions of the same paragraph, out of which only the fifth is complete. In each round, graphs are placed at the same location as in the final paragraph. Therefore one can consider this graphetic method as a cinematographic one, representing a gradual appearance of the graphs. But looking more closely one realizes that in all instances of the paragraph (besides the first, which contains only punctuation: cosmic dust) the visible graphs recombine and form new words, e.g., the first paragraph can be read as <fuit pur fou os stance jus bile jus vivant lemme lié poussière>, twelve French words that mostly disappear in later stages (only two persist until the last paragraph).

,   ,   , «   -   ».
,   ,   ,
,   ,   .
,   ,   .

,   fu   it , pur   , «   fou   ».
os   stance   , jus   ’
bi   le , jus   ’   vivant,   ’   .
, le   mme lié, poussi   e   r   e

l’or gi e fut   vitesse,   ve   nt furtif, « vent-fou   ».
le cosmos   , prit   s a   forme,   ’
lente   table ,   vivant jus   ’ vous.
Bien   à toi,   homme lié, pouss   e   vite   .

l’origine fu   s e, le pur   ouve   rt , « en foudre ».
Puis le cosmos   ,   consista   , jusqu’au
s   table ,   ’au viva t, jusqu’à vous.
Bienvenue   , lent homme   , ou   tre   de vi es   .

À l’origine fut la vitesse, le pur mouvement furtif, le « vent-foudre ».
Puis le cosmos décéléra, prit consistance et forme, jusqu’aux
lenteurs habitables, jusqu’au vivant, jusqu’à vous.
Bienvenue à toi, lent homme lié, poussif tresseur des vitesses.

This paragraph, known as the "À l'origine fut la vitesse" paragraph, also appears in an electronic music oratorio[24] by Philippe Gordiani,[25] performed in Lyon, in 2019.

4.2.3. Extremely Loud & Incredibly Close

The previous two examples were algorithmically recoverable obfuscations: in the case of Silverberg, it suffices to replace binary numbers by ASCII characters, and in the Damasio case it suffices to raise graphs from the bottom of the page to the locations of the missing ones. In this section we will consider an example of *nondeterministic* obfuscation, i.e., an obfuscation allowing more than one possible recovery.

In Foer's *Extremely Loud & Incredibly Close*, pages 269–271, Oskar's grandfather calls his grandmother on the phone, but, being mute, has no other solution than using the ISO/IEC 9995-8 mapping of letters

---

24. See https://vimeo.com/279822383 for a teaser.
25. http://www.tng-lyon.fr/artistes/philippe-gordiani/.

((ISO, 2015)) on telephone keypads to translate letters of his message into digits, and then pushing the corresponding keys so that the dual-tone multi-frequency signals are played. Foer provides the digits (the sounds of which would have been perceived by Oskar's grandmother, assuming she had perfect pitch) (p. 269):

> 6, 9, 6, 2, 6, 3, 4, 7, 3, 5, 4, 3, 2, 5, 8, 6, 2, 6, 3, 4, 5, 8, 7, 8, 2, 7, 7, 4, 8, 3, 3, 2, 8, 8, 4, 3, 2, 4, 7, 7, 6, 7, 8, 4, 6, 3, 3, 3, 8, 6, 3, 4, 6, 3, 6, 7, 3, 4, 6, 5, 3, 5, 7! 6, 4, 3, 2, 2, 6, 7, 4, 2, 5, 6, 3, 8, 7, 2, 6, 3, 4, 3? 5, 7, 6, 3, 5, 8, 6, 2, 6, 3, 4, 5, 8, 7, 8, 2, 7, 7, 4, 8, 3, 9, 2, 8, 8, 4, 3, 2, 4, 7, 7, 6, 7, 8, 4, 6, 3, 3, 3, 8! 4, 3, 2, 4, 7, 7, 6, 7, 8, 4! 6, 3, 3, 3, 8, 6, 3, 9, 6, 3, 6, 6, 3, 4, 6, 5, 3, 5, 7! 6, 4, 3, 2, 2, 6, 7, 4, 2, 5, 6, 3, 8, 7, 2, 6, 3, 4, 3? 5, 7, 6, 3, 5, 8, 6, 2, 6, 3, 4, 5, 8, 7, 8, 2, 7, 7, 4, 8, 3, 3, 2, 8! 7, 7, 4, 8, 3, 3, 2, 8, 3, 4, 3, 2, 4, 7, 6, 6, 7, 8, 4, 6, 8, 3, 8, 8, 6, 3, 4, 6, 3, 6, 7, 3, 4, 6, 7, 7, 4, 8, 3, 3, 9, 8, 8, 4, 3, 2, 4, 5, 7, 6, 7, 8, 4, 6, 3, 5, 5, 2, 6, 9, 4, 6, 5, 6, 7, 5, 4, 6! (… another 2,317 digits on p. 269–271)

together with punctuation marks indicating sentence boundaries. The text contains 129 sentences (actually only 40 *distinct* ones), 92 of which end with an exclamation mark and the rest by a question mark. (It is not clear how the punctuation marks are transmitted through the phone.) Mapping letters to digits according to ISO/IEC 9995-8 is a lossy operation since 3 or 4 letters correspond to each digit. On page 269, Foer gives some examples that can be elucidated without much effort (our solutions given in brackets):

> I pressed "4, 3, 5, 5, 6," [HELLO] she said, "Hello?" I asked, "4, 7, 4, 8, 7, 3, 2, 5, 5, 9, 9, 6, 8?" [ISITREALLYYOU] She said, "Your phone isn't one hundred dollars. Hello?" I wanted to reach my hand through the mouthpiece, down the line, and into her room, I wanted to reach YES, I asked, "4, 7, 4, 8, 7, 3, 2, 5, 5, 9, 9, 6, 8?" [ISITREALLYYOU] She said, "Hello?" I told her, "4, 3, 5, 7!" [HELP]

Calculations have shown that beside the first sentence (MY NAME IS ELIE ALTO (or ELI DALTO) AND I JUST ARRIVED AT THE AIRPORT I NEED TO FIND M(S or R) FINKEL"), most sentences cannot be interpreted and therefore should be considered as fake text. For more details on these calculations, see Haralambous (2020).

4.3. Symbolic Obfuscation

In this section we will consider a case of obfuscation that is only hinted at, so that information is directly accessible to the reader (but possibly not to other characters in the text).

In his novel *Censoring an Iranian Love Story* (2009), the Iranian, US-based author Shahriar Mandanipour (1957–) uses three text levels:
1. in roman face (67.6% of the text), where the narrator is addressing the reader directly and privately, without censorship;

2. in bold face (30% of the text), where the narrator is writing an "Iranian love story," to be published in Iran after being read and censored by a censor called Mr Petrovich;
3. in bold crossed-out type (2.4% of the text), where the reader can see the parts of the "Iranian love story" that the author would like to have published if there were no censorship in Iran: knowing that these segments would be censored, he crosses them out so that the story can be read in two forms: with and without censorship.

There are 164 bold crossed-out segments. Reading them in a row is reminiscent of the sequence of censored kisses in Tornatore's movie *Cinema Paradiso* (which is mentioned in the novel). The text is written is such a way that either way (with or without the crossed-out parts) it remains grammatical, for example (p. 17):

> [...] **That day, Sara went home from the university far more quickly than usual. She closed the door to her room~~, lay down on her bed~~, and began reading the book from the beginning.**
>
> I guess by now you have realized that the crossed-out words in the text are my own doing. And you must know that such fanciful eccentricity is not postmodernism or Heideggerism. In fact...
>
> And by now you have surly grasped the significance of "..." in Iran's contemporary literature.

The fact that, after censorship, text remains thoroughly grammatical illustrates the skill of censors: once the process is complete, no trace of censorship is left in the text, nobody can guess that it has even occurred, since allowing such a guess would be a serious tactical error: readers would then use their imagination to fill in the gaps...

Censorship becomes more elastic as the love story becomes more romantic. For example, while on p. 59, eye contact is censored:

> ~~**And for the very first time in this universe, their eyes meet.**~~

towards the end of the book, eye contact is allowed, as long as it avoids being a "longing look" (p. 256):

> **Then Sara smooths the satin folds of the dress ~~on her chest and stomach~~ and her eyes fall captive to ~~the longing look in~~ Dara's eyes.**

In the last chapter, when sexual intercourse between the two main characters is finally about to occur, the situation becomes so hot that the narrator/author fears that interlinear space may betray the girl's arousal and alert Mr Petrovich (the censor):

> **Two veins on Sara's ankles, the rivers Tigris and Euphrates, that have taught the agony of man's separation from man to the silver flamingos ... Two violet veins that on the peak of the ankles come together ~~and flow to that place where all the torments and joys of man are born...~~**

> Sara does not hear Dara's stream of consciousness, but having seen his caress and passionate kiss on her sandal, she sighs, a sigh that I am afraid Mr. Petrovich will hear from the white between the lines of my story.

In this novel, contradicting attitudes towards sexuality become contradicting representations of reality. By constantly switching between roman and bold (and occasionally stroked-out bold) narration, Mandanipour drives the reader into an incessant ballet between these representations, an exercise that becomes essential to survive in a constrained environment such as contemporary Iran.

5.   Pictograms and Typo-graphic Devices

We will briefly discuss two graphetic methods involving pictoriality: pictograms inside text, and text blocs taking the shape of pictures.

5.1.   The Use of Pictograms

Even though emojis have become very widespread in current digital communication, the use of pictograms in literature has been very sparse. We will illustrate this use through two examples.

5.1.1.   The Goalie's Anxiety at the Penalty Kick

The Austrian Nobel Prize-awarded author Peter Handke (1942−) wrote the novel *The Goalie's Anxiety at the Penalty Kick* in 1970. He describes a man (Bloch) with schizophrenic symptoms, in particular a dissociation between words, concepts and referents:

> He looked at it from left to right, then from right to left. He repeated the look from left to right; this look seemed to him like reading. He saw a "wardrobe," "then" "a" "wastebasket," "then" "a" "drape"; while looking from right to left, however, he saw ⊓, next to it the ⊤⊤, under it the ⬚, next to it the ⊔⊔, on top of it his ⌂; and when he looked around, he saw the ⬚, next to it the ⓐ and the ⊙. He sat on the ⊔⊔, under it there was a ⬳, next to it a ⬱. He walked to the ▥: ▥▥:
> ▭ ▭ ▭ ▭ ▭ ▭ ▭ ▭ ▭ ▭
>
> ⊞ ⊞ ⊞ ⊞ ⊞ ⊞ ⊞ ⊞ ⊞
> 🪜 🚲 ✉ 🧴🧴. Bloch closed the curtains and went out.
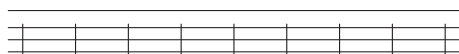
In this excerpt, Handke at first uses the graphetic method of quoting every word (to refer to the underlying concept) and then switches to pictograms, first alternating with text giving relative positions of objects referred to by the pictograms so that they function as nouns and finally writing entire sentences pictographically. This psychedelic experience is presented as a reading act and ends abruptly when Bloch leaves the room. According to Melosi (2020, p. 143–144),

> [...] the rendering of the disturbed relationship between the character and the reality that surrounds him finds expression in forms of concrete prose, in which the apparently obligatory recourse to the linguistic medium, on which Bloch can no longer rely is bypassed through the replacement of words—that is, in Peircean terms, of symbols—with those which, using the same vocabulary, are defined as icons. However, in the end not even the greater immediacy of the latter manages to resolve the psychic (as well as linguistic) crisis of the protagonist.

5.1.2. You Shall Know Your Velocity

In *You Shall Know Your Velocity* (p. 16), Dave Eggers (1970–) uses three identical images of a car inside the text (p. 16):

> In the parking lot we watched a trio of milk-white Broncos drive by— 🚗 🚗 🚗 —and we all stopped momentarily. It was bad enough that they still made them in that color, but to see three at once seemed to bode ill. The girls were unimpressed, and I was not surprised. I'd given up trying to predict what would

Sadokierski (2010, p. 170) provides an explanation for the use of these pictograms:

> By presenting tiny reproductions of the three cars on the page, Eggers forces us to neurotically hone in on this seemingly insignificant detail with Will; removed from the context of a busy shopping centre car park and squeezed so closely and uniformly into the line of type, the reader must take an unexpected visual pause that mimics Will's experience.

But besides the narrator's neurosis, these pictograms carry another layer of meaning: as Sadokierski points out quoting Watman (2002), any reader knowledgeable in cars will realize that the cars depicted are not Broncos but Mercedes vehicles, establishing the flagrant *unreliability of the narrator*.

If this hypothesis holds (and the car depiction error is not simply an editorial mistake) then we have here a very innovative graphetic method: using a picture as a communicational short-circuit in order to confront the narrator's statements with the reader's knowledge of the world.

5.2.   Typo-graphic Devices

Sadokierski (2010, p. 146) defines a *typo-graphic device* as follows:

> [...] it slips between the categories of typography and illustrative elements—it is typographic in the sense that the shape is formed by letters and punctuation marks, but also illustrative because it 'reads' as a picture rather than a piece of writing.

Using text blocks to produce pictorial forms is a long-standing graphetic method, reminiscent of zoomorphic Arabic calligraphy. A detailed study of this method goes beyond the frame of this paper, therefore we will only give four examples (Fig. 3), the first three being: the "mouse's tail" in Lewis Caroll's *Alice in Wonderland* (1865), the "presence of Manon" in Jardin's *Le petit sauvage* (1992) and the big shark in Steven Hall's *The Raw Shark Texts*. In all three cases the text is typeset horizontally, can be read normally and is semantically related to the form of the text block.

The fourth example is a very special case since what we display in Fig. 3 is not an excerpt from a work but rather the shape of a *complete* short story (set on a 56×78 cm surface). The story "∅" by Japanese author 円城塔 Enjō Tō (1972−) takes a triangular global form since every line is exactly one character shorter than the preceding one. This story consists of exactly 150 paragraphs, which we display as lines to make the shrinking regularity visible. In it, the narrator experiences the shrinkage of eir world and develops strategies to struggle against the loss of meaning resulting from the loss of representation space. The final paragraphs are:

<div align="center">

もうわからない。   I'm lost now.
ねえ、笑って。   Hey, laugh.
ありがとう。   Thank you.
さよなら。   Goodbye.
助けて。   Help.
無限。   ∞.
無。   ∅.
！   !

</div>

As in previous examples, punctuation marks are used for extreme situations: in Damasio's *La horde du contrevent*, §4.2.2, they were used to denote cosmic dust—here the exclamation mark is the last sparkle of language at the lower summit of the triangle.

Every paragraph of this story ends with a full stop, including the last paragraphs ("Thank you.," "Goodbye.," "Help.," "∞.," "∅."); in order to remain consistent with this rule, the last paragraph (of length 1) can logically only be a punctuation mark as well. Among the "stand-alone" punctuation marks (those used occasionally as complete sentences), namely

so that her idea of the tale was something like this:——"Fury said to
a mouse, That
he met
in the
house,
'Let us
both go
to law:
I will
prosecute
you.—
Come, I'll
take no
denial:
We must
have a
trial:
For
really
this
morning
I've
nothing
to do.'
Said the
mouse to
the cur,
'Such a
trial,
dear sir,
With no
jury or
judge,
would be
wasting
our breath.'
'I'll be
judge,
I'll be
jury,'
Said
cunning
old Fury:
'I'll try
the whole
cause,
and
condemn
you
to
death.'"

Au petit matin, je descendis dans la cave, décachetai le vase et respirai le parfum de Manon.

Peu à peu, en s'ex-halant dans l'atmosphè-re, son odeur légère et grisante se mit à flotter, devint presque con-crète. J'eus alors le sentiment que sa présence était sus-pen-due dans les airs, impal-pable, invisible et pour-tant tellement là. Son être se trouvait bien de-vant moi. Mon parfum arti-sanal la restituait. J'allais pou-voir la retrouver chaque fois que je le souhaiterais en soule-vant le bouchon d'une bou-teille! En-ivré je me fondis en dans un accord parfait. Plus rien ne nous sépa-rait; et mon odeur mêlée à la sienne me plai-sait. Je versai l'huile odo-rante dans un fla-con que je refer-mai avec soin.

il contenait la présence de Manon.
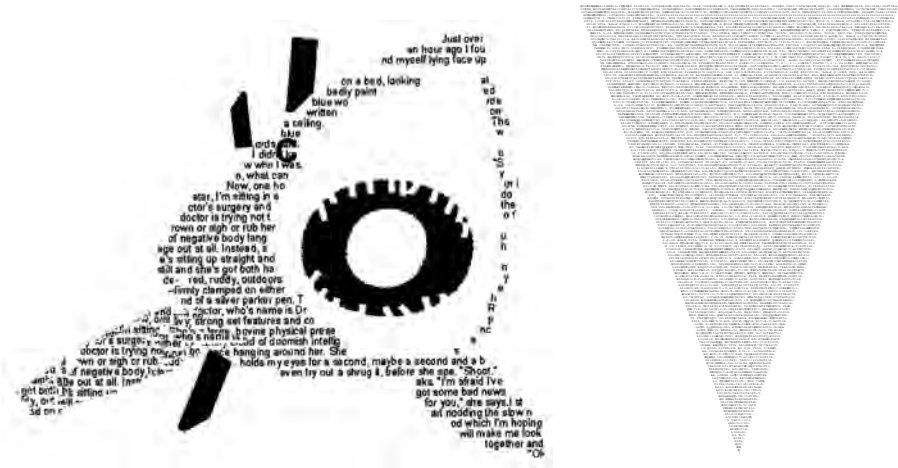
FIGURE 3. Typo-graphics from Lewis Caroll's *Alice in Wonderland* (p. 26), Jardin's *Le petit sauvage* (p. 214), Steven Hall's *The Raw Shark Texts* (p. 375) and the complete short story ∅ by Enjō Tō.

the question mark and the exclamation mark, the author has chosen the latter, hereby giving his story a very special ending.

Acknowledgments

Conclusion

In this paper we have attempted to classify and illustrate the many graphemic and graphetic methods used in speculative fiction. We started by defining an ontology of the book (specific to prose texts) with concepts, relations and rules. We gave examples of methods breaking almost every one of the rules defined. And finally we discussed a family of graphetic methods dealing with different sorts of obfuscation, as well as methods based on pictoriality.

The list of cases we have explored is by no means exhaustive. Nevertheless, this paper aims to classify methods in a way that facilitates incorporation of additional graphemic/graphetic methods yet to be discovered.

Besides giving a glimpse of the infinite creativity of novelists and short story writers, by the careful description of exceptional cases and the investigation of the narrative intentions behind them, this study can also serve to challenge and expand knowledge of the nature and interactions of graphemes, graphs and higher grapholinguistic levels.

Works of Fiction Mentioned in the Paper

Abbel, Éric, *Rendez-vous pour amant·e·s égaré·e·s*, Espaces insécables, 2018.

Adams, Douglas, *The Hitchhiker's Guide to the Galaxy*, Pan Books, 1979.

Asimov, Isaac, "The Bicentennial Man" in *The Bicentennial Man and Other Stories*, Doubleday, 1976, 135–172.

Anderson, Poul, "Journey's End" in Anthony Boucher, *The Best from Fantasy and Science Fiction, Seventh Series*, Doubleday, 1958, 247–257.

Arden, Paul, *Whatever You Think, Think the Opposite*, Penguin, 2006.

Ballard , James G., "Notes Towards a Mental Breakdown" in *War Fever*, Paladin, 1990, 161–170.

Banks, Iain M., *Feersum Endjinn*, Orbit, 1994. German version: *Förchtbar Maschien*, Wilhelm Heyne Verlag, 2000 (transl. Horst Pukallus & Michael K. Iwoleit). French version: *Efroyabl Ange1*, Gallimard folio SF, 2013 (transl. Anne-Sylvie Homassel).

Bester, Alfred, *The Demolished Man*, Penguin Books, 1966. French version: *L'homme démoli*, Gallimard folio sf, 2011 (transl. Patrick Marcel).

——————————, *Tiger! Tiger!*, Penguin Books, 1967. French version: *Terminus les étoiles*, Denoël, 2007 (transl. Patrick Marcel).

Bing, Xu, *Book from the Ground*, MIT Press, 2014.

Bixby, Jerome, "Old Testament," *If*, July 1964, 97–103. Italian version: "Storia sacra. Come nascono le religioni?," *Urania* **364**, December 1964, 99–108 (transl. Hilja Brinis). French version: "Ancien Testament," in *Histoires de la fin des temps*, Livre de poche, 1983 (transl. Frank Straschitz).

Bresner, Lisa, *Le voyage de Mao-Mi*, Actes Sud Junior, 2006.

Brown, Fredric, "The End," *The Dude*, May 1961, 11. French version: "F.I.N.," in *Fantômes et farfafouilles*, denoël, 1963 (transl. Jean Sendy). German version: "Das Ende," in *Alpträume*, Heyne, 1963 (transl. B. A. Egger).

Brunner, John, *Total Eclipse*, Doubleday, 1974.

Budrys, Algis, "Silent Brother," in *Amazing Science Fiction*, February 1956, p. 100–115. German version: "Die sanfte Invasion," in *Die sanfte Invasion*, Goldmann, 1965, p. 5–29 (trans. Tony Westermayr). French version: "Le frère silencieux," in *Histoires de pouvoirs*, Le livre de poche, 1969, p. 315–340 (transl. Michel Deutsch). Japanese version: 「沈黙の兄弟」, S-F マガジン, October 1969, 151–175 (transl. 小菅正夫).

Cégeste, Jacques, *Nudisme*, 1950 (in Jean Cocteau's movie *Orphée*).

Caroll, Lewis, *Alice's Adventures in Wonderland*, VolumeOne Publishing, 1998.

Chiang, Ted, "Story of Your Life," *Starlight 2*, 1998, 257–314.

Cirier, Nicolas, *L'apprentif ʻɹnǝʌɐɹ̣ʂ̣ɹ̣uıɹɯdv pamphlet pittoresque (!) littérario-typographico-bureaucratique, pouvant (nam tua res agitur paries cùm proximus ardet) intéresser toute personne employée, employable, ex-employée*, chez l'auteur, 1840.

Cocteau, Jean, *Orphée. Film*, J'ai lu **2172**, 1987.

Cortázar, Julio, *Libro de Manuel*, Alfaguara, 1995.

Damasio, Alain, *La horde du contrevent*, Gallimard folio SF, 2004.

——————————, *Les furtifs*, La Volte, 2019.

Day, Thomas, *Nous rêvions d'Amérique*, Éditions Baleine, 2002.

——————————, *Dragon*, Le Bélial, 2016.

Defontenay, Charlemagne Ischir, *Star ou Ψ de Cassiopée*, Terre de Brume, 2008.

Delany, Samuel R., *Babel-17*, Ace Books, 1966.

Eggers, Dave, *You Shall Know Your Velocity*, Penguin Books, 2004.

Ende Michael, *Der Spiegel im Spiegel*, Bastian Verlag, 1984. English version: *Mirror in the Mirror*, Viking Penguin, 1986 (transl. J. Maxwell Brownjohn).

——————————, *Die unendliche Geschichte*, dtv, 1987. French pocket version: *L'Histoire sans fin*, Stock, 1984 (trans. Dominique Autrand). English version: *The Neverending Story*, Dutton Children's Books, 1997 (transl. Ralph Manheim). French hardcover version: *L'Histoire sans fin*, Hachette, 2014 (trans. Dominique Autrand).

Ernst, Max and Paul Éluard, *Une semaine de bonté*, Jeanne Bucher, 1934.

Foer, Jonathan Safran, *Everything is Illuminated*, Penguin Books, 2003. German version: *Alles ist erleuchtet*, Fischer, 2005 (transl. Dirk van Gunsteren). Italian version: *Ogni cosa à illuminata*, Ugo Guanda Editore, 2012 (transl. Massimo Bocchiola). French version: *Tout est illuminé*, Points, 2013 (transl. Jacqueline

Huet & Jean-Pierre Carasso). Dutch version: *Alles is verlicht*, ambo|anthos, 2016 (transl. Peter Abelsen).

——————————, *Extremely Loud & Incredibly Close*, Penguin Books, 2005.

Forward, Robert L., *The Flight of the Dragonfly*, Timescape Books, 1984.

Galouye, Daniel F., "Sanctuary," *The Magazine of Fantasy and Science Fiction*, February 1954, 64–92.

Haddon, Mark, *The Curious Incident of the Dog in the Night-Time*, Jonathan Cape, 2003. Dutch version: *Het wonderbaarlijke voorval met de hond in de nacht*, Uitgeverij Contact, 2003 (transl. Harry Pallemans). German version: *Supergute Tage*, Goldmann, 2003 (transl. Sabine Hübner). Italian version: *Lo strano caso del cane ucciso a mezzanotte*, Einaudi, 2003 (transl. Paola Novarese). Portuguese version: *O estranho caso do cão morto*, Editorial Presença, 2003 (transl. Sílvia Serrano Santos). Brazilian version: *O estranho caso do cachorro morto*, Editora Record, 2004 (transl. Luiz Antonio Aguiar & Marisa Reis Sobral). Catalan version: *El curiós incident del gos a mitjanit*, RBA Libros, 2004 (transl. Rosa Borràs). French version: *Le bizarre incident du chien pendant la nuit*, Éditions NiL, 2004 (transl. Odile Demange). Spanish version: *El curioso incidente del perro a medianoche*, Salamandra, 2004 (transl. Patricia Antón).

Hall, Steven, *The Raw Shark Texts*, Canongate, 207.

Handke, Peter, *The Goalie's Anxiety at the Penalty Kick*, Farrar, Straus & Giroux, 2007 (trans. Michael Roloff).

Henry, Léo & Jacques Mucchielli, *Yama Loka Terminus. Dernières nouvelles de Yirminadingrad*, L'altiplano, 2008.

Hyde, Gavin, "Sparkie's Fall" in Frederic Pohl (ed.) *Star Science Fiction Stories 5*, Ballantine Books, 1959, 86–89.

Jardin, Alexandre, *Le petit sauvage*, Gallimard folio, 1992.

Keyes, Daniel, *Flowers for Algernon*, Harcourt, Inc., 1966. German version: *Charly*, Wilhelm Heyne Verlag, 1970 (transl. Maria Dessauer & Hiltgunt Monecke). French version: *Des fleurs pour Algernon*, J'ai lu, 1972 (transl. Georges H. Gallet). Japanese version: アルジャーノンに花束を, 文藝春秋, 株式会社講談社, 1978 (transl. 小尾芙佐).

King, Stephen, *The Shining*, Doubleday, 1977. French version: *Shining*, JC Lattès, 1979 (transl. Joan Bernard). Swedish version: *The Shining*, Albert Bonniers, 1980 (transl. Bo G. A. Ericsson). Italian version: *Shining*, Bompiani, 1981 (transl. Adriana Dell'Orto). German version: *Shining*, Gustav Lübbe, 1982 (transl. Harro Christensen). Spanish version: *El Resplandor*, Plaza & Janés, 1982 (transl. Marta I. Guastavino). Japanese version: 「シャイニング」, 文藝春秋, 1986 (transl. 深町眞理子). Greek version: *Ἡ Λάμψη*, Ἐκδόσεις Κλειδί-Λιβάνη, 1992 (transl. Γιάννα Ἀναστοπούλου). Romanian version: *Shining*, Editura Nemira, 1993 (transl. Ruxandra Toma). Portuguese version: *O iluminado*, Suma, 1999 (transl. Betty Ramos de Albuquerque).

Kissonergi, Katia [Κάτια Κισσονέργη], ܝܘܪ̈ܩܝܢ ܝܘܒܠ̈ܐ ܝܘܥ ܒ̈ܐܝܩܩܘܩܘ ܝܝܬܙ [*You're looking beautiful today!*], Ἐμπειρία Ἐκδοτική, 2000.

Lupoff, Richard A., "With the Bentfin Boomer boys on little old New Alabama" in Harlan Ellison (ed.) *Again, Dangerous Visions 2*, Signet, 1973, 274–380.

Mahieu, Stéphane, *Le phalanstère des langages excentriques*, Ginkgo Éditeur, 2005.

Masson, David I., "The Two-Timer," in *The Caltraps of Times*, New English Library, 1968, 62–98. German version: "Hausfreund von vorgestern," in *An den Grenzen der Zeit*, Ullstein, 1984 (transl. Horst Pukallus).

Miéville, China, *Embassytown*, Pan Books, 2011. German version: *Stadt der Fremden*, Bastei Lübbe, 2012 (transl. Arno Hoven). French version: *Légationville*, fleuve éditions, 2016 (transl. Nathalie Mège).

Miller, Lion, "The available data on the Worp reaction," *The Magazine of Fantasy and Science Fiction*, September 1953, 73–75. Italian version: "I dati disponibili sulla reazione Worp," in *L'altare a mezzanotte: 50 racconti di fantascienza*, La Tribuna, 1965, 299–306 (transl. Romolo Minelli). French version: "Le réacteur Worp," in *Histoires de machines*, le Livre de Poche, 1974, 21–28 (transl. unknown).

Murakami, Haruki [村上春樹], ふしぎな図書館, 株式会社講談社, 2005. German version: *Die unheimliche Bibliothek*, DuMont, 2013 (transl. Ursula Gräfe). English version: *The Strange Library*, Knopf, 2014 (transl. Ted Goossen). Spanish version: *La biblioteca secreta*, Libros del zorro rojo, 2014 (transl. Lourdes Porta). French version: *L'étrange bibliothèque*, Belfond, 2015 (transl. Hélène Morita). Italian version: *La strana biblioteca*, Einaudi, 2015 (transl. Antonietta Pastore). Turkish version: *Tuhaf kütüphane*, Dogan Kitap, 2016 (transl. Ali Volkan Erdemir).

Ohl, Jean-Pierre, *REDRUM*, Gallimard folio SF, 2019.

Ollier, Claude, *Fuzzy Sets*, U.G.E. 10/18, 1975.

Orwell, George, *Nineteen Eighty-Four*, Secker & Warburg, 1949.

Phillips, Peter, "Lost Memory," *Galaxy Science Fiction*, May 1952, 45–54. First French version: "Tu m'as renié par trois fois," *Galaxie*, December 1954, 55–64 (transl. André Beyler?). First Japanese version: " 失われた記憶 " in Groff Conklin (ed.) *Science Fiction Terror Tales*, 1957, 181–192 (transl. 下島連). German version: "Fehldiagnose," *Galaxis*, December 1958, 73–85 (transl. Lothar Heinecke). Second Japanese version: " 失われた記憶 " in Groff Conklin (ed.) *Science Fiction Terror Tales* , 1962, 39–61 (transl. 斎藤伯好). Second French version: "Amnésie," *Histoires de robots*, Le Livre de Poche, 1974, 457–474 (transl. Didier Coupaye).

Plascencia, Salvador, *The People of Paper*, Bloomsbury, 2006.

Queneau, Raymond, *Bâtons, chiffres et lettres*, Idées Gallimard, 1965.

Silverberg, Robert, "Going Down Smooth," *Galaxy Magazine*, August 1968, 44–50. First Italian version: "Psicorobot," *Urania* **517**, 74–82, 1969 (transl. Beata Della Frattina). German version: "Die Obszönität des Computers," *Science Fiction Stories 51*, 1975, 39–46 (transl. Dolf Strasser). Dutch version: "Gaat erin als koek," in *Dertien dwaalwegen*, 1976, 248–256 (transl. Jaime Martijn). Second Italian version: "Tutto va liscio," in *Cristalli di futuro, Galassia* **211**, January 1976, 121–128 (transl. Gianni Montanari). First French version: "Je vous 1000110," *Le livre d'or de la science-fiction. Robert Silverberg*, 123–136, 1979 (transl. Frank Straschitz). Second French version: "Je vous 1001110," in *Nouvelles au fil du temps 1053–1970*, J'ai lu **7499**, 582–592, 2004 (transl. Pierre-Paul Durastanti).

Tanaka, Michi [田中未知], 質問/ᴧ〜ᴧᴧᴧᴧ〜Q, 文藝春秋 [Bungei Shunju], 2018.

Thaler, Richard H., *Misbehaving*, Norton, 2015. Romanian version: *Comportament inꙮadeꙮvat*, Publica, 2015 (transl. Paul Slayer Grigoriu).

Tō, Enjō [円城塔], "∅" in シャッフル航法 [*Shuffle Navigation*], Kawade Shobo, 2018.

Torishima, Dempow [西島伝法], 皆勤の徒, Tokyo Sogensha, 2013. English version: *Sisyphean*, Haika Soru, 2018 (transl. Daniel Huddleston).

Vance, Jack, *The Languages of Pao*, Avalon Books, 1958.

Watson, Ian, *The Embedding*, Gollancz, 1973.

Weisberg, Joseph, *An Ordinary Spy*, Bloomsbury, 2008.

Welsh, Irvine, *Marabou Stork Nightmares*, Jonathan Cape, 1995.

——————, *Filth*, Vintage Books, 1999.

Werst, Frédéric, *Ward. ı^{er}–ıı^e siècle*, Seuil, 2011.

——————, *Ward. ııı^e siècle*, Seuil, 2014.

Wilson, Gahan, "●" in Harlan Ellison (ed.) *Again, Dangerous Visions 2*, Signet, 1973, 12–22.
Zamiatin, Eugene, *We*, E. P. Dutton, 1924.

References

Anis, Jacques (1988). *L'écriture, théorie et descriptions*. Bruxelles: De Boeck.
Aouillé, Sophie (2001). "Tenir la lettre." In: *Essaim* 2001/1, pp. 145–159.
ASA (1963). *American Standard Code for Information Interchange*. Tech. rep. https://www.sr-ix.com/Archive/CharCodeHist/X3.4-1963/index.html.
Barnes, Myra E. (1974). *Linguistics and Language in Science Fiction-Fantasy*. New York, NY: Arno Press.
Baroni, Antonio (2013). "Eye dialect and casual speech spelling: Orthographic variation in OT." In: *Writing Systems Research* 5, pp. 24–53.
Bould, Mark (2009). In: *The Routledge Companion to Science Fiction*. Ed. by Mark Bould et al. London: Routledge, pp. 225–235.
Bowdre, Paul Hull Jr. (1964). "A Study of Eye Dialect." PhD thesis. University of Florida.
Brown, Joseph V. (2010). "Scripting the Docufiction: Combining the Narrative and Documentary Modes in a Social Issue Film." PhD thesis. University of Denver.
Caldwell, Chris K. and Yeng Xiong (2012). "What is the Smallest Prime?" In: *Journal of Integer Sequences* 15. https://cs.uwaterloo.ca/journals/JIS/VOL15/Caldwell1/cald5.pdf, p. 12.9.7.
Chomsky, Noam (1965). *Aspects of the Theory of Syntax*. Boston, MA: MIT Press.
Ciotti, Fabio and Francesca Tomasi (2016–2017). "Formal Ontologies, Linked Data, and TEI Semantics." In: *Journal of the Text Encoding Initiative* 9. https://journals.openedition.org/jtei/1480.
Corbett, John (2012). "Past and Future Language: Matthew Fitt and Iain M. Banks." In: *Scotland as Science Fiction*. Ed. by Caroline McCracken-Flesher. Lewisburg: Bucknell University Press, pp. 117–132.
Crosley, Sloane (2010). "Sloane Crosley Finds The Fun In 'Filth'." https://www.npr.org/2011/07/14/131939926/sloane-crosley-finds-the-fun-in-filth?t=1603402022299.
Crystal, David (2008). *A Dictionary of Linguistics and Phonetics*. 6th ed. Hoboken, NJ: Blackwell Publishing.
Drakakis, John (1997). "Shakespeare in Quotations." In: *Perspectives/Litteraria Pragensia: Selected Papers from the Second British Studies Conference, Prague 18–20 October 1996*. Ed. by Susan Bassnett. London: Routledge, pp. 152–172.
Durastanti, Pierre-Paul (2020). Personal communication.
Dworkin, Craig (2013). *No Medium*. Boston, MA: MIT Press.

Ehrman, John (2009). "An Ordinary Spy. Intelligence in Recent Public Literature." `https://www.cia.gov/library/center-for-the-study-of-intelligence/csi-publications/csi-studies/studies/vol-52-no-4/an-ordinary-spy.html`.

Ellison, Harlan, ed. (1972). *Again, Dangerous Visions 2*. New York, NY: The New American Library.

Ende, Michael (1978). Letter to Roswitha Quadflieg, May 4th, 1978.

Gauthier, Claudine (2008). "La Société de linguistique (1863–). Historique." In: *Bérose. Encyclopédie internationale des histoires de l'anthropologie*. `http://www.berose.fr/article251.html`.

Genette, Gérard (1997). *Paratexts. Thresholds of interpretation*. Cambridge, UK: Cambridge University Press.

Haralambous, Yannis (2007). *Fonts & Encodings. From Advanced Typography to Unicode and Everything in Between*. Sebastopol, CA: O'Reilly.

————— (2020). "Attempting to Decrypt Pages 269–271 of Jonathan Safran Foer's *Extremely Loud & Incredibly Close*." `http://viXra.org/abs/2011.0129`.

Haralambous, Yannis and Joseph Dichy (2019). "Graphemic Methods for Gender-Neutral Writing." In: *Proceedings of Graphemics in the 21st Century, Brest 2018*. Ed. by Yannis Haralambous. Brest: Fluxus Editions, pp. 41–89.

Haralambous, Yannis and Martin Dürst (2019). "Unicode from a Linguistic Point of View." In: *Proceedings of Graphemics in the 21st Century, Brest 2018*. Ed. by Yannis Haralambous. Brest: Fluxus Editions, pp. 167–183.

Hill, Cheryl (2004). "A History of Daniel Keyes' *Flowers for Algernon*." LIBR 548F: History of the Book, University of British Columbia.

ISO (2015). *ISO/IEC 9995-8:2009. Information technology — Keyboard layouts for text and office systems — Part 8: Allocation of letters to the keys of a numeric keypad*. Tech. rep. `https://www.iso.org/standard/51641.html`.

Jaccaud, Frédéric (2008). "Introduction." In: *C.I. Defontenay, Star ou Ψ de Cassiopée*. Dinan: Terre de brume.

Jarry, Alfred (1911). *Gestes et opinions du docteur Faustroll, pataphysicien, roman néo-scientifique, suivi de Spéculations*. Paris: Eugène Fasquelle.

Kincaid, Paul (2017). *Iain M. Banks (Modern Masters of Science Fiction)*. Champaign, IL: University of Illinois Press.

Klein, Gérard (1975). "Dictionnaire des auteurs." In: *Histoires de machines*. Vol. 3678. La grande anthologie de la science-fiction. Paris: Livre de poche, pp. 407–414.

Knee, Robin (1984). "Unmuddling Claude Ollier's *Fuzzy Sets*: An Intra/Intertextual Essay." In: *Symposium: A Quarterly Journal in Modern Literatures* 38, pp. 311–320.

Landragin, Frédéric (2015). *Un modèle de linguistique-fiction?* Postface to Ian Watson, *L'enchâssement*, pages 299–322. Saint Mammès: Le Bélial.

Landragin, Frédéric (2018). *Comment parler à un alien? Langage et linguistique dans la science-fiction*. Saint Mammès: Le Bélial.

———— (2020a). *Comment parle un robot? Les machines à langage dans la science-fiction*. Saint Mammès: Le Bélial.

———— (2020b). "Do you speak globish?" In: *Le Nouveau Magazine Littéraire* 29, pp. 76–78.

———— (2020c). "Exotisme et force linguistique." In: *Dune, exploration scientifique et culturelle d'une planète-univers*. Ed. by R. Lehoucq. Saint Mammès: Le Bélial, pp. 155–178.

Landragin, Frédéric and R. Lehoucq (2019). "L'astrolinguistique: pour éclairer la forêt sombre." In: *Bifrost*, pp. 184–191.

Landragin, Frédéric, J.-S. Steyer, and R. Lehoucq (2017). "Premier Contact: communication du troisième type." In: *Bifrost*, pp. 182–190.

Landragin, Frédéric et al. (2019). *L'art et la science dans* Alien. Montreuil: La Ville Brûle.

Langford, David (1999). "The Naughty Parts." In: *SFX Magazine* 54.

Leeuwen, Theo van (2006). "Towards a semiotics of typography." In: *Information Design Journal* 14, pp. 139–155.

Lewis, Mia (2010). "Painting Words and Worlds." In: *Columbia East Asia Review* 3, pp. 28–45.

Melander, Edvin (2016). "Rubi, the interlinear poetic gloss of Japanese." Bachelor Thesis, Lunds Universitet.

Meletis, Dimitrios (2015). *Graphetik. Form und Materialität von Schrift*. Glückstadt: Verlag Werner Hülsbusch.

Melosi, Giovanni (2020). "Dal paradigma linguistico al realismo critico. Strategia di scrittura e statuto del personaggio nella prima produzione in prosa di Peter Handke." In: *Studia Austriaca* 28, pp. 135–173.

Meyers, Walter E. (1980). *Aliens and Linguists: Language Study and Science Fiction*. Athens, GA: University of Georgia Press.

Neef, Martin (2012). "Graphematics as part of a modular theory of phonographic writing systems." In: *Writing Systems Research* 4, pp. 214–228.

Nikolajeva, Maria (1990). "How Fantasy is Made: Patterns and Structures in the "Neverending Story" by Michael Ende." In: *Merveilles & contes* 4, pp. 34–42.

Nørgaard, Nina (2009). "The Semiotics of Typography in Literary Texts." In: *ORBIS Litterarum* 64, pp. 141–160.

———— (2019). *Multimodal Stylistics of the Novel*. London: Routledge.

Oberhaus, Daniel (2019). *Extraterrestrial Languages*. Boston, MA: MIT Press.

Pohl, Frederic, ed. (1960). *Star of Stars*. New York, NY: Ballantine Books.

Power, Richard, Donia Scott, and Nadjet Bouayad-Agha (2003). "Document Structure." In: *Computational Linguistics* 29, pp. 211–260.

Propp, Vladimir (1968). *Morphology of the Folktale*. Austin, TX: University of Texas Press.

Quadflieg, Roswitha (2020). Private communication.

Sadokierski, Zoë (2010). "Visual Writing: A critique of graphic devices in hybrid novels, from a Visual Communication Design perspective." PhD thesis. University of Technology, Sydney.

Saussure, Ferdinand de (1995). *Cours de linguistique générale*. Ed. by Charles Bailly and Albert Séchehaye. Paris: Payot & Rivages.

Smith, Jad (2016). *Alfred Bester (Modern Masters of Science Fiction)*. Champaign, IL: University of Illinois Press.

TEI Consortium (2020). "TEI P5: Guidelines for Electronic Text Encoding and Interchange." `https://tei-c.org/guidelines/p5/`.

Watman, Max (2002). "Flamboyantly humble." In: *New Criterion* 21, p. 93.

Watson, Ian (1975). "Towards an Alien Linguistics." In: *Vector* 2, pp. 14–23.

Weakland, Joseph P. (2015). ""Forked Tongues": Languages of Estrangement in China Miéville's *Embassytown*." In: *Science Fiction Studies* 42, pp. 78–98.

Westfahl, Gary (1993). "The Words That Could Happen: Science Fiction Neologism and the Creation of Future Worlds." In: *Extrapolation* 34/4, pp. 290–304.

Wright, David Thomas Henry (2018). "'Writing for' with Authority: Theorizing an Electronic Edition of Shahriar Mandanipour's *Censoring an Iranian Love Story*." In: *Materialidades de Literatura* 6, pp. 83–92.

Zadrozny, Wlodek and Karen Jensen (1991). "Semantics of paragraphs." In: *Computational Linguistics* 17, pp. 171–209.

Typographetics of Urban Spaces

The Indication of Discourse Types and Genres Through Letterforms and Their Materiality in Multilingual Urban Spaces

Irmi Wachendorff

Abstract. The present study is a contribution to research on typographetic meaning-making and the social dimensions of typographic acts in multilingual and multiscriptural urban spaces. Writing in cityscapes materialises various types of texts and forms of discourse. The central assumption is that the form and materiality of these written texts contribute to their communicative significance.

This paper is concerned with the way in which typographic resources are used to indicate discourses, index genres and become socially relevant. The research is linked to the joint project *Signs of the Metropolis* at the University of Duisburg-Essen and the Ruhr University Bochum in Germany and is based on a database of 25,523 tagged and geo-referenced images.

A multi-method approach has been applied between typography and sociolinguistics that introduces an analytical framework of parameters for studying the graphetics of lettering in urban space. The results from the application of the framework are presented in a foundational analysis of different discourse types (regulatory, infrastructural, commercial, transgressive, and commemorative), including a comparison of different city districts in the Ruhr Metropolis. Furthermore, it provides an analysis on decorative typefaces in Turkish language texts in shop signs in Duisburg-Marxloh; and presents results from a case study on genres, analysing the (typo)graphetic characteristics of signs in different shop types.

1. Typography in Urban Space

Urban spaces are covered with (mostly short) texts. They mark places, are deictic, and give orientation to people moving through those spaces. Written marks indicate ownership, issue prohibitions, and regulate the behaviour of individuals. Inscriptions in public spaces advertise and seduce; they compete for the attention of passers-by. Likewise, they are means of remembrance, tools of resistance, symbolic representatives of

Irmi Wachendorff   [ID] 0000-0001-9859-3868
University of Duisburg-Essen
E-mail: irmi.wachendorff@uni-due.de

power spheres (Coulmas, 2009), and agents in the struggle for visibility and recognition (Blommaert, 2013).

The materiality, form, and positioning of letters in urban spaces are produced by a variety of authors with different goals. Government agencies, global corporations, local shop owners, graffiti sprayers—they all select from a range of graphic resources to communicate their messages. They design letterforms or choose from a myriad of fonts, select materials, and sign types, decide on colour, size, mounting height, and illumination, the integration of the letters into the architectural context, and create dense visual surfaces. These choices can be individual or, as in the case of traffic signs, subject to national standardisation (Figure 1).

Language is the means by which people present themselves and relate to each other (Spitzmüller, 2013). This also applies to materialised, typographically designed language in urban spaces—no matter whether created by professionals or laypeople. Not only the content of the texts but also their form allows sign producers to express how they see themselves, how they want to be perceived, and whom they address. Written inscriptions in built environments are indicators of identity that show social positioning, differentiation, or affiliation to something.

By choosing connotatively strongly charged typographic forms, values, and attitudes can be communicated (Järlehed, 2015, Spitzmüller, 2015). Likewise, the choices of specific graphetic resources indicate communicative actors, reception contexts, and thematic localisations (Wehde, 2000, Spitzmüller, 2013). Thus, the choices of languages and the (non-)visibility of writing systems can be regarded as acts of assimilation or exclusion or of localisation and inclusion (Backhaus, 2007).

2.   Typo/graph[et]ics: A Definition of Terms

The terminology relating to the research of the form and materiality of writing and its communicative meaning overlap and vary between disciplines, perspectives, and points in time. This section identifies the central reference points for the observations made in this paper and indicates how the terms "typographic" and "graphic" as well as "typographetic" and "graphetic" are used in this text.

Spitzmüller coins the term "graphic variation" and uses it instead of "typography" in his research on the relationship between the printed word and social practices because the term "typography" is not used consistently and is not "actually linguistic terminology" (Spitzmüller, 2013, p. 9, our translation). Järlehed and Jaworski, as two of the first embarking on the research of the communicative meaning potential of letters in urban space, use the term "typographic landscaping" and by that emphasise the "processual, experiential, and embodied practices involved in typographic meaning-making" (Järlehed, 2015, p. 119). Pesca-

FIGURE 1. Photographs of a variety of signs in public space in the Ruhr Metropolis in Germany. All images in this paper are from the Ruhr Metropolis survey areas. Almost all of them derive from the *Signs of the Metropolis* data base (image collection 2013/14) unless indicated otherwise.

tore Frisk and Pauwels, 2019 follow Järlehed's and Jaworski's terminology in 2019 when they write about "typographic landscapes as an ecosocial semiotic system" (ibid., p. 1). This phrasing positions the typographic landscapes in close proximity to the extensive field of research on "linguistic landscapes" (Landry and Bourhis, 1997, Gorter, 2006, Backhaus, 2007, Shohamy and Gorter, 2009, Coulmas, 2009, Blommaert, 2013).

Meletis in his text *Graphetik* (2015) demands that "[r]esearch that deals with the form and materiality of writing [*Schrift*] should—regardless of its disciplinary origin—be labelled (at least additionally) as graphetical research in order to bring together findings and enable comprehensive theory-building or—in other words—the establishment of graphetics." (Meletis, 2015, p. 183, our translation) The present paper follows this request.

Haralambous defines "typographetics" as "[t]he study of the printed representation of language." (Haralambous, 2020, p. 15) as one subject matter in a list of 18 topics that are relevant to the study of Grapholinguistics, "the discipline dealing with the study of the written modality

of language." (ibid. 12) He continues: "Typography is only half a millennium old, but it is in part responsible for the fabulous technological and social advances of this period. Typography has developed its own codes [...]. As a subdiscipline of graphe[mt]ics, typographe[mt]ics becomes a subdiscipline of linguistics: the creative power of typography, scrutinized with scientific methods." (ibid. 15)

In the past, typography exclusively meant printing with movable letters made of metal or wood in a letterpress process (Meggs and Purvis, 2006, p. 64). Today, however, the term has expanded significantly beyond its original use and covers all activities of creating type as well as the composition of letters and further graphic elements in all production techniques, materials, and on all surfaces imaginable—both by laypeople and professionals alike. As Spiekermann puts it: "The generic term typography refers to the activities of designing typefaces and arranging type and other elements on a page. This page can also be a screen or a building wall." (Spiekermann, 2008, p. 409, our translation) This text is written in this broad understanding of typography.

The term "typographetics" can signify a bridge between the two disciplines, typography and linguistics, which are deeply connected in their subject matter and from whose joint efforts much can be expected for the further development of research on the communicative meaning of the written representation of language.

Based on a broad understanding of the term typography and the fact that at times the terms "typography" and "graphetics" can be understood as synonyms (cf. Meletis, 2015, p. 96), this paper takes a joint approach. The terms "typographic" and "graphic" are used here when the emphasis is on typography as a social practice and activity of sign producers. Since typography is a subdiscipline of graphic design, the term "graphic" is used to signify a broader level of analysis of holistic graphic artefacts (as opposed to considerations of typography in graphic artefacts) or to refer to the graphic discipline as such.

The terms "typographetic" and "graphetic" are used when the emphasis is on the communicative production of meaning. In parallel and as suggested by Haralambous, "typographetic" is used as a subdiscipline of the more general "graphetic" (cf. Haralambous, 2020, p. 15).

3.   Context and Objectives

3.1.   Research Context

My ongoing doctoral thesis with the working title "Typographic Landscapes—Social Dimension of Typographic Activity in Urban Spaces" aims at developing an analytical framework to investigate how sign-producers use typographic resources to create communicative meaning

in multilingual and multiscriptural urban spaces. The objective is to bring together typographic and sociolinguistic perspectives on the common subject of language in built environments. The project focuses on analysing what the materiality and formal gestalt of language contribute to its creation of social meaning in the human activity of sign-making in public spaces.

A foundational analysis applies the developed analytical framework to different discourse types (Scollon and Scollon, 2003). Following the findings in this foundational analysis, my thesis includes case studies in four areas of social dimensions: genre, ideology, identity, and stereotypes. The case study on genres examines the thematic localisation of shop types through (typo)graphetic resources in urban spaces. The case study on ideologies investigates the expression of values and attitudes in political stickers, as well as the use of connotatively highly charged type styles, such as blackletter. The case study on identity focusses on social positioning and the creation of cultural identities by the use of graphic means. The case study on stereotypes analyses cultural stereo(type)s in scriptural forms, and script system mimicry (cf. Wachendorff, 2018).

3.2.   Objectives of this Paper

This paper aims at answering three subordinate questions of the overall research project on how typographic resources are used to create communicative meaning in multilingual and multiscriptural urban spaces:

1. Which are the relevant parameters for the examination of the typographetics of lettering in urban spaces?
2. How do the discourse types differ? Moreover: How do they differ between neighbourhoods with unique characteristics?
3. How do certain types of shops in urban spaces differentiate in their use of typographic resources?

With regard to the second question, the hypothesis is that the discourse types function as reception contexts and social patterns and differ, in part significantly, in the described typographetic parameters. Following this hypothesis, it could be assumed that possible prototypical combinations of graphic parameters in each discourse type give off an indication of the type of information passers-by are encountering. This visual indication might structure the expectations of the recipients of the texts in urban space even from some physical distance. Moreover, if there are significant differences between various parts of cities, this would signify that the typographetic characteristics indicate something about its inhabitants, their businesses, and the social structure of the community.

With regard to the third question, the hypothesis is that retail shops show specific typifications in their visual appearance and use of graphic

resources to indicate communicative actors and product groups. More-over, specific genres use different typographic means to achieve their communicative goals.

4.   Research Backdrop, Data, and Methods

4.1.   Research Backdrop

My doctoral research is linked to the research project *Signs of the Metropolis* that investigates the 'visual multilingualism' of the Ruhr area. Visual multilingualism is apparent in all forms of non-moving text in public space ranging from traffic signs, commercial displays, advertising bill-boards to graffiti tags and stickers. The structure of the project is mul-tidisciplinary with collaborating researchers from the fields of linguis-tics, sociology, urbanism, and integration sciences.[1] One central aspect of this multi-method approach is the evaluation of the role multiple lan-guages play for acts of identity creation (cf. Wachendorff, 2016; 2019), multiculturalism, social belonging, and social recognition (Ziegler et al., 2018).

4.2.   Research Location

The research takes place in the Ruhr Metropolis in North Rhine-Westphalia in Germany (Figure 2). It is the biggest locality of labour migration in Germany, due to three major migration phases from 1850 until today[2], which makes it a very diverse and multilingual area. The project database, generated between 2012 and 2013, shows 53 different languages and 14 different script systems. The region has undergone

---

1. The Research Project *Signs of the Metropolis—Visual Multilingualism in the Ruhr Area* at the University of Duisburg-Essen and the Ruhr University Bochum is funded by the MERCATOR Foundation (GZ MERCUR: Pr-2012−0045) and ran from 08/2013 to 12/2017. Prof. Dr. Evelyn Ziegler headed the project. Co-Heads were Prof. Dr. Heinz Eickmans, Prof. Dr. Ulrich Schmitz, Prof. Dr. Klaus Peter Strohmeier, and Prof. Dr. Hacı-Halil Uslucan.

2. Between 1850 and 1915, due to industrialisation, more than 500,000 workers were recruited from Silesia, Masuria, Russia, and Austria-Hungary to the Ruhr area to work in the newly founded coal mines and steelworks. During the second migration phase after World War II (between 1950 and 1973) about 20 million workers from Italy, Turkey, Portugal, Spain, and former Yugoslavia relocated to Germany. The third migration phase continues until today. Due to multiple global incidents, an average of 400.000 people migrate to Germany every year (Cindark and Ziegler, 2014, p. 1). Germany registered over one million refugees in 2015. Based on the federal allocation system, the largest percentage of refugees is attributed to the federal state of North Rhine Westphalia (21%). (Asylum statistic Dec. 2015, German Federal Office for Migration and Refugees.)

major structural change. In 1850 there were approximately 300 mines in the Ruhr area, operating at high productivity for over a century. The coal crisis, which began in the 1960s, eventually led to the closure of all mines, the last of which was closed 2018.[3]

The Ruhr Metropolis in North Rhine-Westphalia
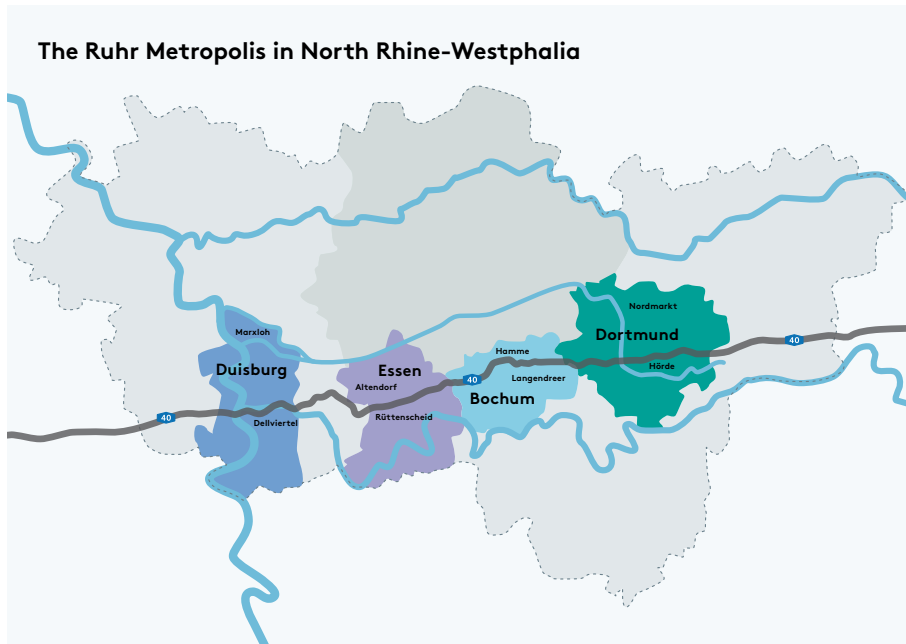
FIGURE 2. Map of the survey areas Duisburg, Essen, Bochum, and Dortmund in Germany.

4.3.   Data

The research group gathered a corpus of 25,523 photographs of fixed inscriptions in eight streets in four cities (Duisburg, Essen, Bochum, and Dortmund) in 2013 and 2014. The eight urban districts have been selected on the basis that they form combinations of residential and commercial areas (cf. ibid., p. 38f). The survey of one street in the North and a corresponding one in the South of each city allows a comparison of the northern and southern districts divided by the A40 motorway,

<hr>

3. Cf.   http://www.ruhrkohlenrevier.de/histozechen.html, https://www.spiegel.de/wirtschaft/bottrop-letztes-stueck-steinkohle-an-frank-walter-steinmeier-uebergeben-a-1245133.html (retrieved 30.09.20).

nicknamed the "social equator" (Kersting, Meyer, Strohmeier, and Ter-poorten, 2009, p. 142). The nickname derives from the fact that the educational levels, rents, and per capita income are lower in the North than in the South and that the districts differ in their social structure as well as ethnic and linguistic diversity (cf. ibid. 145).

4.4. Database

In each of the districts, every single text item visible along one street has been photographed individually, geo-referenced, and then tagged in a database (Figures 3 and 4). There has been no restriction concerning size, materiality, or provenance of the discrete text items. They range from an embossment of a 6pt sized *DIN* on the side of a dust-bin to building-high graffiti letters, and from small handwritten notices fixed with scotch tape on a local shop door to high-gloss advertising billboards of international brands. All 25,523 photos have been tagged by the following categories: location, languages, information management (which part of a multilingual text is translated?), text and image combinations, types of discourses (commercial, transgressive, regulatory, infrastructural, and commemorative), type of institution (such as restaurant, shop, political party), size of the sign, material (sticker, plate, signpost, printed, painted, embossed, engraved), and typography (type styles: serif, sans-serif, slab-serif, scriptural, display/decorative, and blackletter); all of which eventually allows to search for precise combinations of parameters in order to analyse the data. The data analysis presented in this paper is based on the *Signs of the Metropolis* database.

4.5. Research Methods

Overall my doctoral research deploys a combination of research methods, consisting of quantitative and qualitative analyses of image and interview data. In this paper, the results from the quantitative and qualitative visual image analyses comprise eleven parameters in different sample sizes. This analysis includes all 25,523 images, except for the two parameters, colour and material, that are based on a structured randomised sample analysis with 552 images, between 100 and 181 in each discourse type.[4]

---

4. The parameters colour and material were not included in the original conception of the database. They were tagged subsequently in a structured randomised sample analysis of 552 images (spread over the entire data base), as it takes more than eleven weeks per parameter to tag 25,523 images (when 60 seconds are needed per image).

FIGURE 3. The *Signs of Metropolis* database tagging page.

FIGURE 4. A *Signs of Metropolis* database results page.

5. Theoretical Approaches

Two theoretical approaches are applied here for the foundational analysis as well as the case study of genres in shop types: One is the concept of discourse types by Scollon and Scollon (2003) which categorises different text types and their functions and helps to grasp and describe the diversity of writing in urban space. The other approach is based on genre-related concepts that help to understand how forms represent communicative functions of texts in order to create meaning. A closer look at the two perspectives and how they are connected reveals the following basic aspects.

5.1. Discourse Types

Scollon and Scollon (ibid.) have identified four discourse types for the visible signs and texts in urban spaces: The regulatory, infrastructural, commercial, and transgressive discourses. Regulatory signs are the ones announcing rules and prohibitions the compliance of which can be enforced by law, as, for instance, in the case of traffic signs. Infrastructural signs inform the public and organise the infrastructure, such as timetables at train stations or signs indicating institutions like schools. Commercial signs refer to shops, companies, and advertising. All shop signs, advertising posters, billboards, and price tags belong to this category. Transgressive signs are applied in an unauthorised way and superimpose the other discourses, such as graffiti and stickers (cf. ibid., p. 181). In the *Signs of the Metropolis* project (Ziegler et al., 2018, p. 78f) a fifth discourse type was added: the commemorative discourse, which commemorates people, dates, or events in an urban space, such as name plaques on monuments (Figure 5).

| Regulatory | Infrastructural | Commercial | Transgressive | Commemorative |
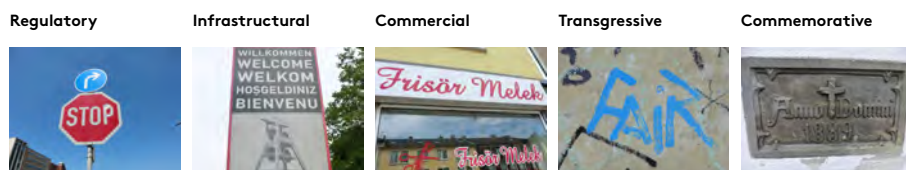
FIGURE 5. Sample images for the discourse types in the *Signs of the Metropolis* data corpus.

5.2. Genres

The concepts related to genre are a very different approach which promises to be useful when looking at visual artefacts. For, although

"all of us know intuitively that generic classifications never quite work" (Briggs and Bauman, 1992, p. 132), "the realities in and amongst which we live are not transparently conveyed to us but are mediated by systems of representation" (Frow, 2015, p. 20). Genres can be understood as reception and production patterns (cf. Bauman, 2001, p. 58) which give access to "form-function-meaning–interrelationships" (Briggs and Bauman, 1992, p. 143) of designed artefacts. They provide conceptual orientation frameworks and variable sets of prototypical elements that communicative actors use to create discourse (cf. Hanks, 1987, pp. 670, 681) and to position themselves socially (cf. Spitzmüller, 2013, p. 237f). The point that Delin, Bateman, and Allen are making for typographically designed print documents is equally applicable to typographically designed texts in urban space; when the authors point out: "the documents look different, and contain different language forms, because they are intended to do different things" (Delin, Bateman, and Allen, 2003, p. 55). Central to the genre concept are the characteristics of visible patterns (Wehde, 2000, p. 119) and repetition (Briggs and Bauman, 1992, p. 148). In fact, the repetition of combinations of visible patterns (cf. ibid.) of graphetic resources leads to similar interpretations that can constitute genres (cf. Spitzmüller, 2013, p. 247). Therefore, genres are links to previous, following, or simultaneous expressions and discourses of a similar kind, likewise for links to other places, peoples, positions, and times (Briggs and Bauman, 1992, p. 147f).

What makes genre construction in the analysis of social dimensions of typographetic artefacts in urban space so intriguing is the fact that meanings are discursively produced and interpreted. Genres are constantly (re)created in shared experiences of repetitive attributions to recognisable and interpretable visible forms. However, due to the fact that inventories of knowledge, social spaces, knowledge of languages and writing systems, geographical references, cultural and historical experiences, typographical socialisation, values and attitudes all diverge between people who produce and read graphic signs (cf. Spitzmüller, 2013, p. 245), there is always a fragmentary remnant—something that remains open. Genres have peculiarities, riddles, a scope for interpretation, a need for request, contextualisation, and translation. This combination of significant unity and meaningful openness makes genres in urban spaces a means of reflection on communicative goals, social positions, and identities.

It must be noted that genre is an intricate field of investigation because references are complex, fixed taxonomies never fit in full and can even be dangerously reductionistic. Most importantly: No single graphic resource relates to any definite meaning. Typographic artefacts need to be analysed in context. Nevertheless, the visible urban landscape is a visually mediated world in which patterns are formed, and genres can be thought of as visual patterns that provide sign recipients a degree

of orientation in urban space. The focus is on the question of what sign producers and recipients do with certain combinations of typographic resources in a certain setting in order to create discourse.

5.3.   The Combined Approach

What both approaches have in common is that both, the foundational analysis on discourse types as well as the case study on genres, look at prototypical typographetic elements that form patterns in the data. In this sense, the concepts are connected. In the foundational analysis, the search for repeated patterns occurs on a very substantial level distinguishing discourse types and indicating different text functions. In the case study on shop types, the investigation focusses on how prototypical typographic elements create genres in different product and service sectors.

Nonetheless, discourse types and genres are different things, or better, they have been created to do different things and solve different problems. Possibly, discourse types, genres, text types, and graphic parameters can be understood as a cascading structural model of thought and not as a fixed sequence of specific occurrences that are firmly bound to one another. Some graphic realisations (such as stickers, for example) occur in many discourse types, genres, and text types. However, they are significantly more common in some and do not occur at all in others. The details of this will be presented in the results.

6.   Analytical Framework

Eleven parameters are defined for the analysis of typographic artefacts in urban spaces in order to investigate how discourse types, genres, and text functions differ in their graphic appearance. Some of the parameters such as languages, script systems, and sign types include all individual occurrences found in the *Signs of Metropolis* data corpus—and are therefore in some respects already results. Other parameters such as type styles, sizes, colours, or mounting height are set categories that combine individual occurrences into larger groups. This paper will focus on presenting the results of the following parameters: discourse types, languages, script systems, type styles, colours, and materials. Furthermore, it presents an integrated comparison of the northern and southern neighbourhoods of the Ruhr cities.

I. Location of the Sign (8)[5]

Four streets in the North: Duisburg-Marxloh, Essen-Altendorf, Bochum-Hamme, Dortmund-Nordstadt;

Four streets in the South: Duisburg-Dellviertel, Essen-Rüttenscheid, Bochum-Langendreer, Dortmund-Hörde.

II. Discourse Type (5)

Regulatory, Infrastructural, Commercial, Transgressive, Commemorative.

III. Languages (53)

Albanian, Amharic, Arabic, Armenian, Azerbaijanian, Bosnian, Bulgarian, Catalan, Chinese, Croatian, Czech, Danish, Dutch, English, Estonian, Finnish, French, German, Greek, Hebrew, Hindi, Hungarian, Icelandic, Igbo, Indonesian, Irish, Italian, Japanese, Korean, Kurdish, Latin, Lingala, Malaysian, Nepali, Non-standard, Norwegian, Persian, Polish, Portuguese, Romanian, Russian, Serbian, Shona, Sinhalese, Slovakian, Slovenian, Spanish, Swahili, Swedish, Tamil, Thai, Turkish, Ukrainian.

IV. Script Systems (14)

Arabic, Cyrillic, Devanagari, Ge'ez, Greek, Hangul (to write Korean), Hanzi/CJK characters (to write Chinese), Hebrew, Kanji-Kana-Hiragana (to write Japanese), Latin, Malayalam, Sinhalese, Tamil, Thai.

V. Type Styles (7)

Serif, Sans-Serif, Slab-Serif, Scriptural, Blackletter, Decorative, (plus actual handwriting in tags and graffiti).[6]

---

5. This figure refers to the number of categories in this parameter in the present study (8 = eight city districts).

6. For the foundational analysis of the discourse types, a simple classification of type styles was used for reasons of feasibility in the tagging of the 25,523 images. It is based on a reduced version of the DIN classification (Nr. 16518/1964) (cf. Schauer, 1975) considering the five main groups differentiated by "form" as described by Willberg (2001, p. 49) plus two other groups: decorative and actual handwriting. For more in-depth investigations into specific aspects of typeface use and connotations, it will be necessary to differentiate each of these groups further. It would be useful to consider the differentiation by "style" (dynamic, static, geometric) (ibid., p. 49) or to implement an even more fine-grained system as suggested by Pool (2017; 2020),

VI. Size (4)

> 100, < 100, < 10, < 1 square metre.

VII. Colours (14)

Primary colours: Red (R), Blue (BL), and Yellow (Y); secondary colours: Green (G), Orange (OR), Purple (PU); achromatic colours: White (W), Black (BK), and Grey (GR); mixed colours: Brown (BR) and Pink (P); emulated material colours: Silver (SI) and Gold (GO); actual Material Colour (MC) (e.g., lettering in metal, stone, or wood).

VIII. Materials (14)

Plastic, Foil, Metal, Paper, Paint, Fabric, Glass, Tiles, Stone, Plaster, Enamel, Wood, Screen, and Light.

IX. Sign Type (50)

Handwritten letters (3): Handwriting, Signwriting, Facade painting/ Graffiti;
   Composed letters (4): Paper cut-out, Mosaic lettering, Stencil lettering, Embroidery;
   Printed letters (8): Printed on Paper, Cardboard, Fabric, Enamel, Metal, Plastic, Adhesive foil, Stickers;
   Moulded letters (2): Relief lettering, Debossed lettering;
   Subtractively formed letters (5): Cut-out lettering, Stone-carving, Wood-carving, Glass-engraving, Metal-engraving;
   Additively formed letters (7): Metal casting, Inlay lettering, Three-dimensional letters hollow, Three-dimensional letters solid, Wrought-iron lettering, Rendered lettering (in plaster), Modular plastic plug-in systems;
   Illuminated and movable letters (21): Illuminated three-dimensional lettering, Lightboxes, Facade lightbox bands, Sign boxes, Cantilevers, Cubes, Slide Lightboxes, Vitrines, City-light-poster, Advertising pillars, Pylons, Advertising towers, or mast systems, Roof lettering, Neon signs,

---

incorporating type width (condensed—extended), weight (ultra light—ultra bold), italic angle (upright—italic), serifs (serif/sans serifs), in the case of serifs: the shape of the serifs (small, fine, pointed, strong, half), and serif curves (none, outside, inside), the overall stroke contrast (low—high), and type of contrast (expansion/static—translation/dynamic).

Glass-only neon signs, Analogue information boards, Digital information boards, LED signs, Screen displays, Fabric coverings, Large-scale facade advertising.[7]

X. Integration Into the Architectural Context and Mounting Height

In order to analyse the integration of the typographic signs into the architecture, the placement of the signs in the built-up space is considered in two ways: On the one hand, the material integration, meaning the physical connection with the built-up structure. On the other hand, the visual integration, looking at how the design of the written information takes the surrounding facade proportions, materials, and colours into account. These two perspectives provide indications of the degree of the "semiotic intrusion" (Scollon and Scollon, 2003, p. 113). Furthermore, this parameter discusses the indexicality of signs, their production of meaning through the place of montage (cf. ibid., p. 30).

XI. Graphic Composition and Density of the Visual Surface

The graphic composition is analysed with the concept of visual literacy along some of the pairs of opposites developed by Dondis (1973, p. 16): balance versus instability, symmetry versus asymmetry, regularity versus irregularity, unity versus fragmentation, reduction versus complexity, static versus dynamic, subtlety versus expressiveness, consistency versus variation, flatness versus depth (layering), singularity versus confrontation. The density of the visual surface is analysed based on the concepts of *horror vacui* by Gombrich (1984: 80) and *amor vacui* by Mortelmans (2005, p. 21). Furthermore, the design principles of "chunking" (Lidwell, Holden, and Butler, 2003, p. 40) and "grouping" (Elam, 2004, p. 10) of information on visual surfaces are considered, grounded on the research by Cowan (2000) stating that the short-term memory of most viewers can process four elements (plus/minus one) most efficiently.

Sample Size

The first six parameters are tagged and quantitatively analysed based on all the 25,523 images of the *Signs of the Metropolis* database. The parameters colour and material are tagged and analysed in a randomised sample study across the entire database with a sample size of 100−181

---

7. The 50 sign types (or lettering) found in the *Signs of the Metropolis* data corpus where clustered, termed, and described based on the work of Stötzner (2000, p. 34), Haslam (2011), and Fischer et al. (2007). The very best has been done to find the equivalent English terms.

images per discourse type. The last three parameters are analysed qualitatively based on all 25,523 images. The parameter sign type is sampled across the entire database, the typical occurrences clustered in every discourse type and systematically visually analysed. The integration into the architectural context and mounting height, as well as the graphic composition and density of the visual surface, are discussed in a qualitative analysis of prototypical examples after reviewing the complete database.

7.   Results: Discourse Types

This foundational analysis focusses on the apparent typographetic differences in the five discourse types in the Ruhr area. The objective is to identify whether heaped occurrences and prototypical combinations of graphic resources are linked to the communicative objectives in the discourse types. Following the presentation of the overall occurrence of discourse types, the language and script system distribution, the results on the use of type styles, colours, materiality, and sign types are presented. Subsequently, the graphic composition and integration of the signs into the architectural context as well as the differences between northern and southern neighbourhoods are discussed.

7.1.   Occurrence, Language, and Script System Distribution

7.1.1.   Overall Occurrence

The overall distribution of the 25,523 images in the five discourse types shows that most signs are—as to be expected—commercial with 49.2%. Less expected, the transgressive signs are the second largest group, with 38.99%. This result is insofar surprising as the authorities impose fines for transgressive signage—if one is caught in the act. The next two largest groups are the infrastructural signs with 6.7% and the regulatory with 4.95%. The by far smallest group are the commemorative signs with only 0.16%.

7.1.2.   Language Distribution

Fifty-three languages occur in our data. However, considering that primary school children in Essen speak more than 100 first languages altogether (cf. Baur, Chlosta, Ostermann, and Schroeder, 2004, p. 98), this means many languages are lived and spoken in the Ruhr area that are not visible on the walls (cf. Schmitz, 2018, p. 153). About 66% of the

texts are German, 20% English, 4% Turkish. All the other 50 language occurrences together make up 10%.

Regarding the language distribution, the commercial discourse type is the most multilingual showing 42 of all the 53 languages in our data set, with 32.43% of the texts in non-German languages. The infrastructural and regulatory discourse types are overwhelmingly in German: 85.2% of the infrastructural and 93.7% of the regulatory signs are in German. The infrastructural discourse type—the discourse organising all the public infrastructure from schools and kindergartens to state organs and institutions—only shows 17 languages and regulatory signs only six languages. The transgressive signs are again more versatile and show 30 languages. 34.4% of the transgressive texts show English texts and only 56.2% German texts. The commemorative signs show six languages, of which 24% are non-German (Figure 6).

Language Distribution in Discourse Types

Regulatory:	Infrastructural:	Commercial:	Transgressive:	Commemorative:
6 languages	17 languages	42 languages	30 languages	6 languages

🟨 German	🟥 Italian	🟩 Polish	🟨 Greek
🟦 English	🟦 Spanish	🟧 Dutch	🟪 Russian
🟥 Turkish	🟩 Arabic	🟪 Chinese	🟦 Nonstandard
🟩 French	🟧 Latin	🟥 Japanese	🟫 Other
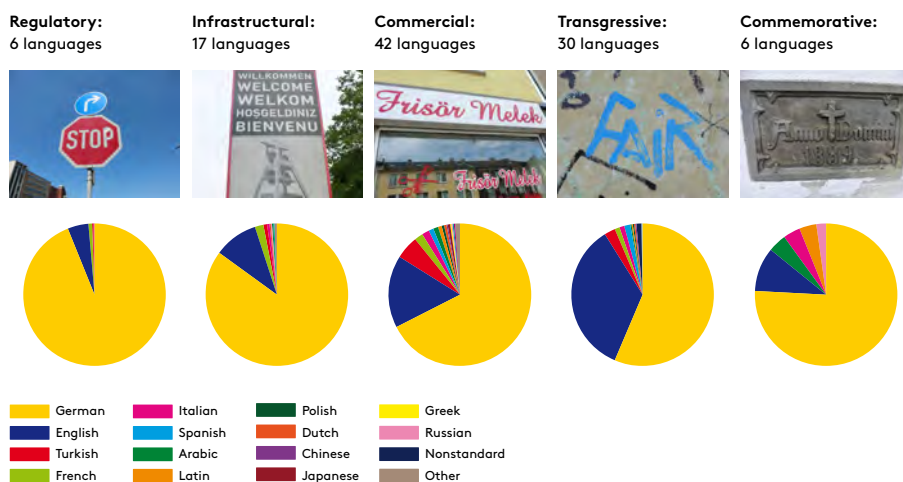
FIGURE 6. The language distribution in the discourse types in the *Signs of Metropolis* data.

7.1.3. Script System Distribution

There are 14 script systems in our data. The 13 script systems beyond Latin make up only 1.2% of our entire data set. 98.82% of all texts are in the Latin script. Arabic is the most common script after Latin, it accounts for 0.45% of all occurrences, and 0.7% comprise all the other 12 script systems. For the most multilingual region and biggest migration

area in Germany, this is a surprisingly low and not very multifaceted outcome. The greatest occurrence of 0.8% of scripts beyond Latin is again in the commercial discourse type, which shows that multiscripturality in our data is strongly linked to trade. Multiscriptural signs appear mostly in signs of food markets, restaurants, and translation agencies. Regulatory signs show 0%, infrastructural 0.03%, transgressive 0.2%, and commemorative 0.01% script systems beyond Latin.

7.2. Type Styles, Colours, Materiality, Sign Types, Graphic Composition, and Integration of the Signs into the Architectural Context

In the following section, the five discourse types will be looked at individually. The results of the used type styles, colours, materials, and sign types, as well as some insights into the graphic composition and the integration of the signs into the architectural context, will be presented in summaries. It is important to note that the photographed items often show more than one colour or type style, so that the total occurrence does not add up to 100%.

(In Figures 7–11 we use the following notation conventions: Type style abbreviations: Sans Serif typefaces (Sans), Handwriting in tags and graffiti (Handw.), Decorative typefaces (Decor.), Slab-Serif typefaces (Slab), Blackletter (Blackl.). Material abbreviations: Fabric (Fabr.), Plaster (Plas.), Enamel (Enam.). Colour abbreviations: White (W), Black (BK), Red (R), Blue (BL), Yellow (Y), Green (G), Orange (OR), Purple (PU), Brown (BR), Pink (P), Grey (GR), Silver (SI), Gold (GO), Material Colour (MC).)

7.2.1. Regulatory Signs: Sans Serif Typefaces, Primary Colours, and Metal

The regulatory signs (Figure 7) announce rules and make laws visible in urban space. In our data, they do this for 98% in sans serif typefaces. The top-down governmental communication is not only monolingual in German and monoscriptural in Latin; it is also mono sans serif; usually, with one type style per item. Sans serif typefaces are formally reduced to the essentials in line with the regulatory text content: without unnecessary decorative elements. The most prevalent typeface in the group of sans serif type styles is the *DIN* font, which is specified in the road traffic regulations for public signage in Germany and can be found in all expected contexts in regulatory (and infrastructural) signs.

Looking at colour, it is surprising that regulatory signs almost exclusively use primary colours (blue, red, and yellow), as well as black and white. The colours are assigned to a specific warning, directional, and regulatory function.

Concerning the graphic composition, the regulatory discourse type is remarkable for its reduction, symmetry, and statics. The majority of the signs show great balance, regularity, and consistency. The low information density reduced colourfulness and the lack of layering results in the flatness of the visual surfaces. With regard to the compositional richness, the regulatory signs, by and large, show the lowest density with few focal points on the visual surfaces.

The analysis of the materiality shows that the different discourses in urban space markedly use different materials to communicate their contents. Three of the five discourse types show different primary materials to realise their messages. Regulatory information stands out in so far that about 80% of it appears on metal signs. In addition to the dominant 'metal plate parade', there are nine other sign types, which is not a wide variety compared to the overall 50 different sign types found in our data.

Concerning the integration of the signs into the architectural context, most signs in the regulatory and infrastructural discourse type belong to one of two groups: On the one hand, signs that are mounted on metal posts independently of buildings in the urban space show accordingly a low level of material and visual integration. They do not take into account the colours, materials, and building proportions of the built environment and form a 'forest of signs' specific to Germany. On the other hand, many signs are placed directly on objects and places of relevance, which are materially firmly integrated but visually stand out very conspicuously from the surrounding space, such as "Danger"-signs on high-voltage electrical boxes. The semiotic interference of these two groups is high; they regulate and organise community life. The smooth running of the urban infrastructure and the functioning of the transport system depends on their visibility and legibility. Their appearance and, in case of traffic signs, their height of two metres at which they are installed, is regulated by law. Human lives may depend on the visibility and functionality of this group of signs. In other countries, this high standardisation of regulatory signs can be quite different or is generally lower.

7.2.2. *Infrastructural Signs: Sans Serif Typefaces, Primary and Secondary Colours, Metal, Plastic, and Paper*

The infrastructural signs (Figure 8) inform the public and organise the infrastructure. Similar to the regulatory, the infrastructural discourse type shows an astonishing 99% of sans serif typefaces, and most signs only use one typeface.

In terms of colour, the infrastructural discourse type adds the secondary colours (green, orange, and purple) to the primary colours (blue, red, and yellow), as well as black and white. The colours in the infrastructural discourse type are again part of a functional and convention-

Regulatory Signs

TYPE STYLES
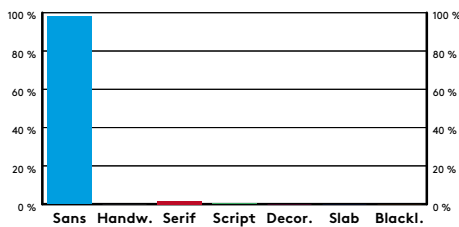
COLOURS
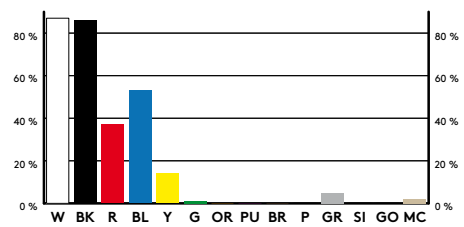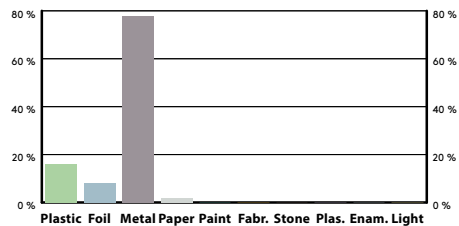
MATERIALS

FIGURE 7. The images show regulatory signs in the Ruhr Metropolis. The graphs show the distribution of type styles, colours, and materials in the regulatory discourse type.

alised system and have explicit semiotic tasks: Red can be found on prohibition and danger signs, blue on most regulation signs, blue and yellow on directional signs, brown on tourist signs, all additional traffic signs are in black and white.

In terms of graphic composition, the infrastructural discourse type shows very different visual surfaces. Some signs are significantly reduced and static, similar to most regulatory signs, with high symmetry, regularity, and consistency. Other signs, like timetables or city maps, show higher complexity and irregularity. Concerning the abundance of the visual surface, the infrastructural discourse type also shows a low density of focal points in the majority of cases.

In the analysis of materiality, the infrastructural signs represent a wider range than regulatory ones. Besides metal signs (which make up more than 30%), many texts are realised in plastics, on paper, or in adhesive foil. The infrastructural discourse shows considerable diversity with 30 out of 50 sign types, including many printed letters on metal, paper, plastic, and foil, a large group of moulded letters, a few movable and illuminated letters (such as pylons, and different information boards).

Concerning the integration of signs into the architectural context, most signs in the infrastructural discourse type also belong to one of the two groups previously described for the regulatory discourse type: Independent signs on metal posts as well as signs permanently mounted at the locations of their relevance. In addition, there is a third group, however, that interacts with the architectural environment in a completely different way. These texts on institutions such as courts, schools, or community centres are highly individual and sensibly integrated into the built environment in a material, visual, and thematic way. The lettering appears to be precisely designed to match the colours, materials, facade proportions as well as the historical periods and areas of responsibility of the institutions. They visibly communicate stable, long-lasting values, but they do not have to advertise or compete for the attention of walk-in customers. Nor does the life-saving intervention depend on their instant recognisability. Therefore, a citizens' office can elegantly mark its entrance with grey letters on grey stone, whereas a fire-fighter water access, visually much less integrated, requires a bright red text on a white background with a strong red frame.

7.2.3. Commercial Signs: All Type Styles, a Wide Range of Colours, Foil, Paper, Plastic, and Light

Commercial signs (Figure 9) announce shops and companies, advertise products and services, and tempt consumption. Here we find the widest variety of type styles: In addition to 84% sans serif typefaces there are 27% serif, 18% scriptural, 9% decorative, 2% blackletter, and 2% slab serif typefaces, and 6% actual handwriting. Most of the signs show more than
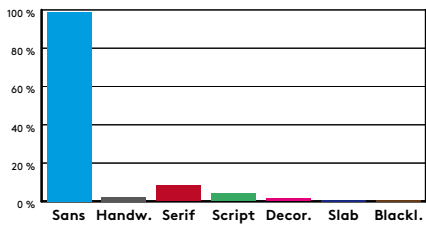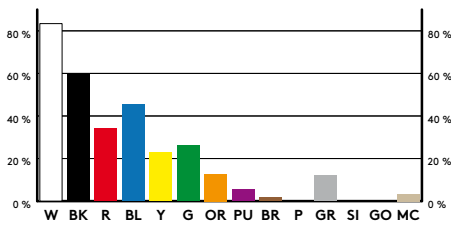
Infrastructural Signs
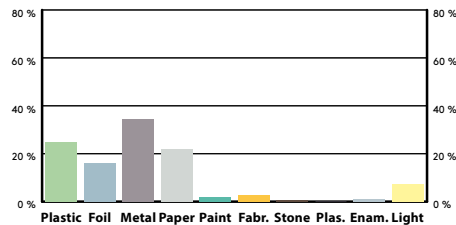
FIGURE 8. The images show infrastructural signs in the Ruhr Metropolis. The graphs show the distribution of type styles, colours, and materials in the infrastructural discourse type.

one type style, on average, 1.5 typefaces per sign. Commercial signs advertise, seduce, and compete. They indicate varying product groups and communicative actors and a variety of expressive typographic forms supports this endeavour.

Also concerning the use of colour, the commercial discourse type is the most multifaceted, with the broadest colour spectrum and the most occurrences of an average of 3.3 colours per sign. In addition to primary and secondary colours, a wide variety of mixed colours can be found, such as brown and pink, as well as silver and gold. This colour diversity is equivalent to the diversity of languages, script systems, and type styles. It serves the purpose of distinction, genre indication, and the achievement of individual communicative goals.

In terms of graphic composition, many commercial signs show high complexity, dynamism, and expressiveness. Layering and variation function as driving compositional principles in advertising. Concerning the richness of the visual surface, the commercial discourse type often shows visual surfaces that correspond absolutely to the four (plus/minus one) principles (cf. Cowan, 2000). Some very reduced visual surfaces create social distinction or sublimity through emptiness (cf. Mortelmans, 2005). Likewise, there are very dense, crowded visual surfaces, particularly when entire shop fronts are understood as one visual surface. The comparison of the discourse types shows that abundance, superimposition, density, and proximity of the graphic elements on the visual surface can be found especially in commercial (as well as transgressive) signs. The question arises whether selling and seducing attempts to create intimacy and familiarity through typographic proxemics. The density of graphic elements might correlate with the desired closeness to the customer. In opposition to this, the regulatory and commemorative types of discourse create distance, demarcation and authority through much clearer and emptier visual surfaces.

In the investigation of materiality, the commercial discourse type shows 36% adhesive foil, 32% paper, 25% plastic, 7% light signs and hardly any metal. This range is reflected in the sign types found. Commercial signs show the broadest spectrum with 48 of 50 sign types. On the one hand there are the most extensive occurrences of paper prints, foil inscriptions, stickers, and handwritten notes. On the other hand, all the big, cost-intensive, illuminated and moving lettering techniques (from neon signs to lightboxes, building high hoardings, and digital billboards), which do not occur in the commemorative, transgressive, or (with a single exception) in the regulatory discourse type can be found in the commercial signs. Correspondingly, most of the characters that are larger than $10\,m^2$ are also found here. The commercial signs in urban space show the widest variety concerning their integration into the built-up environment. The visual integration is often lower and the semiotic interference higher, since the attention of the sign recipients

is intensively sought, under highly competitive pressure. This group of signs, like the regulatory group, wants to be clearly visible, but not for safety reasons, but to seduce.

The massive diversity observed on the design of visual surfaces inshop signage raises the question to what extent high and low visual/material integration is related to factors such as laypeople versus trained graphic design, social strata, neighbourhoods, geographical regions, product genres, and the goals of the communicative actors. (Whereby, it became clear in the broader data analysis that it is not the money spent that makes a sign functional, aesthetic, and effective in urban space, but rather the appropriate means of expression in relation to the communicative needs and contexts under consideration of the architectural surroundings.)

In terms of indexicality, the commercial discourse type differs greatly from the regulatory and infrastructural one. In addition to texts that develop their meaning from the particular location of their montage, such as the names and labels of the shops, services, and products that can be purchased exactly at the place where the sign is attached, there is a second group of advertising spaces which refer to events or products that are not connected to the place of the attachment of the sign whatsoever.

7.2.4.   Transgressive Signs: Handwriting and Decorative Typefaces, a Wide Range of Colours, Stickers, and Paint

Transgressive signs (Figure 10) superimpose, they interfere with or fight against other discourses (and sometimes advertise without permission). Like the commercial discourse, transgressive signs show a huge variety of scriptural forms, particularly decorative typefaces. 57% of the items show handwriting in tags and graffiti, 39% sans serif, 18% decorative, 9% serif, 8% scriptural, 7% slab serif, and 1% blackletter typefaces. The transgressive discourse expresses political attitudes, ideological positions, social concerns, scene affiliations, and rivalling sport club allegiances. This requires expressive and connotatively strongly charged letterforms. Creativity and individuality take precedence over legibility. Many stickers show more than one typeface, on average, 1.5 per item.

Similar to the commercial discourse, transgressive texts show a wide spectrum of colours. Concerning the graphic composition, transgressive stickers show the highest complexity in comparison to all other discourse types. The small space and the low demand for legibility on stickers often lead to intense layering, compositional dynamics, high variation, and expressiveness. The materiality of transgressive signs is spread out over two big and one small group: 52% adhesive foil (stickers), 45% paint (tags and graffiti), and 3% paper. With this high number of stick-

Commercial Signs

TYPE STYLES

Sans Handw. Serif Script Decor. Slab Blackl.

COLOURS

W BK R BL Y G OR PU BR P GR SI GO MC

MATERIALS

Plastic Foil Metal Paper Paint Fabr. Stone Plas. Enam. Light
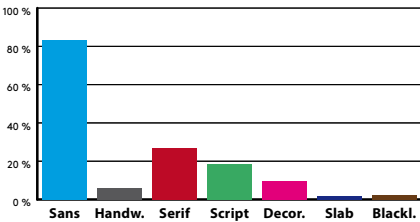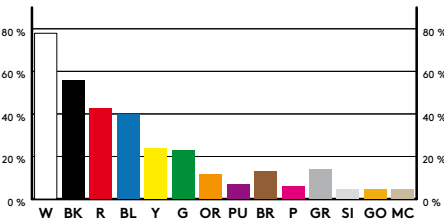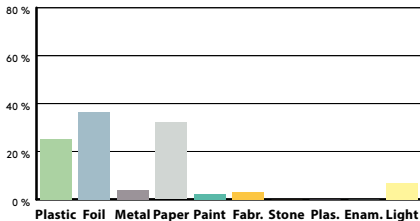
FIGURE 9. The images show commercial signs in the Ruhr Metropolis. The graphs show the distribution of type styles, colours, and materials in the commercial discourse type.

ers, the transgressive discourse has the largest group of tiny items, with 57% under 20 cm².

Transgressive signs are by design not visually integrated into the architectural context; they explicitly do not take into account surrounding facade proportions, materials, and colours, but resist and overwrite the given. They often aim for high visibility, but not for safety reasons (as in the regulatory and infrastructural discourse) nor to advertise products (as in the commercial discourse), but to mark the territory, express political positions, and social agendas and give visibility to subcultures as well as popular cultures. In that, few signs refer specifically to the location of their placement.

7.2.5. Commemorative Signs: Serif Typefaces and Blackletter, Lots of Material Colour, Metal, and Stone

Commemorative signs (Figure 11) materialise the memories of people, dates, and events in urban space. They occur in six of seven type styles, not showing any slab serif typefaces, however. With 5% they show the largest percentage of blackletter in memorial plaques on buildings and with 23% a high occurrence of serif typefaces, mainly in stone inscriptions. Remarkably, the commemorative discourse shows minimal colour overall. 49% of all items have the colours of the underlying materials, such as stone, cast iron, or plaster. This indicates that the culture and practice of remembrance is a subtle and quiet activity. Not only in this respect commemorative signs in urban space form a kind of visual antithesis to the loud, colourful, and attention-seeking commercial signs.

Many visual surfaces of commemorative signs are characterised by great balance, symmetry, regularity, and simplicity. Commemorative graphic surfaces often show static lines of centre aligned text. While regulatory signs cultivate the emptiness of the visual surface in order to achieve clear visibility, in commemorative visual surfaces, however, they seem to aim more at sublimity, quiet appreciation, and distinction from the other groups of signs.

Commemorative signs show a wide range of materials, amounting to uniquely high quantities in materials such as metal (26%), stone (10%), enamel (about 3%), and plaster (also 3%). The 13 sign types reflect these exceptionally high material occurrences: There are stone engravings, metal cast plaques, forged iron letters, stone mosaics, plaster reliefs, and facade paintings, all of which are very rare in all the other discourse types (or, such as stone inscriptions and plaster reliefs, do not occur at all). This suggests that certain materials and sign types in urban space can cross-refer to the kinds of texts and discourses that passers-by are facing in urban space. Furthermore, it shows how the materiality of signs and their value is linked to the functions of the text. In this case, the longevity of stone is associated with the intention of long-lasting memory.
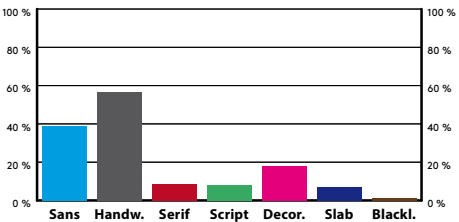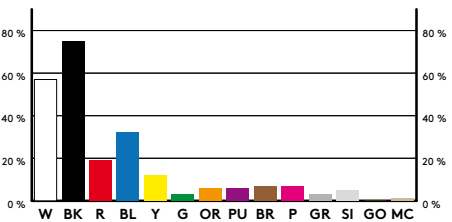
Transgressive Signs
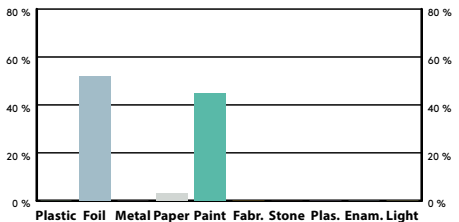
FIGURE 10. The images show transgressive signs in the Ruhr Metropolis. The graphs show the distribution of type styles, colours, and materials in the transgressive discourse type.

The relationship of commemorative signs to the architecture is singular. Many signs are inextricably integrated into the built-up space in an almost inseparably stable way. Likewise, the visual integration is extraordinarily high (and, correspondingly, the semiotic interference is low), as many signs are in material colour. Furthermore, a unique number of commemorative texts are not in the field of vision, but placed below waist height, on the floor, or above head height. Commemorative signs do not need to be clearly visible for safety reasons, nor do they compete with each other. Therefore, the practice of reminiscence can take place very discreetly and silently, in durable, uncoloured materials. Public discussions about the mounting heights of commemorative signs, whether commemorated people are "trampled underfoot," when signs are located in the ground[8] or whether one can encounter commemorated people "at eye level" in a stele[9] instead, are indications of the considerable importance of these design decisions.

7.3.   Interim Conclusion: The Discourse Types in Comparison

In conclusion, the results of the discourse type analysis so far suggest that, despite overlaps, different core materials and prototypical combinations of typographetic resources indicate discourses in urban space (Figure 11). In broad strokes, the regulatory discourse is characterised by many metal signs, black, white, and primary colours as well as sans serif typefaces, mainly the *DIN* typeface. The infrastructural discourse shows a lot of metal, plastic, and paper, as well as primary and secondary colours, and 99% of it remain in sans serif typefaces. The commercial discourse has the greatest diversity in languages and writing systems as well as in type styles, colours, and sign types, with the primary materials being foils, papers, and plastics. The transgressive discourse is the least diverse in sign types and materials (it occurs only in stickers and graffiti tags), but shows the widest variety in decorative typefaces and colours. The commemorative discourse displays high percentages of serif typefaces as well as the highest percentages of blackletter typefaces. With half of the signs in material colours, it is characterised by unique sign types such as cast metal, forged letters, and stone inscriptions. Accordingly, it becomes apparent that four out of five discourse types mainly use different materials to realise their messages: regulatory (metal signs), commercial (plastic, foil, paper), transgressive (stickers and paint), and commemorative (wrought iron, cast metal, stone).

---

8. Cf. Jakob Wetzel: Debatte um Stolpersteine: Gedenken, das entzweit. Süddeutsche Zeitung. 13. Oktober 2014. (`https://perma.cc/D6Z3-XNNP`) (retrieved 16 December 2020)

9. Cf. Myriam Siegert (12.11.2018): Gedenken an Nazi-Opfer, Wieder Debatte um Stolpersteine—32 neue verlegt. Abendzeitung München. (`https://perma.cc/MUK3-34VM` (retrieved 16 December 2020)
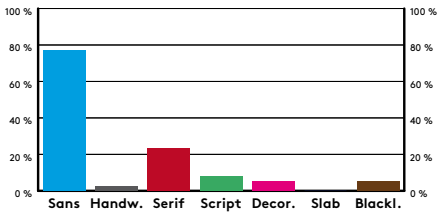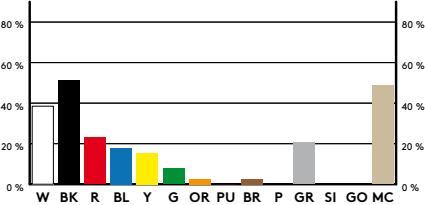
Commemorative Signs
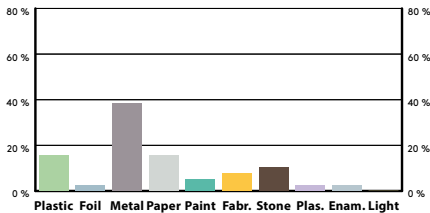
FIGURE 11. The images show commemorative signs in the Ruhr Metropolis. The graphs show the distribution of type styles, colours, and materials in the commemorative discourse type.

For each discourse type, certain combinations of graphetic resources are more common than in others. This finding reveals that the combinations are related to and serve the communicative goals of the sign producers in the respective discourses. The regulatory type of discourse requires standardisation, stringency, and clarity in graphic terms to ensure readability. The commercial discourse type requires a high diversity of typographic means to indicate goods and service providers under competitive pressure in a dense visual landscape. On the smallest canvases of transgressive stickers, the greatest creative freedom is enjoyed without limitations by legibility issues. Rich compositions, as well as connotatively strongly charged letterforms, are beneficial for the expression of political positions, social agendas, and scene affiliations. Commemorative signs show little colour, are firmly integrated into the architectural environment, and are made of extraordinarily durable materials that reflect intentions of long-lasting memory. Infrastructural signs are less prototypical and somewhere in the middle between standardised regulatory signs, commercial lightboxes and highly integrated, individual, valuable commemorative signs.

These prototypical typographic differences in the design of prohibitions, warnings, wayfinding, advertisements, protests, and memories indicate the groundwork as well as the meaning creation of typographetic resources in urban space. Since certain combinations of graphetic resources are more common in some discourses than in others, it can be assumed that these combinations give passers-by in urban space an indication of what kind of message they might be encountering. Furthermore, it can be assumed that the use of appropriate and customary graphic resources helps the sign producers to gain the sign recipients trust and understanding.

Beyond that, the graphetic differences analysed indicate in some respects that the classification proposed by Scollon and Scollon (2003) is valid. This very broad foundational analysis of discourse types, with more than 25,523 images, focusses mainly on aspects of the para- and micro-typographic level. For the following case studies with smaller sample sizes the meso- and macro-typographic levels (cf. Stöckl, 2004, p. 22f) are to be taken into greater consideration.

7.4.   Differences Between Northern and Southern Neighbourhoods

7.4.1.   Differences in Languages, Script Systems, Colours, and Type Styles

The comparison of the four northern and four southern districts reveals several significant differences (Figure 13). With regard to the distribution of languages, the North is more diverse. On the one hand, the northern districts have fewer monolingual occurrences. Furthermore, the two

Discourse Types in Comparison

MATERIALS

Legend:
- Regulatory
- Infrastructural
- Commercial
- Transgressive
- Commemorative

X-axis: Plastic, Foil, Metal, Paper, Paint, Fabr., Stone, Plas., Enam., Light

TYPE STYLES

X-axis: Sans, Handw., Serif, Script, Decor., Slab, Blackl.

COLOURS

X-axis: W, BK, R, BL, Y, G, OR, PU, BR, P, GR, SI, GO, MC
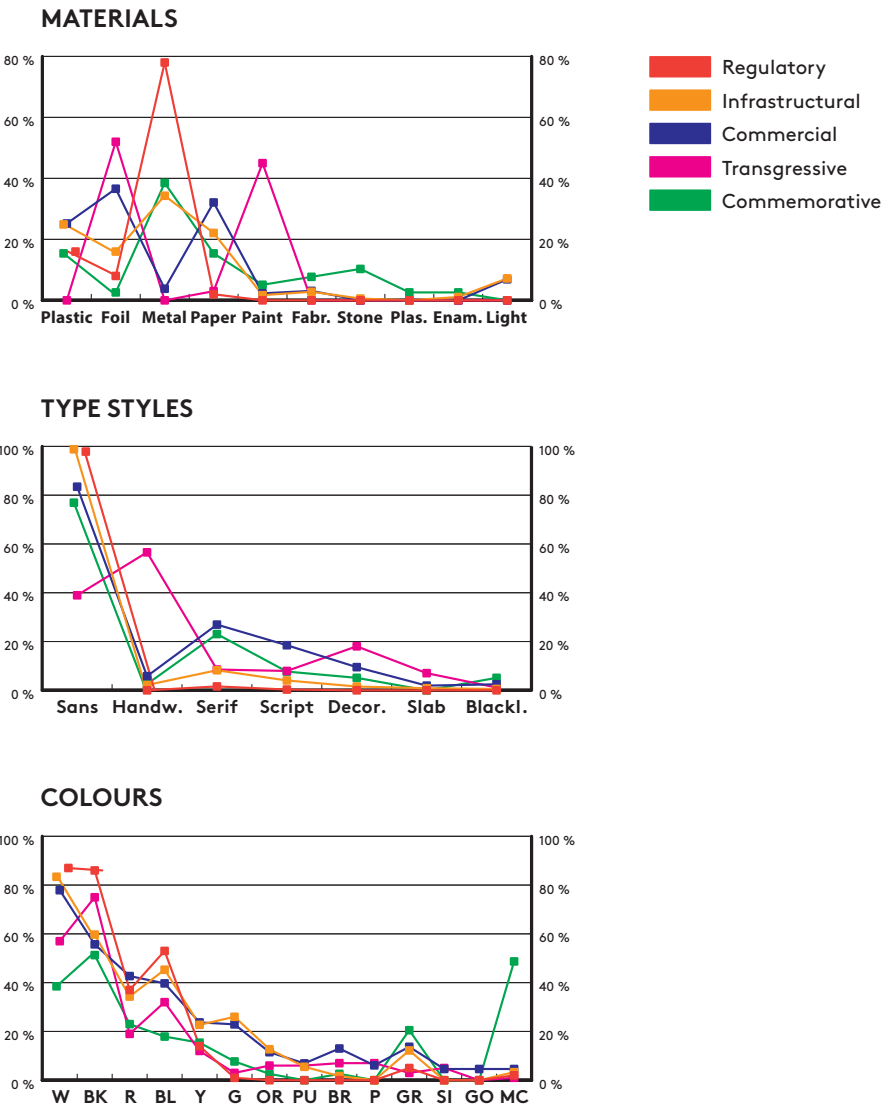
FIGURE 12. Three graphs showing the differences in the distribution of type styles, materials, and colours between the five discourse types in the Ruhr Metropolis.

largest language groups, German and English, are slightly less represented in the North. Accordingly, the North shows a greater number and variety of non-German and non-English texts (17.8%) in comparison to the South (12.4%). Western and southern European languages such as French, Italian, and Spanish are about twice as common in the South. In contrast, the more recent migrant languages such as Turkish and Arabic are about five times more common in the North (cf. Ziegler et al., 2018, p. 65). Overall, of the 53 found languages, 44 are visible in the North and 41 in the South.[10]

Languages distribution

The 15 most frequent language occurrences in the Ruhr Metropolis in comparison of the northern and southern districts

North

	North	South
German	64.1%	67.1%
English	18.1%	20.5%
Turkish	9.1%	1.6%
French	0.9%	1.9%
Italian	1.1%	1.7%
Spanish	0.7%	1.3%
Arabic	1.5%	0.3%
Latin	0.4%	0.7%
Polish	0.4%	0.6%
Nonstandard	0.3%	0.4%
Dutch	0.3%	0.4%
Chinese	0.2%	0.3%
Japanese	0.2%	0.4%
Russian	0.2%	0.3%
Greek	0.3%	0.2%

South

Duisburg-Marxloh
Essen-Altendorf
Bochum-Hamme
Dortmund-Nordstadt

Duisburg-Innenstadt
Essen-Rüttenscheid
Bochum-Langendreer
Dortmund-Hörde
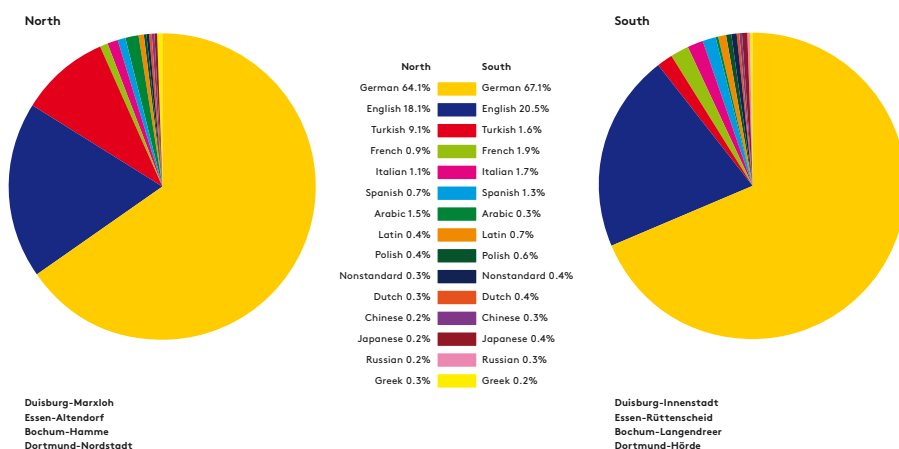
FIGURE 13. The different distribution of the 15 most frequent language occurrences in the Ruhr Metropolis based on a comparison of the northern and southern districts.

In the distribution of writing systems, the North shows texts in 13 script systems, which is just one more than the South. However, 58.4% of the occurrences of script systems beyond Latin are located in the North, thus offering more script system diversity. Strikingly, the writing systems are distributed very unevenly: Arabic is found at a rate of 92.72% in the North; Hànzì, Kanji/Hiragana/Katakana, and Hangul for

10. The North has no Igbo, Irish, Lingala, Malay, Norwegian, Shona, Swahili, Thai, and Hungarian. The South has no Albanian, Amharic, Armenian, Azerbaijani, Bulgarian, Estonian, Finnish, Indonesian, Catalan, Nepali, Sinhalese, and Ukrainian. However, the occurrences of these languages in the respective region of comparison are also small, ranging from one to 13 occurrences.

writing Chinese, Japanese, and Korean are jointly found in the South at a rate of 77.9%. Hànzì, Kanji/Hiragana/Katakana, and Hangul are mainly found in Chinese, Japanese, and Korean restaurants, that are almost exclusively located in the southern neighbourhoods (Figure 14).

Concerning type styles, the regulatory signs show no difference between North and South, as all occurring examples are set in sans serif typefaces. In the infrastructural signs, the South is slightly more diverse, with more decorative, blackletter, sans serif, and slab serif typefaces as well as more handwriting. In the commercial signs, the North shows a greater diversity compared to the South with more serif and decorative typefaces. With an additional small plus of blackletter and serif typefaces, the North shows more diversity in the commercial signs, which is the largest discourse type in our data. In the transgressive signs, the South is more diverse, as more stickers are being placed there (particularly in Essen-Rüttenscheid), and stickers show a high diversity of typefaces. In the commemorative discourse, the North is more diverse again, with more decorative and blackletter typefaces as well as more handwriting.

In a comparison of colour occurrences in the commercial signs, which are the largest group, the North shows higher occurrences in 11 of 14 colours (all colours except black, grey, and material colour) and is hence more colourful and diverse than the South (Figure 15).

The visible differences in the graphic parameters seem related to the social structures of the districts. As research by Ziegler et al. (ibid.) shows, the North as a whole, especially in the neighbourhoods of Duisburg-Marxloh and Dortmund-Nordstadt, have the greatest diversity in the population. The two districts show the largest groups of non-Germans and dual nationals (72.8% in Duisburg-Marxloh and 55.7% in Dortmund-Nordstadt) and the highest diversity index of 0.8 (cf. ibid. 49). The diversity index (according to Simpson, 1949, p. 688) indicates the extent of the diversity of the population in a particular area, whereby "1" represents maximum diversity and "0" represents none (cf. Ziegler et al., 2018, p. 51). Essen-Rüttenscheid is least characterised by migration, with the proportion of German nationals at 86.1% (cf. ibid. 49) and the diversity index at the lowest of 0.2 (cf. ibid. 51).

The data analysis shows that the North is graphically as colourful and diverse as its population structure. In the northern more multicultural quarters a broader range of visual strategies is used. One might conclude that the urban space reflects in its graphic signs which social groups inhabit and cultivate a space. It can be stated that in our data, cultural and linguistic diversity is associated with visual and typographic variance.

Three things stand out in particular in a North-South comparison: (1) The commercial discourse type in the North is more diverse in colours and typefaces. It seems interesting to take a closer look at the shops and their visual strategies that create this diversity. (2) The Duisburg-
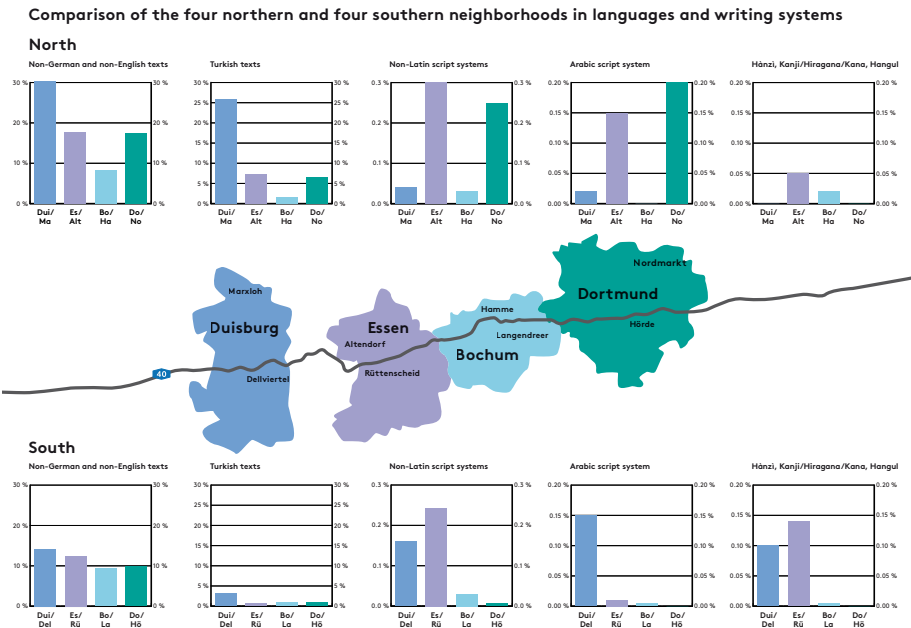
FIGURE 14. Comparison of the northern and southern neighbourhoods with re-spect to selected languages (non-German, non-English and Turkish texts) and selected script systems (Arabic, Hànzì, Kanji/Hiragana/Kana, Hangul).

Marxloh district, with the most non-German and Turkish texts, also shows by far the largest group of decorative typefaces. It seems worth exploring whether there is a meaningful correlation between these re-sults. In the following, these two notable findings, which have emerged from the data, will be examined in more detail.

7.4.2. *Possible Explanations for the Increased Diversity in the North*

The results from the comparison of the northern and southern neigh-bourhoods show that the North is more diverse in the languages and script systems as well as in type styles and colours in the commercial discourse type. However, this result was by no means to be expected. For it could have been reasonably anticipated that the South is more di-verse, as it has the expansive shopping districts (for instance in Essen-Rüttenscheid), where various elaborate retailers try to distinguish them-selves under competitive pressure. Greater colour and typographic di-versity could have been expected in the South as well. However, the graphic plurality in commercial signs is typical of the North. There are two possible explanations for this.

Comparison of the four northern and four southern neighborhoods in colours, type styles and population
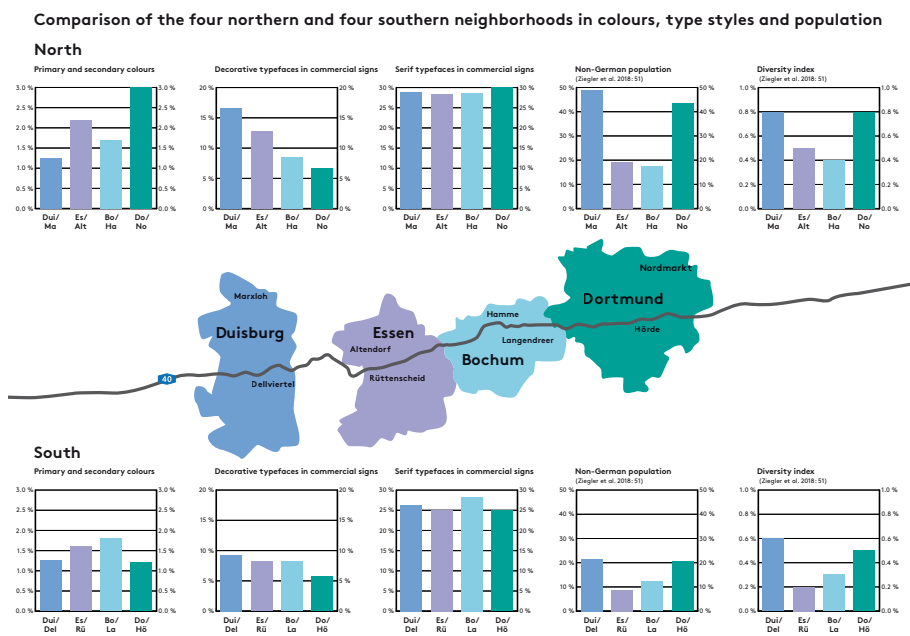
FIGURE 15. Comparison of the northern and southern neighbourhoods with respect to primary and secondary colours, decorative and serif typefaces in the commercial discourse type, non-German population, and diversity index.

Looking at the kind of shops that are located in the different neighbourhoods, it becomes apparent that there are more owner-operated retail shops in the North and more international chains in the South (Figure 16). It shows that owner-operated shops are characterised by more individual approaches to sign making; hence the North is more diverse. Accordingly, the visual appearance of individually owned small grocery shops, for example, is much more multifaceted in colours and type styles as well as languages and script systems. Whereas the big international chains very consciously tend to develop systematic, reduced, neutralising, "one look pleases all" approaches that in times of increasing "blandisation"[11] tend to become more similar.

However, this seems to be only half of the explanation. When looking at fashion shops, it turns out that owner-operated retail shops in the North are still more diverse than owner-operated shops in the South (Figure 17). Therefore, it is not only small shops as opposed to big chains that account for the difference here, nor laypeople design (in

---

11. http://www.eyemagazine.com/feature/article/normcore-inferno (retrieved 30.09.20).

small shops) against the design of marketing strategists who develop the design of big brands. Thus, it might be that some shop owners in the North follow different aesthetic ideals when creating typographic spaces (which are to be explored from an epic perspective in interviews with the sign makers), an aspect which moves us on to the next observation.

Grocery shops in the North
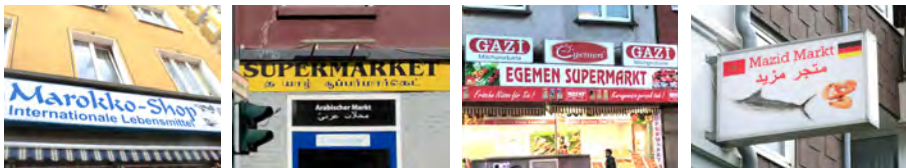
Grocery shops in the South

FIGURE 16. Small individual grocery shops in the North showing more visual diversity than big chains in the South.

Owner-operated fashion shops in the North

Owner-operated fashion shops in the South
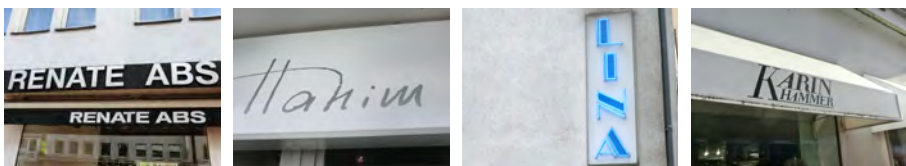
FIGURE 17. Individual fashion shops in the North show more visual diversity than individual fashion shops in the South.

Decorative typefaces in Turkish language texts in Marxloh

FIGURE 18. A selection of decorative typefaces in Turkish language texts in Duisburg-Marxloh, top left to bottom right: (a) Hairdresser (Typeface: *Victorian*, Letraset Type Studio, 1970s (Letraset 1978: 156)), (b) Cafe (Typeface: Similar to *Bookman*, based on *Antique Old Style No. 7*, 1858, A. C. Phemister, part of the Letraset Collection (Letraset 1978: 22)), (c) Restaurant (Typeface: *Victorian*, Letraset Type Studio, 1970s (Letraset 1978: 156)), (d) Cafe (Typeface: *Algerian*, Stephenson Blake, 1902, part of the Letraset Collection (Letraset 1978: 110)), (e) Bakery (Typeface: *Arrus*, designed for Bitstream by Richard Lipton in 1991), (f) Music school (Typeface: *Fontleroy Brown NF*, a so-called 'retro' font designed by Nick Curtis, released in 2009). Information on the typefaces *Bookman*, *Algerian* and *Arrus* (cf. `https://fontsinuse.com` (retrieved 30.09.20)), *Fontleroy Brown NF* (cf. `https://www.myfonts.com/fonts/cheapprofonts/fontleroy-nf-pro/` (retrieved 30.09.20)).

7.4.3. *Decorative Typefaces in Turkish Texts in Duisburg-Marxloh*

Comparing the northern and southern neighbourhoods an extraordinarily high number of decorative typefaces in Turkish language texts in the Weseler Straße of Duisburg-Marxloh emerged from the data. Checking again all the decorative typefaces in the data set it becomes apparent that most of the ones in Turkish language texts in Duisburg-Marxloh are unique; they do not exist in any other language or location in our data (Figure 18).

There is a variety of 20th century British and American advertising typefaces, many of them revived for Letraset in the 1960s and 1970s; however, there are also some newer typefaces. A fair number of them have swashes and ornamental elements that could be understood as em-

Decorative typefaces on wedding dress shops in Marxloh

FIGURE 19. Decorative typefaces in Turkish language texts in signs of wedding dress shops in Duisburg-Marxloh, top left to bottom right: (a) "Topkapı Gelinlik" (Topkapi Wedding Dresses) (Typeface: *Pretorian* (Letraset 1978: 87)), (b) "Stil" (Typeface: *Arnold Böcklin* (Letraset 1978: 16)), (c) "Bayar" (Typeface: *Roberta*), (d) "Milano" (Typeface: *Revue* (Letraset 1978: 90)), (e) "Dikelim" (Typeface: *Arrus*), (f) "Gelinlik & Abiye" (Wedding and Evening Dresses) (Typeface: *Titania*, Hass, 1906) (cf. `https://fontsinuse.com/typefaces/70908/titania-haas` (retrieved 30.09.20)), (g) "Braut Karakaşlar" (Typeface: *Tango* (Letraset 1978: 154)), (h) "Tesettür Giyim" (Body-covering clothing) (Typeface: *Harlow* (Letraset 1978: 129)), (i) "Gelinlik/Brautmoden" (Typeface: *Horizon*, based on the Star Trek Logo 1966) (cf. Yves Peters: Typography – The Final Frontier. The Fonts of Star Trek. Link: `https://www.fontshop.com/content/the-typography-of-star-trek` (retrieved 30.09.20)).

ulating something of a calligraphic tradition (reminiscent of Turkey's script reform from Arabic to Latin in 1928), but mainly they look ornamental in the style that was popular in the 1960/1970s. The question is: What is the correlation between the highest number of Turkish language texts and the highest number of decorative typefaces in this part of town?

The Miracle of Marxloh

The decorative typefaces are applied in different shops such as bakeries, cafes, and hairdressers. However, most of them are used in signs of wedding dress shops (Figure 19). To contextualise this, it is worth considering the history of the bridal gown industry in Duisburg-Marxloh: When the coal mines and steelworks started closing in the 1970s, the district was affected by major structural changes for the years to come. To escape from misery, the community invented a new industry, which is wedding dress tailoring. There are 25 wedding dress shops and about 27 adjunct business (without gastronomy) such as bakeries, hairdressers, photo studios, and invitation card printers on the intersection of Weseler Straße, Kaiser-Friedrich-Straße and Kaiser-Wilhelm-Straße with customers coming from all over Europe (cf. Gorres, Sucato, and Yıldırım, 2010, p. 246).

The Typefaces

Looking at the typefaces, it occurs that some of them have been used widely in famous 1960s and 1970s Turkish movie posters.[12] Let us have a closer look at the typefaces used in the bridal fashion shops and their use in film posters in the four following examples.

Pretorian

The wedding dress shop "Topkapı Gelinlik" on the Weseler Straße in Duisburg-Marxloh (Figure 20) uses the typeface *Pretorian* horizontally in the words "KUYUMCU," "TOPKAPI," "GELİNLİK" as well as vertically framing the door in the words "JUWELIER" and "ABENDKLEIDER". (The shop name "Topkapı Gelinlik" at the top is set in *Cooper Black*.) *Pretorian* is an early 20th-century British typeface, released by the foundry P.M. Shanks and Sons, Ltd., The Patent Type Foundry in London, and received by Letraset as rub-down type in 1976[13] ("Letraset Katalog" 1978, p. 87). *Pretorian* is used multiple times[14] for the title designs in movie posters such as *Sultan Gelin (The Sultan's Bride)* 1973, *Ölmeyen Şarkı (The song that does not die)* 1977, *Kibar Feyzo (Gentle Feyzo)* 1978 or *Aşkın Gözyaşı (Tears of Love)* 1979.

Arnold Böcklin

The wedding dress shop "Stil" (Figure 21) uses the art nouveau typeface *Arnold Böcklin*. It is named after the Swiss artist Arnold Böcklin

---

12. Many thanks to Gülşah Edis Kış for the reference to film posters and the fruitful discussions on the use of typefaces in the city of Istanbul.

13. Cf. `https://fontsinuse.com/\index{typeface}typefaces/26150/pretorian` (retrieved 30.09.20).

14. The online archive of the "Center for Turkish Cinema Studies" (`www.tsa.org.tr`) shows 12 movies using *Pretorian* between 1960–1979. (retrieved 30.09.20).

FIGURE 20. Top left to bottom right: "Topkapı Gelinlik" Wedding Dress Shop in Duisburg-Marxloh, Movie Posters: *Sultan Gelin* 1973, *Ölmeyen Şarkı* 1977, *Kibar Feyzo* 1978, *Aşkın Gözyaşı* 1979.

FIGURE 21. Top left to bottom right: "Stil", Movie Posters: *Gülizar* 1972, *Gülizar* 1972 (Detail), *Oğlum Osman* 1973, *Eksik Etek* 1976.

(1827–1901) and was released by the foundry Otto Weisert in Germany in 1904.[15]   With its organic and flowery shapes, it had a considerable revival in the 1960s and 1970s and was adopted by many dry-transfer manufacturers such as Letraset ("Letraset Katalog" 1978, p. 16). It appears on multiple Turkish movie posters in the 1970s such as *Gülizar* 1972, *Oğlum Osman (My son Osman)* 1973, and *Eksik Etek (The Missing Skirt)* 1976.

Roberta

A further exceptional Art Nouveau-style typeface is used in the vertical sign of the wedding dress shop "Bayar" on the Weseler Straße in Duisburg-Marxloh (Figure 22). The typeface called *Roberta* is designed by Bob Trogman in 1962/63 and released by the foundry FotoStar in the USA. The letter shapes were either inspired by wood type initials Trogman spotted in a Belgian magazine[16] or a Belgian restaurant sign.[17] *Roberta* is again a popular font in the 1960s and 1970s movie posters, such as *Ezo Gelin (The Bride Ezo)* 1968, *Aşk Sepeti (The Love Basket)* 1972, *Para (Money)* 1972, and *Şaban Oğlu Şaban (Saban the Son of Saban)* 1977.

Revue

Another notable example is the typeface *Revue* designed by Colin Brignall for Letraset England, released in 1968[18] (ibid., p. 90). It appears on a fashion shop for men's evening wear "Milano" (Figure 23) as well as in offer notices on the window panes of bridal fashion shops[19] on the Weseler Straße in Duisburg-Marxloh. *Revue* is also the font used in the title design of a movie titled the *Inatçı Gelin (The Stubborn Bride)* in 1965, and *Mutlu Ol Yeter (Be happy, that is all I want)* 1981.

The Typographic Representation of the Miracle of Duisburg-Marxloh

It appears that the shop owners use these intriguing, lively, and manifold typefaces here to create something particular.   Most of these movies that show typefaces also used on signs in wedding dress shops in Duisburg-Marxloh already indicated in their titles that they evolve

---

15. Cf.   https://fontsinuse.com/\index{typeface}typefaces/1142/arnold-boecklin (retrieved 30.09.20).

16. Cf.   https://drtype.wordpress.com/2013/05/27/origin-of-roberta-font/ (retrieved 30.09.20)

17. Cf. http://www.fontbros.com/families/roberta/styles/fancy-caps (retrieved am 30.09.20).

18. Cf.   https://fontsinuse.com/\index{typeface}typefaces/3485/revue (retrieved am 30.09.20).

19. Seen on the Weseler Straße in Duisburg-Marxloh at "ag collection" in September 2020.

FIGURE 22. Top left to bottom right: "Bayar" Wedding Dress Shop in Duisburg-Marxloh, Movie Posters: *Ezo Gelin* 1968, *Ezo Gelin* 1968 (Detail), *Aşk Sepeti* 1972, *Para* 1972, *Şaban Oğlu Şaban* 1977.

around love and lovers overcoming all kinds of obstacles. Like most romantic comedies particularly in that period, they are concerned with "finding the one" and ultimately marriage (*Ölmeyen Şarkı* 1977, *Eksik Etek* 1976, *Aşk Sepeti* 1972, *İnatçı Gelin* 1965). They are also concerned with the search for happiness by leaving the countryside and moving to big cities (*Aşkın Gözyaşı* 1979, *Kibar Feyzo* 1978, *Mutlu Ol Yeter* 1981)—i.e., the dream of escaping from poverty. Furthermore, some films address the situation of Turkish labour migrants in Germany, the travelling back and forth between Turkey and Germany, the contact with German culture, Turkish-German love relationships, and the migrant work experience in Germany (*Oğlum Osman* 1973) as well as the challenges between young lovers, one of whom grew up in Europe and the other in Turkey (*Gülizar* 1972).

These typeface choices appear like a typographic representation of the miracle of Duisburg-Marxloh. They imply a specific historical, geographical, and contextual reference and are characterised by an interesting play with traditions. The typefaces combine connotations to hopes and dreams on multiple levels: The wonderous saving of Marxloh by inventing a new branch of industry, the dream of a fairy tale wedding that brides, grooms, and their family entourages might have, whilst shopping for evening attire for weddings, and the stories that are told in these movies, of love, of transcending into other spaces and, at times, of being

FIGURE 23. Top left to bottom right: Fashion shop for men's evening wear "Milano" and offer notice on bridal fashion shop "ag collection", Movie Posters: *Inatçı Gelin* 1965, *Inatçı Gelin* 1965 (Detail), *Mutlu Ol Yeter* 1981.

liberated from poverty. These hopes are resonating through the streets of a migrant community in Duisburg-Marxloh by means of the shapes of these letters.

To deepen and continue this research, some of the key questions should be: What is the signs producers' perspective, their motivations and communicative goals? To what extent are these typeface choices the result of a conscious decision? Do the shop owners explicitly and consciously make references to movies from the 1970s, or is it more a matter of a subconscious favouring of popular and iconic lettering of a specific time and place? To what extent are graphic designers or sign manufacturers involved in recommending typefaces and how consciously (concerning the history of the use of the typeface) are they making these recommendations? Are there any technical reasons for recommending certain typefaces over others (such as availability, software, production techniques)? These questions can only be answered in interviews with shop owners and sign producers (which will be the next step in my doctoral research).

8. Results: Shop Types

This case study focusses on the typographic genre indication through graphetic resources in different shop types in the Ruhr area. The objective is to identify how retail shops that offer various products and services differ in their typographic visual appearance to create distinction and recognition. It is assumed that different sectors use varying graphic resources in order to achieve their communicative objectives and indicate genres, and that typifications occur within certain groups.

The 12,556 commercial signs in the data set identify 711 individual shops. They form 30 shop types (e.g., jewellers, hairdressers, bakeries, dry cleaners, gambling halls) that are categorised into five topical clusters ((1) Retail Shops, (2) Beauty Services, (3) Grocery Shops, (4) Repair and Cleaning Services, (4) Entertainment Venues). The shops' graphetic characteristics are analysed in a detailed visual analysis on imageboards (Figures 24 and 25) of two shop types in each cluster with a minimum of 20 individual shops per type (35−75 images per shop type). The imageboard analysis focusses on the grouping and measuring of the occurrences of shop names, type styles, image motives, colour palettes, materials, and sign types.

Figure 24. Imageboard (sample slide) from the visual data analysis on type styles used in jewellery shop signs in the *Signs of the Metropolis* data.

FIGURE 25. Imageboard (sample slide) from the visual data analysis on colours used in bakery signs in the *Signs of the Metropolis* data.

8.1. Heterogeneous Forms

The analysis reveals that some shop types show very diverse, heterogeneous visual strategies and hence cannot be differentiated by their graphetic characteristics alone. In contrast, others do show prevalent occurrences of typical visual characteristics which allow presuming that graphetic characteristics visually indicate certain shop types in urban space.

Shops that exist in high numbers in our data and appear to be the most diverse and heterogeneous in their visual strategies in the Ruhr area are 73 hairdressers, 114 fashion shops, and 28 grocery shops (Figure 26). They use a wide range of colours, sign types, and typefaces. Fashion shops use *Comic Sans* as well as gothic letter shapes and everything in between without a significant repeated occurrence of particular type styles. Hairdressers and grocery shops show equally versatile and colourful visual strategies.

Shop types with heterogeneous visual strategies

Hair dressers   **Fashion shops**   **Grocery stores**

FIGURE 26. Hairdressers, fashion shops, and grocery shops are three shop types that show very heterogeneous visual strategies in the *Signs of the Metropolis* data.

8.2.   Homogeneous Forms

Other shop types, however, show prevalent occurrences of typical visual characteristics, such as 24 jewellery shops, 30 bakeries, and 21 gambling halls (Figure 27). The following is a brief description of the three shop types.

Of the 24 jewellery shops, 56% use a serif typeface in their central shop sign. Contrary to the dominance of sans serif typefaces across all discourse types in our data set, it is impressive how united the group of jewellers are in the prevalent use of serif typefaces in this context of valuable and expensive goods. This result coincides with the high use of serif typefaces in the study of jewellers' shops in Antwerp Belgium by Pescatore Frisk and Pauwels (2019, p. 12). To this very day serif typefaces still refer

Shop types with typical visual characteristics

Jewellers   **Bakeries**   **Gambling halls**
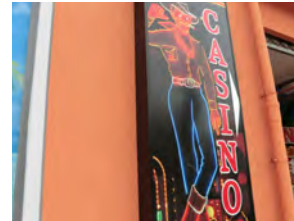
FIGURE 27. Jewellers, bakeries, and gambling halls are three shop types that show more homogeneous visual strategies with prevalent occurrences of typical visual characteristics in the *Signs of the Metropolis* data.

to value, authority, power, and status (cf. Walker, 2014, p. 44), hinting at their origin and historical contexts of use as capital inscriptions (*Capitals Monumentalis*) in ancient Rome (cf. Sutton and Bartram, 1988, p. 5f). Letterforms carry connotations that convey their places and times of origin as well as early contexts of use. The communication of value and luxury in the visual design of jewellery shops is not only generated by the type styles alone but co-occur with the 48% use of the colour gold in the letters and by valuably and individually crafted luminous relief letters in 30% of the shops. 56% of the jewellery shops use no images.

Of 30 bakeries, 40% use a scriptural font in their central shop sign. Scriptural typefaces reference the movement of the human writing hand in the letterforms and thereby appear handmade, trustworthy, personal,

and tangible (cf. Brumberger, 2003, p. 210): Attributes that one equally wishes from a homemade breakfast roll. 87% of the bakeries use a combination of warm colours such as red, yellow, orange, and brown that can be linked to associations of heat, baking, oven, and bread. 75% of the bakeries show pictures like ears of corn, pretzels, and bread loaves. 87% use adhesive foils and lightboxes on their shops. It is apparent from our data that there is a prototypical visuality in bakeries in the urban space of the Ruhr area with multiple combinations of the most common graphic parameters in many shops. A scriptural typeface in red and yellow with picture elements such as ears, windmills, and pretzels on lightboxes and adhesive foils, should be a fairly reliable indicator for the nearest bakery for passers-by in the Ruhr Metropolis.

Of 21 gambling halls, 60% use a serif, a slab serif, or a decorative typeface in their central shop sign, 40% make a reference to American show typefaces, as used in the gamblers' paradise Las Vegas. There are serif typefaces (top image) whose outlines emulate glowing neon signs next to a photo of the waving cowboy, a landmark neon sign that is placed in front of the *Pioneer Club* in Las Vegas. There is a visual representation of marquee lettering[20] (central image) above a silhouette of the Las Vegas welcome sign.[21] And there are decorative serif typefaces (bottom image), which are reminiscent of 19th-century American wood type with Tuscan-styled serifs in the centre and lower part of the letters (Kelly, 2010, p. 87f). 50% of the signs are very colourful, showing more than three colours. Over 50% of the signs show pictures of, for instance, playing cards, dice, roulette tables, bills, and coins. The most common sign types are adhesive foils, cantilevers, and lightboxes. The styles, shapes, visual treatments and arrangements of the letters, the emulations of sign types as well as the colours and images are forming a genre by which this group of communicative actors repeatedly and unambiguously references gambling and, in particular, the geographic location of Las Vegas, without, however, mentioning the city's name.

8.3.   Interim Conclusion: Shop Types

The results show that the shop types that use the most diverse strategies are in tendency the ones with the highest occurrences in numbers in our data: 73 hairdressers und 114 fashion shops. Using similar visual strategies appears to be regarded as beneficial solely to merchants and providers of similar products and services when the relative frequency

---

20. Cf. `https://www.neonmuseum.org/the-collection/north-gallery`) (eingesehen am 30.09.20).

21. Cf.   `https://www.rd.com/advice/travel/things-you-never-knew-about-the-las-vegas-sign/` (eingesehen am 30.09.20).

of this kind of shops is low, and when they are not in direct visual competition. Otherwise, the differentiation amongst each other seems to override the wish to be distinguishable as a group of dealers with a similar product range. Twelve hairdressers in one street do not want to look alike. In contrast, the only jeweller in one particular street might want to be recognised as the one and only by using all the visual cues typical of the genre in a most deliberate way.

Those shops which are fewer in numbers—such as the 24 jewellery shops, 30 bakeries, and 21 gambling halls—predominantly prefer a range of prototypical combinations of typographic means to communicate who they are and what they are selling. This indicates that graphetic resources can be central to the contextualisation, positioning and recognisability of communicative actors in urban space. Choices on type styles, colours, images, and sign types create genres in build-up environments, enable sign producers to achieve their communicative goals by reaching their audience—unless strong direct competition causes the retailer to focus less on the thematic genre and more on outdoing the direct visual competitors. Furthermore, if not in the immediate vicinity, it can be assumed that the formation of visual clusters between shop types and the repeated use of certain graphic resources lead to visual patterns that form perceptual expectations and graphic knowledge, with the effect of providing orientation to sign recipients.

9.   Conclusion

This paper develops a framework of eleven parameters for the analysis of typographic artefacts in urban spaces in order to investigate how discourse types, genres, and text functions differ in their graphic appearance. The eleven parameters are (1) the geographical location of the sign in the city, (2) the discourse type of the message, (3) the languages used, (4) the script systems used, (5) the type styles used, (6) the size and positioning of the sign, (7) the colours used, (8) the materials used, (9) the sign types such as lightbox, adhesive foil, or stone engraving, (10) the integration into the architectural context and mounting height, and (11) the graphic composition and density of the visual surface.

In conclusion, the analysis of the discourse types based on the eleven parameters shows that each discourse type (regulatory, infrastructural, commercial, transgressive, and commemorative) is characterised by different accents and unique combinations with respect to the use of graphic resources. Four out of five discourse types mainly use various materials to realise their messages: Regulatory signs use metal; commercial signs use plastic, foil, and paper; transgressive signs use stickers and paint; and commemorative signs use a lot of iron, cast metal, and stone. Regulatory and infrastructural signs show sans serif typefaces in

98% of the cases, whereas commercial and transgressive signs show (up to almost 20%) serif, script, and decorative typefaces. Thus, it can be stated that, in our data, core materials, and prototypical combinations of typographic resources point, in some way or another, to discourses in urban space. Thereby the signs indicate the type of information passers-by are encountering. It can be argued that these usual contexts of use create reception patterns (cf. Spitzmüller, 2013, p. 241) and that the recurring combinations of graphic resources provide sign recipients with a frame of orientation (cf. Hanks, 1987, p. 681) in urban space.

The comparison of the northern and southern neighbourhoods reveals the indication of social spaces, for example, in the very uneven distribution of script systems: 92.72% of the Arabic scripts in the North and 77.9% of the Hànzì, Kanji/Hiragana/Katakana, and Hangul in the South of the Ruhr Metropolis. Furthermore, the data analysis shows that the North is graphically as colourful as its population structure is diverse. For instance, the use of type styles is more diversified in the North than in the South; particularly, in the predominant discourse type, the commercial signs, which are characterised by more serif and decorative typefaces. Moreover, the North shows higher occurrences in 11 out of 14 colours in commercial signs. Thus, a more diverse residential structure seems to be connected to a broader range of visual strategies. All in all, cultural and linguistic diversity becomes apparent as being linked to visual and typographic plurality.

A closer look at the outstanding results in the Duisburg-Marxloh district, where most non-German and Turkish texts, as well as the largest group of decorative typefaces, were found, reveals a meaningful relationship of these results in the typographic design of wedding dress shops, using typefaces that played a significant role on 1960s/70s movie posters. These processes relating to visual identity creation in making typographic connections to other places, previous times, and contexts of meaning (cf. Briggs and Bauman, 1992, p. 147) are worth a further in-depth exploration.

The analysis of the (typo)graphic appearance of 711 shops grouped in 30 shop types selling various products and services in five topical clusters ((1) Retail Shops, (2) Beauty Services, (3) Grocery Shops, (4) Repair and Cleaning Services, (4) Entertainment Venues) shows that the abundant and ubiquitous shops use very diverse, heterogeneous visual strategies and cannot be differentiated by their graphetic characteristics. In contrast, some of the smaller groups clearly show prevalent occurrences of typical visual characteristics, which means their typographic outfit indicates who they are and what they are selling.

The shop types with the most diverse strategies are the ones with the highest numbers of shops (hairdressers and fashion shops), which indicates that using similar visual strategies appears only beneficial when the relative frequency of a shop type is low. Otherwise, the differentia-

tion amongst each other seems to override the wish to be distinguishable as a group of dealers with a similar product range. Eight fashion shops in one street do not want to look alike. In contrast, one gambling hall in one street wants to be recognised as such by using all the visual cues typical of the genre in a deliberate way.

In the less ubiquitous shops, such as the jewellery shops, bakeries, and gambling halls, recurring combinations of genre-specific graphetic resources indicate the respective communicative actors and product sectors. As far as these shops are concerned, the typographic decisions that shop owners make can be taken, to a considerable extent, as a clue to who they are and what they are offering. This proves that typographic and graphic decisions in urban space have a unique ability to visually indicate communicative actors, point out and (re)create genres as well as to distinguish between traders and product groups.

Overall, this study shows that the form and materiality of written language are related to its communicative meaning and significance. Typographic decisions in urban spaces form visual patterns that offer orientation to potential sign recipients. The analysis of the graphetic resources used in cityscapes indicates communicative actors and socio-spatial structures since references to meaning travel with letterforms through times and places. This enables sign producers to use typographic resources to point to current and past contexts of use and create connotative spaces of significance.

References

Backhaus, Peter (2007). *Linguistic Landscapes: A Comparative Study of Urban Multilingualism in Tokyo*. Bristol: Multilingual Matters.

Bauman, Richard (2001). "The Ethnography of Genre in a Mexican Market: Form, Function, Variation." In: *Style and Sociolinguistic Variation*. Ed. by Penelope Eckert and John R. Rickford. Cambridge: Cambridge University Press, pp. 57–77.

Baur, Rupprecht S. et al. (2004). "'Was sprecht Ihr vornehmlich zu Hause?' Zur Erhebung sprachbezogener Daten." In: *Essener Unikate* 24.

Blommaert, Jan (2013). *Ethnography, Superdiversity and Linguistic Landscapes: Chronicles of Complexity*. Bristol: Multilingual Matters.

Briggs, Charles L. and Richard Bauman (1992). "Genre, Intertextuality, and Social Power." In: *Journal of Linguistic Anthropology* 2.2, pp. 131–172.

Brumberger, Eva R. (2003). "The Rhetoric of Typography: The Awareness and Impact of Typeface Appropriateness." In: *Technical Communication* 50.2, pp. 224–231.

Cindark, Ibrahim and Evelyn Ziegler (2014). "Mehrsprachigkeit im Ruhrgebiet. Zur Sichtbarkeit sprachlicher Diversität in Dortmund." In: *Gegenwärtige Sprachkontakte im Kontext der Migration*. Ed. by Stefaniya Ptashnyk et al. Heidelberg: Winter, pp. 133–156.

Coulmas, Florian (2009). "Linguistic Landscape. Expanding the Scenery." In: ed. by Elana Shohamy and Durk Gorter. London: Routledge. Chap. Linguistic Landscaping and the Seed of Public Sphere, pp. 13–24.

Cowan, Nelson (2000). "The Magical Number 4 in Short-Term Memory: A Reconsideration of Mental Storage Capacity." In: *Behavioral and Brain Sciences* 24, pp. 87–185.

Delin, Judy, John A. Bateman, and Patrick Allen (2003). "A Model of Genre in Document Layout." In: *Information Design Journal* 11.3, pp. 54–66.

Dondis, Donis A. (1973). *A Primer of Visual Literacy*. Boston, MA: MIT Press.

Elam, Kimberly (2004). *Grid Systems. Principles of Organizing Type*. Princeton, NJ: Princeton Architectural Press.

Fischer, Udo et al. (2007). *Handbuch Lichtwerbung Teil 1: Hinweise zur Gestaltung von Lichtwerbanlagen*. Haselund: Hansen Neon GmbH.

Frow, John (2015). *Genre*. London: Routledge.

Gombrich, Ernst H. (1984). *The Sense of Order. A Study in the Psychology of Decorative Art*. London: Phaidon.

Gorres, Anke, Evelyn Sucato, and Akut Yıldırım (2010). "Hochzeitskultur als Motor der Stadtteilökonomie in Duisburg-Marxloh." In: *Informationen zur Raumentwicklung*. Vol. 2. 3. Stuttgart: Franz Steiner Verlag.

Gorter, Durk (2006). "Introduction: The Study of Linguistic Landscape as a New Approach to Multilingualism." In: *International Journal of Multilingualism* 3.1, pp. 1–6.

Hanks, William F. (1987). "Discourse Genres in a Theory of Practice." In: *American Ethnologist* 14.4, pp. 668–692.

Haralambous, Yannis (2020). "Grapholinguistics, TEX, and a June 2020 Conference." In: *TUGboat* 41.1, pp. 12–19.

Haslam, Andrew (2011). *Die Kunst der Beschriftung*. Teufen: Niggli.

Järlehed, Johan (2015). "Ideological Framing of Vernacular Type Choices in the Galician and Basque Semiotic Landscape." In: *Social Semiotics* 25.2, pp. 165–199.

Järlehed, Johan and Adam Jaworski (2015). "Typographic Landscaping: Creativity, Ideology, Movement." In: *Social Semiotics* 25.2, pp. 117–125.

Kelly, Rob Roy (2010). *American Wood Type 1828–1900. Notes on the Evolution of Decorated and Large Types*. Saratoga, CA: Liber Apertus Press.

Kersting, Volker et al. (2009). "Die A 40—Der Sozialäquator des Ruhrgebietes." In: *Atlas der Metropole Ruhr. Vielfalt und Wandel des Ruhgebiets im Kartenbild*. Ed. by Achim Prossek et al. Köln: Emons Verlag, pp. 142–145.

Landry, Rodrique and Richard Y. Bourhis (1997). "Linguistic Landscape and Ethnolinguistic Vitality: An Empirical Study." In: *Journal of Language and Social Psychology* 16, pp. 23–49.

"Letraset Katalog" (1978). Frankfurt a.M.

Lidwell, William, Kritina Holden, and Jill Butler (2003). *Universal Principles of Design*. Beverly, MA: Rockport Publishers.

Meggs, Philip B. and Alston W. Purvis (2006). *Meggs' History of Graphic Design*. Hoboken, NJ: John Wiley & Sons.

Meletis, Dimitrios (2015). *Graphetik. Form und Materialität von Schrift*. Glückstadt: Verlag Werner Hülsbusch.

Mortelmans, Dimitri (2005). "Visualizing Emptiness." In: *Visual Anthropology* 18.1, pp. 19–45.

Pescatore Frisk, Ryan and Luc Pauwels (2019). "The Shared Stories that Written Words Tell when No One is Reading: Exploring Modality in Typographic Landscapes as an Ecosocial Semiotic System." In: *Visual Communication*, pp. 1–34.

Pool, Albert-Jan (2017). "Type SketchKit 4, Muthesius Kunsthochschule Kiel, Dutch Design. [personal teaching material]."

———— (2020). "Schriftklassifikation nach Formprinzip." In: *Das ABC der Typografie*. Ed. by Patrick Marc Sommer and Natalie Gaspar. Bonn: Rheinwerk Design, pp. 60–73.

Schauer, Georg K. (1975). *Die Einteilung der Druckschriften*. München: Heinz Moos.

Schmitz, Ulrich (2018). "Im Raume lesen wir die Macht. Zur semiotischen Architektur von Text-Bild-Diskursen im Öffentlichen Raum des Ruhrgebiets." In: *Kommunikationsformen und Textsorten im Öffentlichen Raum zwischen Tradition und Innovation. Perspektiven Germanistischer Linguistik*. Ed. by Sascha Michel and Steffen Pappert. Vol. 13. Stuttgart: ibidem, pp. 133–158.

Scollon, Ron and Suzie Wong Scollon (2003). *Discourses in place. Language in the Material World*. London: Routledge.

Shohamy, Elana and Durk Gorter (2009). *Linguistic Landscape. Expanding the Scenery*. London: Routledge.

Simpson, Edward Hugh (1949). "Measurement of Diversity." In: *Nature* 163, p. 688.

Spiekermann, Erik (2008). "Wörterbuch Design. Board of International Research in Design." In: Basel: Birkhäuser. Chap. Typografie, pp. 409–416.

Spitzmüller, Jürgen (2013). *Graphische Variation als soziale Praxis. Eine soziolinguistische Theorie skripturaler 'Sichtbarkeit'*. London: De Gruyter.

———— (2015). "Graphic Variation and Graphic Ideologies: A Metapragmatic Approach." In: *Social Semiotics* 25.2, pp. 126–141.

Stöckl, Hartmut (2004). "Typografie: Gewand und Körper des Textes—Linguistische Überlegungen zu typographischer Gestalt." In: *Zeitschrift für angewandte Linguistik* 41, pp. 5–48.

Stötzner, Andreas (2000). "Signographie als eigenständiges Fach." In: *Signa. Beiträge zur Signographie* 1, pp. 23–36.

Sutton, James and Alan Bartram (1988). *An Atlas of Typeforms*. Ware, Hertfordshire: Wordsworth Editions.

Wachendorff, Irmi (2016). "Social Recognition through Multilingual Typography in Public Space—Global, Local and Glocal Texts in Dortmund Nordstadt." In: *6.º Encontro de Tipografia: Livro de Atas*. Ed. by Pedro Amado et al. Aveiro: Universidade de Aveiro, pp. 53–82.

——————— (2018). "Cultural Stereotypes in Letter Forms in Public Space." In: *NERD—New Experimental Research in Design*. Ed. by Michael Erlhoff and Wolfgang Jonas. Basel: Birkhäuser, pp. 206–233.

——————— (2019). *Identitätskonstruktionen durch skripturale Variation mehrsprachiger Typografie im urbanen Raum*. Duisburg: Universitätsverlag Rhein-Ruhr.

Walker, Sue (2014). *Typography and Language in Everyday Life—Prescriptions and Practices*. London: Routledge.

Wehde, Susanne (2000). *Typografische Kultur. Eine zeichentheoretische und kulturgeschichtliche Studie zur Typographie und ihrer Entwicklung*. Berlin: De Gruyter.

Willberg, Hans Peter (2001). *Wegweiser Schrift*. Mainz: Verlag Hermann Schmidt.

Ziegler, Evelyn et al. (2018). *Metropolenzeichen—Atlas zur visuellen Mehrsprachigkeit in der Metropole Ruhr*. Duisburg: Universitätsverlag Rhein-Ruhr.

Appendix: Picture IDs in the Database

Figure 1. Picture IDs top left to bottom right: 5499, 13635, IMG_3711, 21843, 258, 1563, 0330, 9094, 1964. The top right image was taken by the author in a subsequent data collection 2019 in Essen-Rüttenscheid.

Figure 5. Picture IDs 12230, 20529, 17703, 19312, 1676.

Figure 6. Picture IDs 12230, 20529, 17703, 19312, 1676.

Figure 7. Picture IDs top left to bottom right: 319, 5404, 9745, 5121, 12230, 4361, 4476, 28486, 20817.

Figure 8. Picture IDs top left to bottom right: 5005, 423, 1316, 1198, 20529, 5506, 1215, 25148, 11951.

Figure 9. Picture IDs top left to bottom right: IMG_3709, 11259, 25234, 3586, 354, 4086, 19526, 25460, 26867. The top left image was subsequently collected by the author in 2019 in the Essen-Rüttenscheid collection area.

Figure 10. Picture IDs top left to bottom right: IMG_3574, 8175, 12698, 7905, 5830, 8892, 5717, 12282, 610. The top left image was subsequently collected by the author in 2019 in the Essen-Rüttenscheid collection area.

Figure 11. Picture IDs top left to bottom right: 1676, 4187, 9688, 26138, 11361, 17243, 2658, 15036, 14701.

Figure 16. Picture IDs top left to bottom right: 4089, 18108, 16751, 2197, 25351, 25384, 25005, 23961.

Figure 17. Picture IDs top left to bottom right: 4138, 16805, 16495, 16758, 24069, 26479, 26429, 24081.

Figure 18. Picture IDs top left to bottom right: (a) Hairdresser (16081), (b) Cafe (16152), (c) Restaurant (16797/IMG_0195), (d) Cafe (16725/IMG_0210), (e) Bakery (17078), (f) Music school (16062).

Figure 19. Picture IDs top left to bottom right: (a) "Topkapı Gelinlik" (16895), (b) "Stil" (16570), (c) "Bayar" (Bayar_Roberta_GSV_2008) (The photo of the shop sign "Bayar" in Weseler Straße 30, Duisburg-Marxloh was overlooked in the data collection 2013/14 and taken from the Google Street View recorded in September 2008.), (d) "Milano" (16555), (e) "Dikelim" (IMG_0315) (The photo of the shop "Podium" (Dikelim) in Duisburg-Marxloh was subsequently collected in 2020.), (f) "Gelinlik & Abiye" (16768/IMG_0282), (g) "Braut Karakaşlar" (IMG_0154) (The photo of the shop sign "Braut Karakaşlar" in Weseler Straße 42, Duisburg-Marxloh was subsequently collected in 2020 as it was overlooked in the data collection 2013/2014. However, it already existed in 2013/2014.), (h) "Tesettür Giyim" (16577), (i) "Gelinlik/Brautmoden" (16434).

Figure 20. Picture ID top left: "Topkapı Gelinlik" Wedding Dress Shop in Duisburg-Marxloh (16895, 16895_Detail). All movie poster images are retrieved from the online archive of the "Center for Turkish Cinema Studies" (www.tsa.org.tr) on 30.09.20.

Figure 21. Picture ID top left: "Stil" (Picture ID 16570, Stil_ArnoldBoecklin_GSV_2008) (The photo of the shop sign "Stil" in Weseler Straße, Duisburg-Marxloh on the facade above the cloth awning was overlooked in the data collection 2013/14 and taken from Google Street View recorded in September 2008.) All movie poster images are retrieved from the online archive of the "Center for Turkish Cinema Studies" (www.tsa.org.tr) on 30.09.20.

Figure 22. Picture IDs top left to bottom right: "Bayar" (Bayar_Roberta_GSV_2008). The photo of the shop sign "Bayar" in Weseler Straße, Duisburg-Marxloh was overlooked in the data collection 2013/14 and taken from Google Street View recorded in September 2008. All movie poster images are retrieved from the online archive of the "Center for Turkish Cinema Studies" (www.tsa.org.tr) on 30.09.20.

Figure 23. Picture IDs top left to bottom right: "Milano" (Picture ID 16555), "ag collection" (IMG_0181) (seen on the Weseler Straße in Duisburg-Marxloh in September 2020). All movie poster images are retrieved from the online archive of the "Center for Turkish Cinema Studies" (www.tsa.org.tr) on September 30, 2020.

Figure 26. Picture IDs top to bottom: Hairdressers (16673, 4763, 17713), fashion shops (14515, 19913, 26429), grocery stores (13913, 16751, 19526).

Figure 27. Picture IDs top to bottom: Jewellers (24017, 16421, 4034), bakeries (25544, 5553, 17533), gambling halls (1083, 1085, 26867).

Between the Words

Emotional Punctuation in the Digital Age Communication

Olga Kulish

Abstract. A hidden, yet very important part of the written language is punctuation. Traditionally, punctuation is primarily used for grammatical purposes, serving to structure a written text. On the other hand, a variety of previously unseen options for using punctuation nowadays give it a new role and a separate meaning, different from what we previously knew. More specifically, an important aspect of using punctuation in digital communication is the tendency to use it as a way of expressing personal emotions and non-verbal signals, similar to facial expressions and gestures in live, face-to-face communication, that are typically not possible to convey otherwise. This article aims to analyze different contemporary ways of using punctuation in the areas of graphic design and digital communication. In particular, the study looks into novel, unconventional punctuation marks, as well as their possible combinations. As a practical contribution, this study also presents a collection of novel signs created by peer students and colleagues, which were combined and assembled into a common system. Each sign represents a specific human emotion, a mood, or a state of mind, and provides written text with a new meaning and/or different phonation. This project is rather an experiment, but despite its seemingly informal and casual nature, it reflects the existing tendencies in modern digital communication.

1. Introduction

Early punctuation primarily served for oral communication, helping speakers to structure their speech (e.g., Aristophanes' system of dots, Lupton and Miller, 1999). The technological advances enabled further development of written communication through book printing, mass production, advertisements, and posters. As a result, punctuation gradually became more systematized and universalized, eventually turning into an integral part of many alphabets. Nowadays, punctuation undertakes not only grammatical functions, but also enables more complete and comprehensive expression of emotions in written communication.

Olga Kulish   0000-0003-0494-7464
Polish-Japanese Academy of Information Technology, Warsaw, Poland
E-mail: olga.s.kulish@gmail.com

Among the most widely used "emotional" punctuation marks are the exclamation and question marks, the ellipsis, and the quotation marks. Their manifold functionality allows expressing a wide range of emotions in a written form. People express their excitement, sadness and anger, or simply ask questions by placing one of these marks or a sequence of them at the end of a sentence. To achieve this well-defined set of marks and corresponding emotions, for several centuries, people continuously experimented with shapes and curves, trying to express their feelings and emotions through different marks.

Nowadays when using punctuation marks in written communication, people seem to consider only the currently adopted use of a punctuation mark, whereas its possibly different historical meanings are neglected. The same applies to the new meanings emerged in the Digital Era. That is, one and the same punctuation mark could have completely different functions and convey completely different meanings in the past, when it first appeared, and in the present time, more and more dependent on digital communication. Indeed, with the invention of digital forms of communication and information representation, the role of punctuation is changing. As we more often use computers, smartphones and other digital channels to communicate (e.g., e-mails, instant messengers, blogs, comments, etc.), we are witnessing a change in the accustomed writing system and the established way of using punctuation marks. More specifically, in the Digital Age, punctuation marks are often combined in some novel ways, thereby providing a completely different semantic meaning. They are also frequently used even without a textual context as independent stand-alone elements. Moreover, even when used in a text, their original role changes to such an extent that they can modify the overall meaning of a sentence. In modern digital communication, we often treat punctuation very casually, skipping some marks or—vice versa—putting extra marks or combining several of them, thus aiming to add an emotional connotation to the written text. This way, punctuation often provides non-verbal signals to the written language, which usually lacks the usual benefits of the live, face-to-face communication and is unable to unambiguously express human emotions.

In this context, this paper looks into novel, unconventional punctuation marks, as well as their possible combinations. It focuses on the lack of emotional expressivity in written digital communication, and explores the potential of punctuation marks to communicate human emotions, primarily from a graphic designer's point of view. The study contributes to the research on punctuation marks by exploring how their role in human communication has evolved since the early days until the Digital Age. As a practical contribution, this study also presents a collection of novel signs created by peer students and colleagues, which were combined and assembled into a common system. Each sign represents a specific human emotion, a mood, or a state of mind, and provides written usage descrip-

tion with a new meaning and/or different phonation. These newly designed signs are unique to their authors and reflect their personal feelings and views, and are, therefore, not necessarily understandable by the others, as revealed by a conducted survey, also included in this study.

2. Conventional Punctuation: Changing the Meaning

The use of punctuation marks in the modern written language varies depending on the media and the target audience, for which a certain text is written. For example, scientific writing uses a formal technical language with relatively strict punctuation rules, where a casual unstructured arrangement of signs is unacceptable, especially when it concerns strict mathematical formulas and/or scientific statements. On the other hand, in poetic pieces of literature, the author's arrangement of punctuation marks often does not follow the established rules but is still acceptable. Punctuation in this case is used by the author to convey the emotional message of the piece, improve the interaction between the reader and the piece, and establish a connection between the reader and the author. Some authors even aim to experiment with how their works are communicated to the reader using punctuation signs. For example, in some of his poems the French writer Guillaume Apollinaire did not use punctuation at all (Apollinaire, 1918).

According to Adrian Frutiger's classification (Frutiger, 1989), punctuation marks can be divided into three main groups depending on their main purpose: sentence-structuring signs, expression signs, and reference signs. Among the three groups, expression signs are of particular relevance to this study. This group includes three punctuation marks: the *exclamation mark* (used for expressing affirmation or exclamation), the *question mark* (used for expressing a question or a doubt), and the *quotation marks* (used for expressing different types of quoted speech).

It is impossible to ignore the fact that communication through written messages is deprived of the physical, personal communication, when we can see a person, their emotions and feelings, as well as other non-verbal signals. In informal writing we often replace all these by words, punctuation, emoticons, "emojis," pictures, voice messages, etc. Concerning punctuation, for example, two opponents in a dialogue can use an excessive number of characters, such as several exclamation and question marks in a row, as well as many full stops. Some punctuation marks change their meaning in texting nowadays: for example, a full stop at the end of a phrase might be perceived not just as the end of it, but makes the message appear less sincere (Gunraj et al., 2016), or convey negative emotions. Such a full stop at the end of the message in texting is often referred to as a "dot of hate".

A full stop has acquired yet another role in the design works of Un Mundo Feliz—a public initiative that unites cultural activists and graphic

FIGURE 1.   Arial font with a swastika symbol by Un Mundo Feliz (Feliz, 2015) Source: `http://unmundofeliz2.blogspot.com/2015/10/el-patriotismo-arail-symbol.html`

designers who aim to disseminate social and political messages through their artworks in new digital media, such as the Internet. They consider graphic activism as a controversial site for promoting public debates and confrontations (Jiménez, García, and Fernández, 2011). In their work, all the dots in the Arial font were changed to a swastika symbol (Fig. 1).

Speaking of less frequently used symbols and signs, it is worth mentioning that some symbols, albeit not used today in everyday writing, are still widely used by the graphic designers to prepare books, corporate

identity, posters and other graphic materials. Due to their unusual shape and semiotic meaning of the past, they have become quite popular nowadays.

A good example of this is the *index* ☞ —an index translated from Latin as "little hand". The symbol represents a pointing hand, which literally means "pay attention to" or "look at the direction of the pointing finger". The modern function of this sign in many graphic design projects is to catch the attention of the reader, user, consumer or any other person staring at the sign, when, for example, passing by a café, thereby inviting them to enter inside (Fig. 2). In a broad sense, the meaning of this punctuation sign nowadays is the same as in the 12th century, when it first appeared (Houston, 2013).
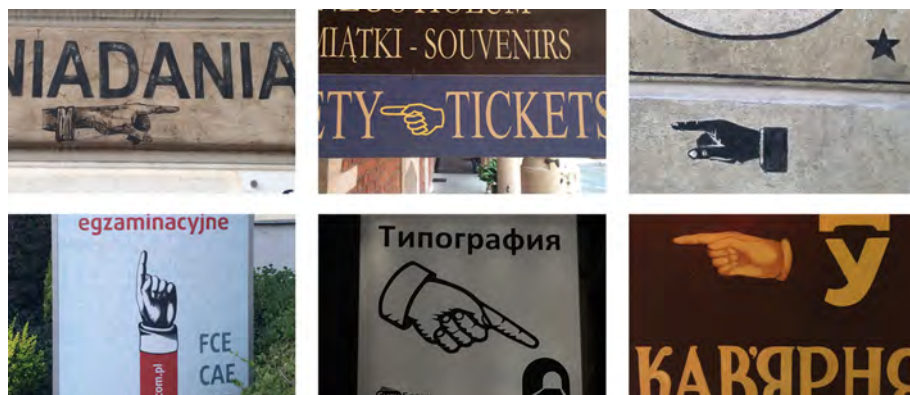
Figure 2. Manicules on advertising signs in Poland, Ukraine and Russia. Source: author's personal archive.

Punctuation in logotypes typically conveys some semantic information, such as, for example, in the personal logotype of the type designer Martin Majoor who creates font families, consisting of both serif and sans serif typefaces (Fig. 3). Accordingly, his logo represents a handshake of a serif and a sans serif manicules.

Figure 3. Martin Majoor's personal logotype. Source: http://martinmajoor.com

Another example is the book cover for *The scarlet letter* novel (1850). The pointing hands perfectly reflect the main topic of the novel—social shaming and stigmatizing (Fig. 4).
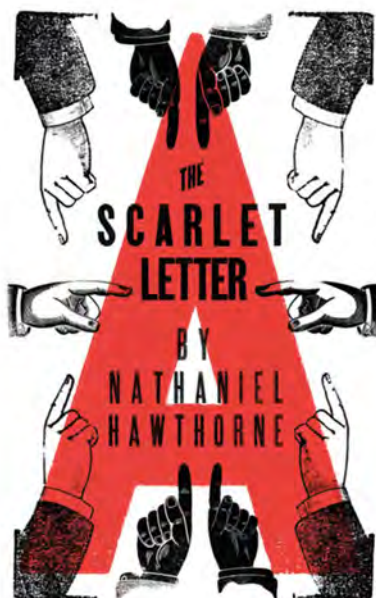
Figure 4. Cover for the novel *The Scarlet Letter* by Mr Furious. Source: `http://recoveringtheclassics.com`

The usage and the meaning of punctuation marks constantly change, in the same way as, for example, the economic and social situation. Today we interpret a semicolon and a bracket as a smiling face:) when receiving a digital message from a friend. Similarly, full stops appearing in the middle of a word have acquired a new connotation in the French language, since they commonly represent a unisex, gender-neutral version of a word (Vernooij, 2018).

3. Emoticons

In text communication (especially in texting) that is partially limited by the set of characters on the keyboard, people "invented" a new way of conveying emotions by using combinations of punctuation marks, as well as numbers and letters—that is, by using emoticons. The first digital emoticon (at least in the way we use it today) was used by Scott Ruan

(2011) when he included a smiling face :-) and a sad face :-(in his e-mail.

   A system of such signs has become widely adopted in digital communication, when writing electronic messages and posts. The system of emoticons is constantly supplemented with new signs, as well as with the so-called ASCII[1] Text Art. Such text art, however, existed before the era of personal computers. For example, in 1948, Paul Hadley published an article Keyboard Art in the "Popular Mechanics" magazine (Hadley, 1948), where he provided a creative master class on creating own emoticons using a usual typewriter (Fig. 5).
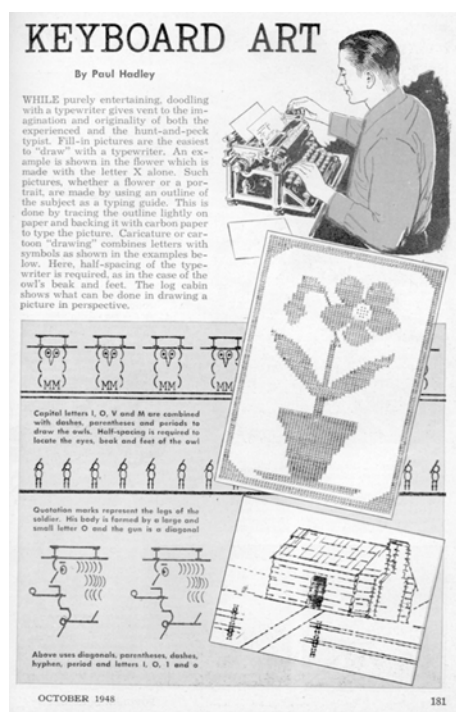
FIGURE 5. "Keyboard Art" by Paul Hadley. Source: `http://blog.modernmechanix.com/ascii-art-1948`

   Interestingly, the first emoticons appeared long before the mankind was able to send electronic messages. The first use of the emoticon is related to the American satirical magazine Puck that published an article titled "Typographical Art" in 1881 ("Typographical Art" 1881). The

---

1. ASCII Table and Description `https://www.asciitable.com/`.

article was illustrated with four pictograms symbolizing melancholy, indifference, astonishment and joy (Fig. 6).
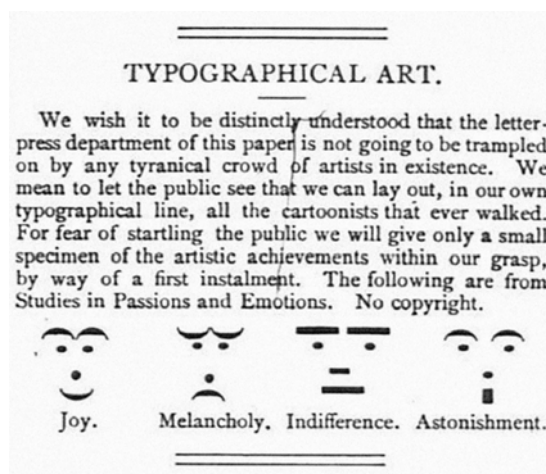
FIGURE 6. "Typographical Art" in Puck Magazine. Source: `https://en.wikipedia.org/wiki/Puck_(magazine)`

Nowadays, the popularity of emoticons has also been supported and promoted by various instant messengers, where multiple combinations of characters from different written systems are widely adopted by Internet users. The popularity of emoticons and emojis rapidly grew in the Digital Age, making it the subject of research for psychologists, philologists, and linguists. From these scientific perspectives, these signs are considered as a natural change of the written language, caused by the ubiquitous spread of mobile networks and the Internet.

Emoticons (particularly faces) communicate emotions in a very literal way, and the widest category among them is a smiling happy face (see Annex A). The smiley face is a very recognizable symbol, and it is widely used everywhere in visual communication: labels, magazines, street signs, etc. (Fig. 7).

Some other examples include the logotypes of type foundries, companies and conferences, where it is easy to spot a smiling face, resembling the famous emoticon Smiley (Fig. 8).

With the emergence of *emojis*, they become popular not only as a supplement to the text but become a text itself. One of the examples is *Book from the ground* (Xu, 2014), which is written in emoticons, where you can still see the punctuation marks, which serve their conventional role (Fig. 9).
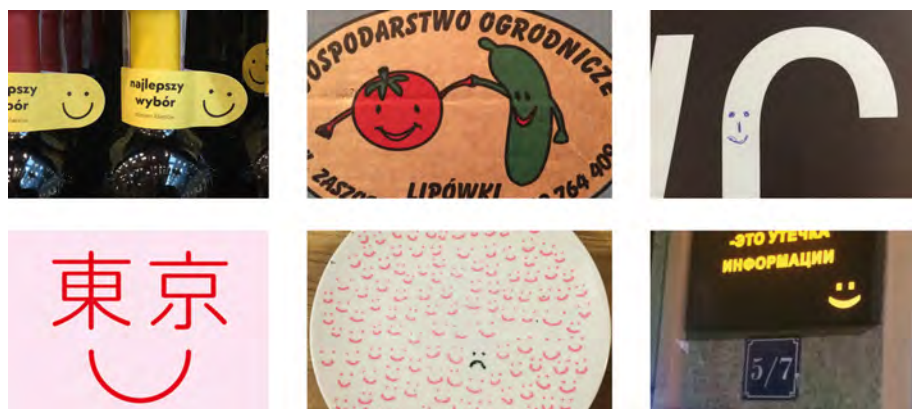
FIGURE 7. Smiling faces on different objects and in advertisement. Source: https://slanted.de, author's personal archive.

FIGURE 8. Examples of smiling faces in the logotypes of: Laughter Conference, Threedotstype Type Foundry, DesignByHumans, Laïc: Type Foundry. Source: https://laughter.pja.edu.pl, https://threedotstype.com, https://designbyhumans.com, https://laic.pl

Another beautiful example is the book "Genesis" by Juli Gudehus (1997), where the biblical creation story was translated into pictograms, symbols and logos (Fig. 10).

World-wide use of emoticons has also been adopted in the typographic practice, where a written language is supplemented by new signs integrated into a text. Nevertheless, combinations of standard punctuation marks in the form of emotional faces does not lose its popularity. This is mainly due to the possibility of expressing emotions even without using words, which makes such a "language" universal to a certain extent, as well as shortens the time spent on writing, in particular, when typing short text messages. As a result, punctuation marks are often given a new meaning and a new role.
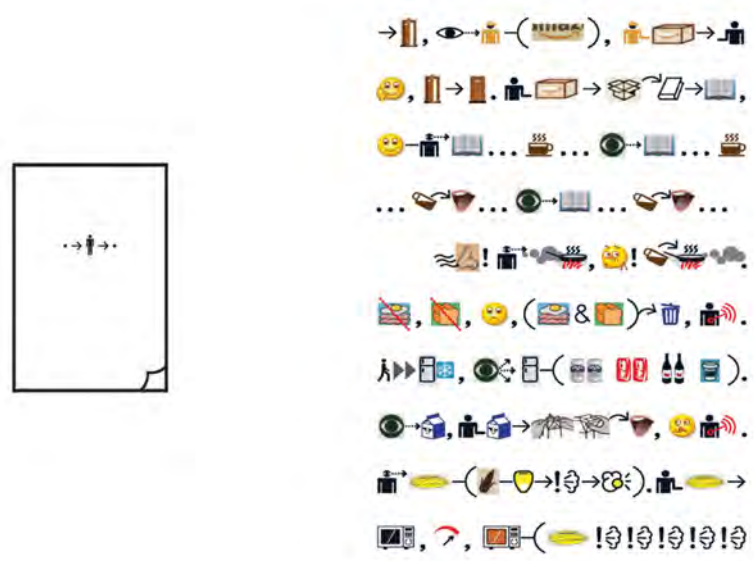
FIGURE 9. *Book from the Ground* by Xu Bing. Source: `http://xubing.com`

FIGURE 10. "Genesis" by Juli Gudehus. Source: `https://juligudehus.net`

4. Unconventional Punctuation

4.1. An Overview of Existing Signs

The first documented attempt to express thoughts without explicitly using words, but rather using a specific sign in written communication

dates back to the 16th century and was made by the London printers Parkes (2016). The *percontativus* symbol ⸮ was used by them to mark a *percontatio*, or a rhetorical question, and was "employed not to elicit information, but for purposes of rhetorical effect instead of a positive statement" (ibid.). This punctuation mark looks like a reversed question mark, and appears in several books in 1580 and 1581 (and less frequently in the 17th century)—for example, in hand-written works of the English poets Robert Herrick and Thomas Middleton.

The first documented evidence of using an *irony mark* dates to 1668 and can be found in Essay Towards a Real Character and a Philosophical Language authored by the English philosopher John Houston (2013). The sign he proposed looks like an inverted exclamation mark ¡ (ibid.). It was not used very widely, but the idea of a punctuation mark to represent irony has been quite popular until very recently, judging from the number of various designed signs: *Irony* by Marcelline Jobard in 1842 (Jobard, 1842); *Point d'ironie* by Alcanter de Brahm in 1899 (De Brahm, 2018); *SarcMark™* by Douglas and Paul Sak in 2006; *Ironieteken*[2] by Underware in 2007 (see Annex B). However, none of these marks is being actively used nowadays.

A whole new system of emotional punctuation marks was proposed by the French writer Hervé Bazin in his essay "Plumons l'Oiseau" ("Let's pluck the bird") in 1966 (Bazin, 1966). Bazin's signs expressed a range of emotions, such as doubt ⸮, certitude ⸮, acclamation ⸮, authority ⸮, love point ⸮, and irony ⸮. This project was brought back to life by Mykyta Yevstifeyev and Karl Pentzlin in 2011 (Yevstifeyev and Pentzlin, 2012), who proposed to include these 6 characters in the Unicode standard. Furthermore, the newly-developed font Bazin that includes these unconventional symbols is freely available for downloading and installing for digital use (Zong, 2015). There are also other new punctuation marks, available online, that aim to address narrow-tailored purposes in written communication, such as Sarkmark by Jacob Smith[3] (Smith, 2015) or the set of "Legal marks" (Stewart, 2015).

Noteworthy, quite a few of the invented punctuation marks mentioned above are intended to express irony. In most cases, it is quite typical to use quotation marks to show that the enclosed expression should be understood in a way, different from what is actually written. In this case, however, there is no guarantee that the irony will be correctly understood by the reader, since the quotation marks can be missed or misinterpreted by the reader. On the contrary, if the irony is indicated in a

---

2. https://underware.nl/logotypes/irony_mark/

3. Please note the difference between the two symbols with similar functions and slightly different names—SarcMark by Douglas and Paul Sak and Sarcmark by Jacob Smith.

clear and unambiguous way by some kind of an irony mark, will there be any room left for the readers to interpret the text in their own way?

Another widely known unconventional emotional sign is the *interrobang*. Designed by Martin K. Speckter in 1962 (Houston, 2013), it represents a combination of the question and exclamation marks merged in a single glyph ‽ to replace the disjoint combination of the two marks. Speckter proposed several designs for the new sign in his paper for the Typo Talks journal, after which invited interested readers to contribute to the design by sharing their own versions. The offer was successfully accepted by a wider audience, resulting in multiple appearances of the new sign not only in newspapers, such as Wall Street Journal and New York Herald Tribune, but also in the next issue of the Typo Talks journal, which gathered and presented all the possible design variations proposed by graphic designers and typographers (ibid.).

In 2017, a novel punctuation system was proposed by the Austrian graphic designer and typographer Walter Bohatsch. In his book "Typojis" (Bohatsch, 2018), he describes philosophical and linguistic ideas that provided a foundation for creating a completely new system of previously unseen signs. The system includes 30 symbols that serve to represent different emotions and human moods, such as, for example, sympathy, solidarity, curiosity, scepticism, boredom, etc.—all these are typically difficult to express in written communication as "messages with the kinds of additional meanings that are conveyed instantly when speaking face to face" (ibid.). The main goal of the project was to eliminate ambiguity in written messages for better inter-human communication.

Taken together, the developed set of characters supplements a font created by the author, thereby making Typojis look organic and natural when typing. Glyphs representing the signs are unified and have a dot at the bottom, just below the baseline. Unlike emoticons that often look like icons or pictograms, the typoji graphemes are abstract signs of various asymmetric shapes. Nevertheless, to some extent they tend to mimic familiar symbols, thereby invoking certain associations when people are looking at them. For example, the sign of tolerance resembles an agreement tick, and the irony sign reminds of its long-standing predecessors—various modifications of the well-known question mark.

A common question asked by readers when reading sentences with these signs: what intonation should I be using for such sentences? If in the speech of a person I can imagine what punctuation mark I would put at the end of a sentence, is it possible to recognize and visualize these signs in oral communication?

The main difference of the new unconventional punctuation marks from usual punctuation marks is their singular function. That is, each of these new marks undertakes a single function of, for example, expressing a specific emotion, feeling or mood that the author would like to

communicate to the reader. As far as the digital media are concerned, another difference is that the new punctuation marks are not present on a typical modern keyboard of a PC or a smartphone, which we use to write digital messages. Accessibility and a constant visual reminder of the symbols' presence could significantly increase the distribution of these signs in written communication, while recognition would depend on the frequency of their appearance in electronic and printed media.

4.2.   New Shapes, New Meaning

Our alphabet has gone through a long evolution from simple drawings and pictograms to abstract shapes, which we combine in different orders, thereby composing words, sentences, or even whole novels. Admittedly, the first thing that comes to mind when talking about an alphabet is letters. There are, however, many other signs and symbols that serve to structure a written text, provide it with a different phonation, or even completely change the meaning of words. Among these symbols are punctuation marks, which we use in written communication. What if there were much more punctuation marks to express virtually unlimited human emotions, moods, and states that need to be expressed by the humans when writing messages?

The spectrum of human emotions is virtually unlimited, and expressing them even in a live communication, either in a verbal or a non-verbal manner, is already a challenge. In this respect, is it possible to think that punctuation marks can be sufficient to express all these subtle emotions, moods, and states in written communication? If yes, what kind of signs and how many of them do we need? How to ensure that these signs are unambiguously understood by people from different language and cultural backgrounds?

Accordingly, this section of the paper presents a collection of novel signs created by authors friends and colleagues, which were combined and assembled into a common system. Each sign reflects a very specific human emotion or a mood, so that a written text acquires a new meaning and different phonation, when combined with one of these signs.

Essentially, this project is a creative exercise on possible ways of expressing human emotions in written communication by means of graphic signs. Despite this seemingly informal and casual nature, the project actually reflects the existing tendencies in modern digital communication, such as the insertion of emoticons in texts, the absence of punctuation marks in place where they are typically used, and—vice versa—the presence of punctuation marks in unusual, unconventional places.

The 9 participants of this project come from three different professional backgrounds: linguists, software developers, and designers, who

were asked to create their own punctuation mark to express an emotion or a mood. The author got the original drawings (Fig. 11), each of which represented specific emotion, mood, or state, together with the description of each sign and an example of how this sign can be used in writing (see Annex C). All the resulting images were post-processed by the author to create a single system compatible with the font *Ayka Regular* Ayka by Maciej Połczyński[4] (Fig. 12).
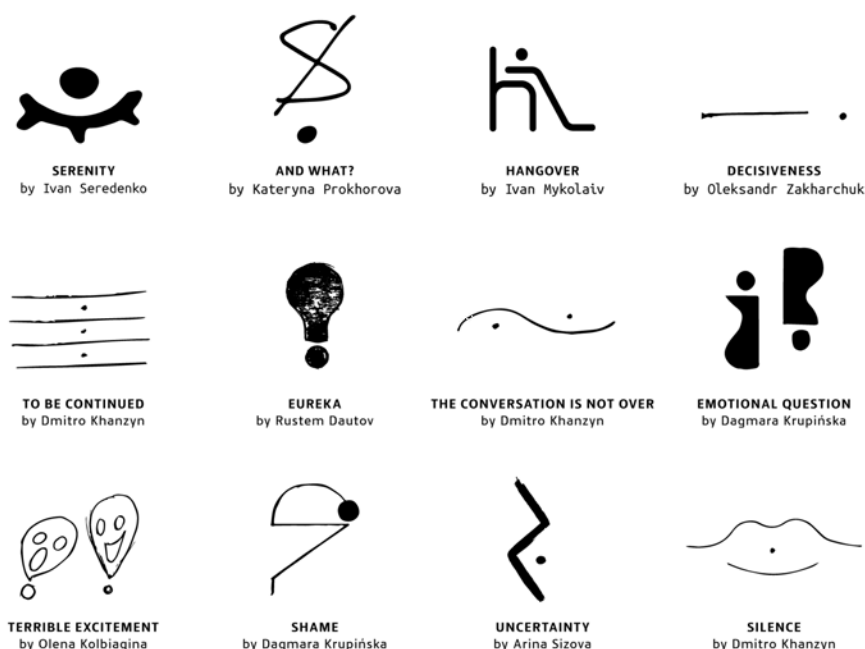
FIGURE 11. Original drawings of suggested punctuation marks.

This study on the new, unconventional punctuation marks, has resulted in the following interesting observations:

– Newly-invented marks match to the character of their creators and correlate with their backgrounds. To a great extent, all participants have expressed their own personalities through their suggested signs.
– An ambiguous and uncertain opinion on using additional unconventional punctuation marks. That is, when answering whether we need more punctuation marks, the distribution of votes was 60% for *Yes*

---

4. http://laic.pl/
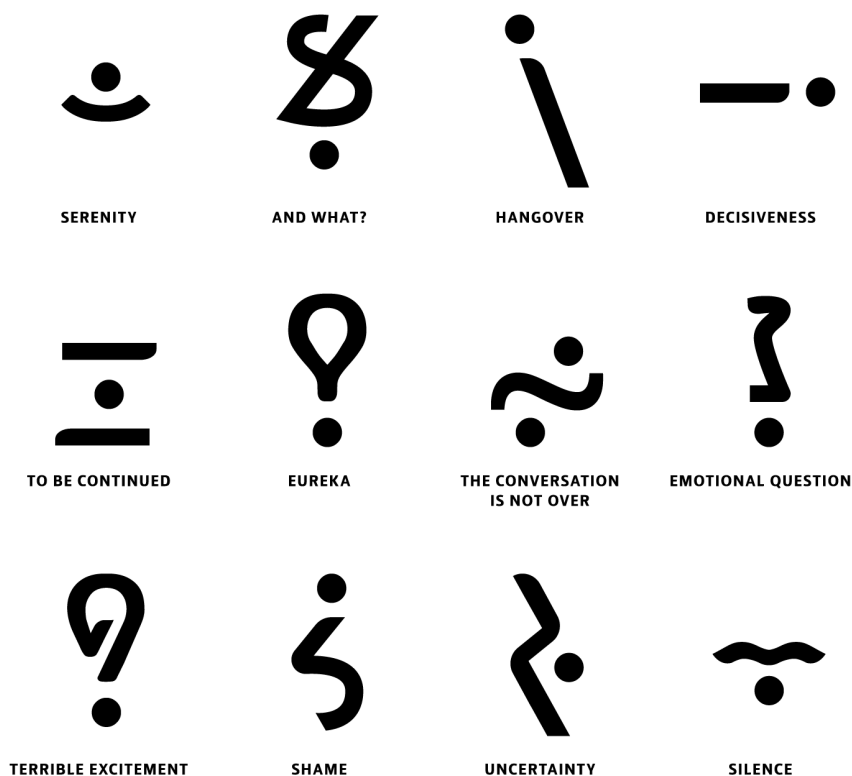
FIGURE 12. Post-processed images.

and 40% for *No*. Even though this statistics is not representative enough due to the limited number of participants, it is a promising finding that can serve as a starting point for further research.

Another interesting detail is that all the participants put their signs at the end of a sentence, thus following the conventional rules. Moreover, the first example of using a particular sign contained the same meaning in words. This could be due to the fact that the sign was just artificially invented and not evolved naturally, and the sign creators did not have necessary skills to use it correctly, even though they invented it.

5. Conclusion

Nowadays, punctuation undertakes not only grammatical functions, but also enables a more complete and comprehensive expression of emotions

in written communication. Among the most widely used "emotional" punctuation marks are the exclamation and question marks, the ellipsis, and the quotation marks. Their manifold functionality allows expressing a wide range of emotions in a written form. Despite this wide use and adoption of these marks, for many centuries new punctuation marks have been invented, serving to express different emotions and feelings, ranging from irony to asking a rhetorical question. Most of these newly invented marks are not being widely used today.

With the emergence and further development of digital media, punctuation has gained new functions and a new meaning. Punctuation marks were widely used as separate "pictograms"—emoticons, which later evolved into emojis. Nevertheless, since their first appearance in 1982, using textual emoticons still remains very popular.

Two opposite trends are observed in modern digital communication. On the one hand, people often do not follow generally accepted grammar rules, by, for example, not using a full stop at the end of a sentence (while the conventional full stop itself has received an additional negative connotation in informal digital messages). On the other hand, people tend to combine multiple punctuation marks as a way of expressing their emotions. This way, these combined marks act not as part of an alphabet, but rather as individual stand-alone pictograms.

In oral communication, human emotions are expressed through the voice tone and intonation. In written communication, however, the existing punctuation marks can only express a very limited set of basic emotions and human moods. As a result, it is often difficult if not impossible to share the exact emotional state with the reader in a written form.

Aiming to address this limitation (at least partially), the conducted case study suggested 9 participants to create their own to express very precise emotions, moods, or situations. As a result, each participant has proposed a unique emotion and a matching unique sign, none of which overlapped with each other. This project is rather an experiment, than a direct statement. Each of the newly-invented signs needs time for evolution, as well as the real demand from the society and the implementation in the digital technologies. A new sign should be recognizable by a group of people; it should exist in different typefaces and be accessible. In texting we often value minimum time delays, so probably will not search for hidden characters, rather type the most accessible symbols on a keyboard. Of course, it is opposite when it comes to experiments, artistic books or projects.

The practical experiment involved only 9 participants, but what if there were 100 or even 1,000 of them? Given the extreme range of human emotions and life situations, as well as the multitude of graphical forms to express them, how many unique, non-repeating signs would be proposed then? On the other hand, would it be possible to systematize

such a variety of signs and make them all recognizable and unambigu-
ously understandable by all people? There is probably no immediate
answer to all these questions, and the search is to be continued.

Acknowledgments

References

Apollinaire, Guillaume (1918). *Calligrammes: poémes de la paix et da la guerre,
    1913–1916*. Paris: Mercure de France.
Bazin, Hervé (1966). *Plumons l'oiseau*. Paris: Grasset.
Bohatsch, Walter (2018). *Typojis: A Few More Glyphs*. Mainz: Verlag Her-
    mann Schmidt.
Brahm, Alcanter de (1899). *L'ostensoir des Ironies*. Paris: Bibliothèque d'art
    de «La Critique».
De Brahm, Alcanter (2018). *L'ostensoir des Ironies, Vol. 3 of 3: Essai de Méta-
    critique; Les Étapes de la Pensée Et le Sens de la Vie (Classic Reprint)*. London:
    Forgotten Books.
Feliz, Un Mundo (2015). *Patriotism(o) / Arial Symbol*. URL: http : / /
    unmundofeliz2.blogspot.com/2015/10/el-patriotismo-arail-symbol.
    html.
Frutiger, Adrian (1989). *Signs and Symbols: Their Design and Meaning*. New
    York: Watson-Guptill.
Gudehus, Juli (1997). *Genesis*. Zurich: Lars Müller Publishers.
Gunraj, Danielle N et al. (2016). "Texting insincerely: The role of the pe-
    riod in text messaging." In: *Computers in Human Behavior* 55, pp. 1067–
    1075.
Hadley, Paul (1948). "Keyboard Art." In: *Popular Mechanics* 10, p. 181.
Houston, Keith (2013). *Shady characters: The secret life of punctuation, symbols,
    and other typographical marks*. New York: WW Norton & Company.
Jiménez, M. Sonia Diaz, J. Gabriel Martinez García, and Isabel M. García
    Fernández (2011). "Bastard Pop Design, Visual Remix and Mashup
    (by Un Mundo Feliz)." In: *Design History Society Conference. Design activism
    and social change*.
Jobard, Jean Baptiste Ambroise Marcellin (1842). *Industrie française: rapport
    sur l'exposition de 1839*. Vol. 2. Paris: Mathias.
Lupton, Ellen and Abbott Miller (1999). *Design, Writing, Recearch*. London:
    Phaidon Press.
Parkes, Malcolm Beckwith (2016). *Pause and effect: An introduction to the his-
    tory of punctuation in the West*. London: Routledge.

Ruan, Li (2011). "Meaningful Signs—Emoticons." In: *Theory and Practice in Language Studies* 1.1, pp. 91–94.

Smith, Jacob (2015). *The Sarcmark*. URL: https : / / jacobsmithdesign . wordpress.com/2015/06/02/the-sarcmark/.

Stewart, Brian M. (2015). *Innovative Punctuation for Innovative Legal Writing?*. URL: https://perma.cc/CN5L-DFBT.

"Typographical Art" (1881). In: *Puck Magazine* 212, p. 65.

Vernooij, Dennis (2018). *Vive la différence: Language activists are trying to make French gender-neutral*. URL: https://www.economist.com/europe/2018/05/17/language-activists-are-trying-to-make-french-gender-neutral.

Xu, Bing (2014). *Book from the ground: from point to point*. Boston: MIT Press.

Yevstifeyev, Mykyta and Karl Pentzlin (2012). *Revised preliminary proposal to encode six punctuation characters introduced by Hervé Bazin in the UCS*. Working Group Document. International Organization for Standardization.

Zong, Jonathan (2015). *Proposed Punctuation: The Typographic Apocrypha of Hervé Bazin*. URL: http : / / jonathanzong . github . io / proposed - punctuation/.

A. Annex A

:)	:))	=″>	:->	={D	%*}	@:-)	>:D<
))	:|)	:-D	@-)	B-)	0:D	:-*>	\:D/
:3	:{)	=^}	:~)	B-D	=^D	:-″>	:-{}
=]	:-)	:-]	(*8	8-)	0:-)	<:o)	x{|:)
8D	(-:	I-)	:-}	%-)	:'-)	<|:0	*<(:)
X3	=D>	:*)	:'D	#-)	:.-)	*<:)	8|___)
XD	:″>	$-)	:{D	B-}	8:-)	>.-)	*<|:o)

FIGURE 13. Smiling emoticons in different variations

B. Annex B
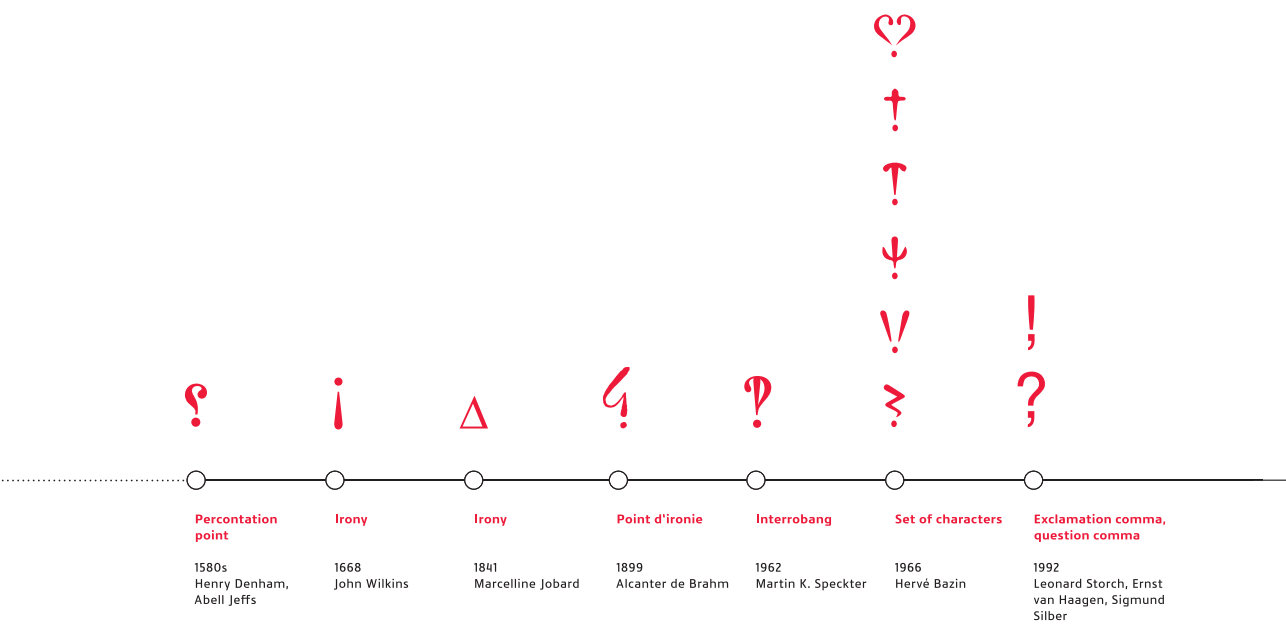
FIGURE 14. Timeline of unconventional punctuation. Part 1/2
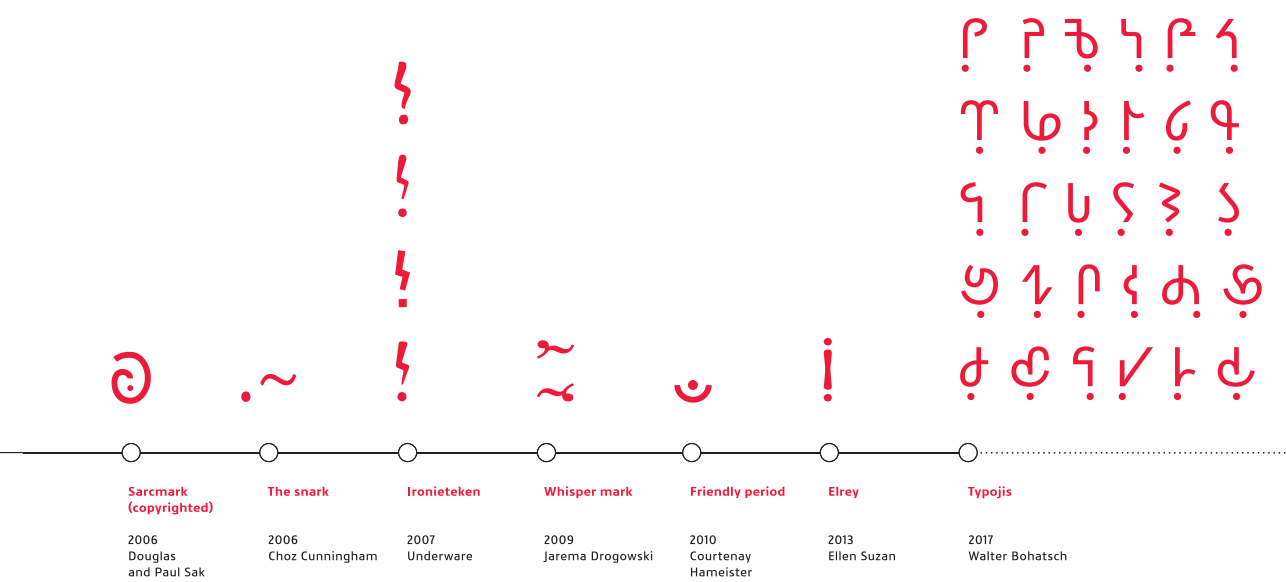
FIGURE 15. Timeline of unconventional punctuation. Part 2/2

C. Annex C

TO BE CONTINUED
it is supposed to suggest to the reader that the current storyline will continue shortly, but an additional scene or an episode will interrupt it for a while

Sorry, I must
be leaving
now ⲈⲈ

EUREKA
it is not just an exclamation mark, since it additionally highlights the fact that there was some exploration, searching and trying at the background

Finally ⸮
I managed
to solve this
annoying bug
in my code

SERENITY
the dot represents the integrity of body and mind; the closed eye that we can see under the dot represents relaxation

Sure ⸛

UNCERTAINTY
the sign shows a feeling when someone is not sure about the situation

I have some
plans, but
I will try ⸮

AND WHAT?
astonishment mixed with irritation/excitement

— I've met Mark!
   We started
   talking and
   I invited him
   for a dinner
   tonight.
— Great ⸭

SILENCE
sometimes you need to say something out of politeness, but you do not know what to write

— What did
   he tell you
   when I left
   yesterday?
— Nothing ⸚

DECISIVENESS

an indication of the fact that the author's opinion will not change

It's not going
to happen ⸱

THE CONVERSATION IS NOT OVER
the sign means that person is not satisfied with the result of the conversation

Will see ⸜

EMOTIONAL QUESTION

a combination of the exclamation mark and the question mark

Who are you ‽

SHAME
when a person is ashamed of what happened and wants to apologise

Hi... You know,
I am still
thinking about
what happened
yesterday ⸘

TERRIBLE EXCITEMENT
used for scary stories

You know
what happened
today ⸮

HANGOVER
shows not just an emotional, but also a physical state

Omg dude,
the night was
amazing,
but today ⸌

FIGURE 16. New signs with descriptions and examples as suggested by their creators

The Missing Scripts Project

Johannes Bergerhausen · Thomas Huot-Marchand

Abstract. The Missing Scripts Project, started in 2016, is a long-term initiative that aims to identify writing systems which are not yet encoded in the Unicode standard. As of today, there are still 140 scripts not yet to be used on computers and smart phones.

The first step in 2018 was a web site and a silk screen poster presenting one glyph for each of the 290 world's writing systems: www.worldswritingsystems.org.

The project is a joint effort of ANRT Nancy, France; IDG Mainz, Germany and SEI, Berkeley, USA.

Visible Speech, 1867

Alexander Melville Bell, a Scottish phonetician, developed a universal phonetic notation system called 'Visible Speech' which could represent every sound in every human language. The abstract, often circular symbols, could also help the deaf learn to understand spoken language. Melville Bell's son Alexander Graham Bell, continued his father's work on 'Visible Speech', involving himself intensively with the physiognomy of the human voice. In 1876, he would submit his new invention to the patent office: the telephone.

International Phonetic Alphabet, 1888

The International Phonetic association, established in 1886 by the French linguist Paul-Édouard Passy, introduced the International Phonetic Alphabet (IPA) in 1888. These characters were developed on the basis of Latin and Greek characters, revealing the bias of the researchers

Johannes Bergerhausen　　 0000-0001-5235-6779
Hochschule Mainz, School of Design, Holzstraße 36, D-55116 Mainz, Germany
E-mail: bergerhausen@hs-mainz.de

Thomas Huot-Marchand
Atelier National de Recherche Typographique (ANRT), School of Art and Design Nancy, 1, place Charles Cartier-Bresson, 54013 Nancy Cedex, France
E-mail: thomas.huot-marchand@anrt-nancy.fr

of that time. They missed the chance of taking more appropriate characters from other writing systems.

Intergalactic Network, 1962

J. C. R. Licklider, an American psychologist, formulated the idea of an 'Intergalactic Computer Network'. The computers of that time could fill up entire rooms. A year later, he half-jokingly referred to his colleagues as 'Members and Affiliates of the Intergalactic Computer Network'. But it was less of a joke than he had imagined. Within 7 years, Licklider was one of the developers of the ARPA-net, the precursor of the Internet.

ASCII, 1963

Bob Berner, a computer scientist at IBM, led a group of engineers developing the American Standard Code for Information Interchange, widely known as ASCII. No one imagined at the time that a purely American character encoding standard would still be in use on every computer in the 21st century. ASCII defined 95 typographic symbols and 33 control codes used to communicate between computers. The standard, which proved itself to be fundamental to the early Internet, was integrated as a subset of Unicode in 1991 and as such is nearly as well distributed as the DNA code.

ARPA-net, 1969

50 years ago, during the same year as Woodstock and the Moon Landing, ARPA-net, named after the Advanced Research Projects Agency (ARPA), and forerunner of today's Internet, went online. It originally connected four American universities each with just one computer. The first ever message delivered over the network on 29th of October, 1969 was the word 'LOG', meaning 'LOGIN'. The L and O were transmitted successfully in binary sequences but during the processing of the letter G, one of the two computers crashed.

Xerox PARC, Dynabook, 1971

Xerox corporation was so successful with their photocopy machines, they were able to fund the archetypal technology research center in California exploring the future of office work. The team at Xerox Palo Alto Research Center (PARC) in the 1970s would invent the signature technologies of the ensuing decades: the personal computer, the Graphical User Interface (GUI), the laser printer, and the Ethernet.

In 1971, Xerox employees English and Lampson designed the character generator, which was the first GUI type design program. The psychologist and PARC researcher Alan Kay, who foresaw, with his Dynabook concept, the development of the laptop by 20 years, tells us in a speech in 1986: "Here is an interesting thing: What do you do when you are doing a rough draft and you are printing it out in Times Roman? And the answer is: you use our own handwriting! I never understood why this didn't catch on [in type design]."

Writing, Typing

We informally say we are 'writing' on a computer. Of course, we do not mean we are writing by hand (Chirography) but rather we are 'typing' from the Greek τυπογραφία: Typographia: writing with types. This is an abstract process. One no longer writes or draws an 'A' but rather types on the 'A' key and an <A> is displayed on the screen. This is still, in principle, the same process as with a typewriter.

Interpress, 1982

Since he could not get any support or interest for the page description language he developed at Xerox PARC, John Warnock quit his job and went on to found his own company. He called his new software PostScript and his company Adobe.

Xerox and Apple, 1984

The Xerox-PARC researcher, and later co-founder of Unicode, Joseph D. Becker, published the groundbreaking paper 'Multilingual Word Processing' in *Scientific American*, where the important distinction is made between characters and glyphs. In the same year, Steve Jobs presented the first Macintosh, which employed and further developed many ideas pioneered at Xerox PARC.

Unicode 88

In his nine-page paper 'Unicode88', Joseph D. Becker foresees the "need for a new, world-wide ASCII". When humanity develops worldwide networked computers, the Latin ASCII letters will no longer be sufficient. Becker outlines the main features of the Unicode Consortium, which would be founded two years later.

Apple Newton, 1997

After 12 years at Next and Pixar, Steve Jobs returned to the first company he founded. It would not take him long to stop the development of the Newton platform with its shaky handwriting recognition. Jobs remarked in 2003 at the *All Things Digital* conference: "It's really slow to write stuff [by hand]! You could never keep up with your email if you had to write it all out".

World Standard

Unicode 12.1, released in May 2019, encodes 137,929 characters. This means that today exactly 150 scripts can be used on computers (and smartphones). Every year, new characters are added to this world standard. These can then be found in the operating system updates of all computers (including smartphones). Among these new characters, new emojis are added every year.

The Unicode consortium decides which characters are typographically available to people—and which are not. The consortium, registered in Mountain View, California, is primarily made up of representatives from the IT industry giants. Apart from Apple, Facebook, Google, IBM, or Microsoft, very few state institutions are represented. The academic world is also hardly represented. An exception would be the Script Encoding Initiative (SEI), led by the linguist Dr. Deborah Anderson from the Department of Linguistics at UC Berkeley. The Mainz university project decodeunicode is a liaison member without voting rights.

Any institution or company can become a member of the consortium. Through a 'full membership' at $21,000 USD per year, one has the right to vote and can participate in decisions.

The Internet speaks Unicode worldwide. There is no competition. For example, without this standard we could not send text messages from the Netherlands to Russia today. It would be nearly impossible to have both Cyrillic and Latin letters in text messages without Unicode.

Languages ≠ Scripts ≠ Countries, 2019

Brief overview: Ethnologue.com catalogs 7,111 known living languages, SEI Berkeley defines 290 scripts and the United Nations has 193 member states.

Cultural Achievement

Unicode is increasingly becoming a collection of human writing systems. For us, this is not only a technical, but also a cultural achievement.

It amazes us that such a utopian project has gained real international acceptance and is available on every computer. The world speaks, at least on this level, one language.

Characters and Glyphs

Unicode defines many technical specifications, but the principle of character encoding is simple. Each character is assigned a name and a hexadecimal number. Thus the letter A is encoded as LATIN CAPITAL LETTER A with the number U+0041 (41 is hexadecimal for decimal 65).

So when one sends an A by SMS or e-mail, one does not send the graphic form (glyph) of the letter, only the code. The receiving device receives a binary string, interprets the hexadecimal value and represents the matching glyph.

Unicode does not specify the appearance of characters. This is the work of the type designer. The transcription through code is akin to the Platonic concept of the character free of any particular form. Unicode encodes characters—not glyphs.

When Is an A an A?

Is it even possible to give a character a determinate form? For example, one might claim that the upper half of a capital A is always pointed, but it is easy to find examples where this is not the case.

Likewise, there are many glyphs for A that have no crossbeam but are still easily recognized as A.

Part of the definition of the character A might be that it is one of the 26 (or 52) letters of the Latin alphabet, that it is read from left to right, and that it usually stands for the sound /a/. However, such properties are emergent from the context and are form-independent.

We claim that an A is only really defined through its encoding into Unicode. Only thus can there be an international agreement about the character.

The definition of a character involves cultural conventions. If the glyphs look too similar, the name or code position can help distinguish them. For example, the two characters ┐ and ⁊ are almost indistinguishable, but in Unicode the former is called BOX DRAWINGS LIGHT DOWN AND LEFT, so it is always a perfect right-angle, while the latter is called TIRONIAN SIGN ET, a glyph from Roman times whose angle may vary.

Missing Scripts

Unicode has significantly reduced the relative visual presence of the Western (or, rather, the Latin) world. At the time of ASCII, it was almost impossible to display 'exotic' letters on the computer.

Imagine you could not use your own script on your smartphone. Unicode has remedied this for most writing systems. 150 scripts are usable today, a great success.

But there is still a lot to do. A first step of the Missing Scripts project at the Institut Designlabor Gutenberg (IDG) at Mainz University of Applied Sciences and at the Atelier National de Recherche Typographique (ANRT) in Nancy, was to ask Dr. Deborah Anderson (SEI) how many writing systems are missing from Unicode. After consulting her experts worldwide, she responded with an amazing number: 140. Only about half of the world's writing systems are available on today's computers.

United Nation of Type

Without binary code, scripts cannot be used on computers. This means that cultures whose writing systems are not accommodated by Unicode cannot be digitized, stored or published as texts without conversion to binary codes. Additionally, any culture so affected cannot compose and distribute new digital texts either. Every writing culture in the world should be able to disseminate and extend its cultural heritage on all modern devices. Unicode is becoming a kind of assembly of the united typographic nations. Here, every culture should be represented.

Historical Scripts

32 historical scripts have not yet been included in Unicode. The question here is whether it is worth encoding a script whose last users have died out thousands of years ago.

In a sense, no script is ever really extinct. Somewhere in the world there are scientists (or enthusiasts) still working with these historical texts. For example, there are around 3,000 people worldwide who can read and write cuneiform. This community also wants to use these characters in text editing programs. This is why they have to be encoded and included.

At the University of Bonn, there is a 10-year project to develop a dictionary of Mayan hieroglyphs. Without character encoding, these researchers will be at a loss. The dictionary won't be able to be published online (or be printed) unless the characters have been encoded and glyphs designed. Once this is done, it becomes available to humanity and can be copied and passed on freely. Perhaps if all Mayan

texts become available online, new possibilities for research will emerge through text comparisons and full-text search.

If we want to achieve the utopian-real goal of one day making available all the texts of humanity, we must also encode extinct scripts and digitize their texts.

7 out of 290

Incidentally, of the 290 scripts, there are exactly 7 that have not yet been deciphered. One is *rongorongo*, a playground for researchers and adventurers.

The World's Writing Systems

As a first step in the long-term project 'Missing Scripts' of IDG Mainz, ANRT Nancy and SEI Berkeley, we researched and designed a representative glyph for each of the 290 writing systems. In this collection, the letter A represents the Latin alphabet as the letter Omega Ω is internationally recognized as Greek.

In cases where there was no representative character, for alphabets we used the character for the sound /a/, for syllabic scripts the character for /ka/, and for pictographic-ideographic scripts, the character for human body.

In this way, typographic forms have been developed for some writing systems for the first time. This collection was presented with a poster and website www.worldswritingsystems.org in 2018. Research and type design were carried out by Johannes Bergerhausen, Arthur Francietta, Jérôme Knebusch and Morgane Pierson at ANRT.

The Unicode Proposals

In order for a new character or writing system to be implemented in Unicode, a formal application must be made. In 2019, there are exactly 71 proposals for scripts that have not yet been implemented in Unicode. These we have presented in the reading room in alphabetical order. Each proposal can be studied in peace. They have been available online for years but are hardly known. Why have some proposals still not yet been accepted though they were filed years ago?

Acceptance into Unicode is not trivial. First, it must be proven that a community that uses these characters exists. This is sometimes more difficult than one might think. Subsequently, the applicant must prove that the character set is complete. Each character must have a unique name according to scientific standards. It is often not easy to find an expert for an obscure script. Additionally, the information from the community of users is often contradictory.

When Is a Script a Script?

Scripts are writing systems, collections of visual characters which can completely represent at least one human language. Therefore emojis are not scripts. Sometimes two experts, when presented with two similar scripts, cannot concur whether or not they are 'only' glyph variants of the same script. This is why, for instance in 2001, the Etruscan or Venetian alphabets of the Italian peninsula were encoded under the generic category "Old Italic".

Missing Living Scripts

In Unicode, living scripts take priority. Why do we then still find, among the 71 scripts which have been proposed but not yet accepted, 39 living scripts? Can it have any-thing to do with the fact that these are used in regions which promise no commercial potential (as yet) for the IT sector? Why has there never been a Unesco project to ensure that these scripts are taken up as quickly as possible into Unicode? This is surprising given that everyone has been talking about digitization for so long.

Research at ANRT, Nancy

There are scripts for which no confirmed typographic form has been established. During encoding, the script inevitably must make the leap from chirography (handwriting) to typography. This is where research at the ANRT in Nancy, headed by Director Thomas Huot-Marchand, begins.

   As part of the IDG, ANRT and SEI's 18-month research program Missing Scripts, post-graduate students at ANRT often develop a typographic form for the first time. They consult all available documents and do handwritten and typographic analyses. If they work with a living script, they obtain feedback from the user community. This research program started in 2016.

Not Neutral

The reference glyphs for our project were designed in a monolinear, non-contrasting manner to make the shapes comparable. As with 'conventional' font design, the impression is that all the glyphs were designed with the same (analogue) instrument.

   Critics might say that this is a Western approach. We would agree. Our typographic eyes were trained in the 'Western World'. But one

might also draw these characters in another style. It is easy to imagine writing all the shapes with a ballpoint pen. Our glyphs do not claim universality.

Can there be a 'neutral' shape for all glyphs?—No. There is no neutral font. A more general style would perhaps emerge if one were to draw all the characters with a finger in the sand (i.e., monolinear rounded, stroke width: one finger). Characters have been written in this manner for millennia, does that mean a finger is a neutral tool?

Latin letters are still very dominant worldwide. Our hardware and software is mainly made in the USA. In type specimen books in the 'Western' world, 'other' writing systems are called 'exotic' or 'Non-Latin' even today. This is as problematic as the term 'World Music'.

General Visual Typographic Laws

Are there 'universal' visual laws according to which the letters of all the most diverse cultures, at least those on this planet, are shaped?—We think so. We must discover these laws. We would like to suggest one principle: gravity.

Every type designer knows that there is a 'visual gravity' in the way a character 'stands up'. They 'lie' on the paper. An <O> can visually 'tilt' left or right if it is not drawn correctly. An <M> stands sturdily with both legs on the script line, an invisible but imaginary floor. We humans project things we have learned through our natural senses into these glyphs. Therefore, I think that gravity is a first element of the general visual typographic laws.

Two Ships Passing in the Night

It remains astonishing how persistently many disciplines keep to themselves and don't see what is going on around them. This is how it is possible that the excellent work Dr. Deborah Anderson has been doing at SEI since 2002 is still today so little known in the worlds of typography and type design. Likewise, should the Irish linguist Michael Everson, author of the most Unicode proposals, be invited much more often to typography conferences?

Interest in the commercial sector only emerges when smartphones begin to be marketed in a new country and suddenly it becomes apparent that the people there use an obscure script which is not yet available from the operating system. Only Google's Noto-project has the universal vision which is capable of grappling with this task.

Funding for Encoding

It is complex work to linguistically and typographically systematize an exotic writing system and to write a proposal for Unicode. Outside of the passionate amateurs, experts cannot sustain this work without funding. It is all the more astounding how the IT sector does not support funding a comprehensive vision. In such a situation, we can only call for Dr. Deborah Anderson's SEI to be funded.

All Texts, All Times

The human project and human dream to make all the texts of all the ages digitally available is today within reach. The time is ripe. This massive undertaking must only take place once in the history of humanity, in the 21st century.

One example: The Murty Classical Library of India aims to make accessible modern translations of all classic Indian texts in print and online. In the first five years, 22 volumes in 12 different languages have been published.

A complex, multilingual typographic system is needed for this unique 100-year publishing project.

Missing Completed, 2044

Unicode took 27 years to encode 150 scripts. At the same pace, all the writing systems of humanity will be united in a universal code around the year 2044. It will have taken a little more than 50 years to encode approximately 5,000 years of written history. The prerequisite for making all texts of mankind available digitally would be created.

References

André, Jacques and Jean-Louis Estève, eds. (1995). *Ligatures & caractères contextuels*. Vol. 22. Cahiers Gutenberg. Rennes.

André, Jacques and Michel Goossens, eds. (1995). *Codage des caractères et multi-linguisme : de l'ASCII à Unicode*. Vol. 20. Cahiers Gutenberg. Rennes.

Barthes, Roland (1981). *Das Reich der Zeichen*. Frankfurt: Suhrkamp.

Becker, Joseph D. (September 1984). "Mehrsprachige Textverarbeitung." In: *Spektrum der Wissenschaft*, pp. 42–54.

Benjamin, Walter (1928). *Einbahnstraße*. Berlin: Ernst Rowohlt.

Bergerhausen, Johannes (2014). *Digitale Keilschrift / Digital Cuneiform*. Mainz: Hermann Schmidt.

Bergerhausen, Johannes and Siri Poarangan (2011). "decodeunicode— Die Schrift-zeichen der Welt." https://decodeunicode.org/.

FIGURE 1. Screenshot of www.worldswritingsystems.org, scripts sorted by time of creation
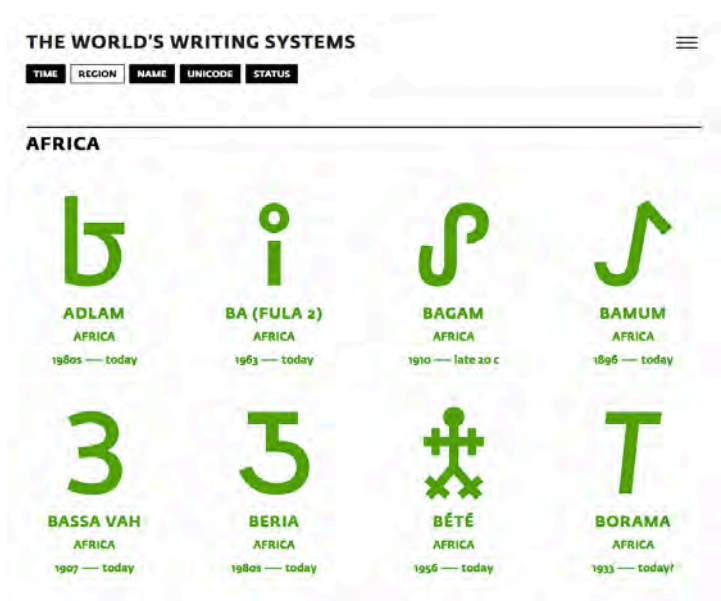
FIGURE 2. Screenshot of www.worldswritingsystems.org, scripts sorted by geographical region

FIGURE 3. Screenshot of www.worldswritingsystems.org, scripts sorted by name, sorted by Latin Alphabet
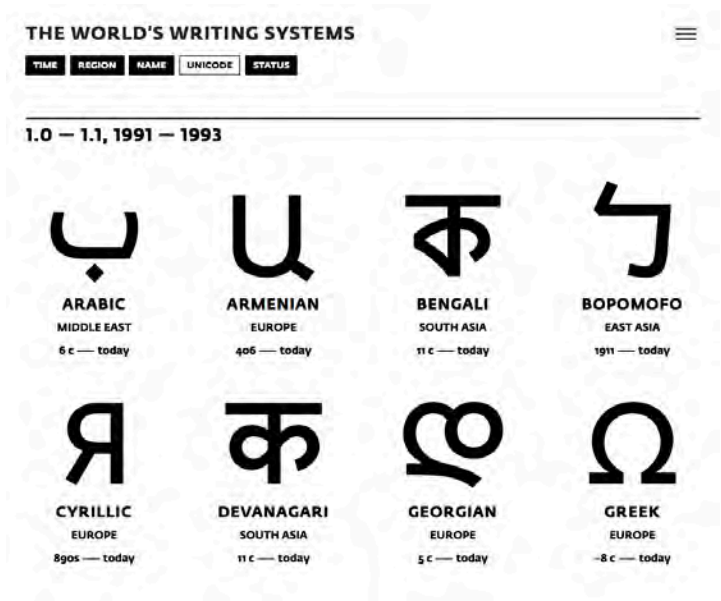
FIGURE 4. Screenshot of www.worldswritingsystems.org, scripts sorted by time of Unicode encoding

THE WORLD'S WRITING SYSTEMS

TIME REGION NAME UNICODE STATUS

LIVING SCRIPT

ADLAM	AFÁKA	AHOM	ARABIC
AFRICA	AMERICA	SOUTH ASIA	MIDDLE EAST
1980s — today	1908 — today	15 c — today	6 c — today

ARMENIAN	AVESTAN	AVOIULI	BA (FULA z)
EUROPE	MIDDLE EAST	OCEANIA	AFRICA
406 — today	6 c — today	1980s — today	1963 — today

FIGURE 5. Screenshot of www.worldswritingsystems.org, scripts sorted by status (living or historical)

Berry, John D., ed. (2002). *Language, Culture, Type*. New York, NY: Graphis.

Bringhurst, Robert (1999). *The Elements of Typographic Style*. 2nd ed. Hartley and Marks.

Cajori, Florian (1993). *A history of mathematical notation*. Mineola, NY: Dover.

Consortium, The Unicode (2006). *The Unicode Standard*. Mountain View, CA: Addison-Wesley.

Daniels, Peter T. and William Bright (1996). *The world's writing systems*. Oxford, UK: Oxford University Press.

Dehaene, Stanislas (2010). *Lesen*. München: Knaus.

Dürscheid, Christa (2012). *Einführung in die Schriftlinguistik*. Göttingen: UTB.

Eco, Umberto (2002). *Einführung in die Semiotik*. Stuttgart: UTB, Fink.

——— (2009). *Die unendliche Liste*. München: Hanser.

——— (2015). *Zeichen. Einführung in einen Begriff und seine Geschichte*. Frankfurt: Suhrkamp.

Ed Annink, Max Bruinsma (2010). *Gerd Arntz, graphic designer*. Rotterdam: 010 Publishers.

Eisele, Petra and Isabel Naegele, eds. (2012). *Texte zur Typografie. Positionen zur Schrift*. Zürich: Niggli.

Fara, Patricia (2010). *4000 Jahre Wissenschaft*. Heidelberg: Spektrum.

FIGURE 6. Silk screen poster of one reference glyph for each writing system of the world. Type design of 290 glyphs: J. Bergerhausen, Arthur Francietta, Jérôme Knebusch, Morgane Pierson; poster design: J. Bergerhausen, Ilka Helmig—first edition 2018 ANRT Nancy, France; IDG Mainz, Germany; SEI Berkeley, USA (second edition 2019)

Faulmann, Carl (2003). *Schriftzeichen und Alphabete aller Zeiten und Völker*. Reprint of 1880 Edition. Augsburg: Augustus.

Flusser, Vilém (2002). *Die Schrift*. 5th ed. Göttingen: European Photography.

Frutiger, Adrian (1978). *Der Mensch und seine Zeichen*. 1st ed. Frankfurt: Stempel AG.

———— (2000). *Zeichen*. 3rd ed. Vol. 7. Typotron. St. Gallen.

Gardiner, A. H. (1928). *Catalogue of the Egyptian hieroglyphic printing type*. Bibliotheca Aegyptiaca. Chicago Ridge, IL: Ares Publishers.

Gelb, Ignace J. (1963). *A Study of Writing*. 2nd ed. Chicago, IL: The University of Chicago Press.

Gill, Erik (2013). *An Essay on Typography*. London: Penguin Books.

Gillam, Richard (2002). *Unicode Demystified*. Boston, MA: Addison-Wesley.

Gillessen, Maximilian and Anton Stuckardt (2019). *Roussel, Brisset, Duchamp. Engineers of the Infra-Thin*. The Hague: Alphabetum.

Gottlob, Max-Peter and Gerhard Strecker (1984). *Die BTX-Fibel*. Haar: Markt & Technik.

Graß, Tino, ed. (2008). *Schriftgestalten. Über Schrift und Gestaltung*. Sulgen/Zürich: Niggli.

Haralambous, Yannis (2004). *Fontes & Codages*. Paris: O'Reilly.

Herzfeld, Andy (2005). *Revolution in the Valley*. Sebastopol, CA: O'Reilly.

Hiltzik, Michael A. (2000). *Dealers of Lightning: Xerox PARC and the Dawn of the Computer Age*. New York: Harper Business.

Hofstadter, Douglas R. (1985). *Gödel, Escher, Bach. Ein endloses geflochtenes Band*. Stuttgart: Klett-Cotta.

Huot-Marchand, Thomas, Roxane Jubert, and Sébastien Morlighem (2016). *Atelier national de recherche typographique, Archives 1985–2006*. Nancy: Les presses du réel.

Kinross, Robin (1992). *Modern Typography*. London: Hyphen Press.

Klee, Paul (2003). *Pädagogisches Skizzenbuch*. Neue Bauhausbücher. Berlin: Gebr. Mann.

Koch, Rudolf (1926). *Das Zeichenbuch*. 2nd ed. Offenbach am Main: Wilhelm Gerstung.

Korpela, Jukka K. (2006). *Unicode Explained*. Sebastopol, CA: O'Reilly.

Krampen, Martin (1983). *Die Welt als Zeichen: Globale Kommunikation mit Piktogrammen*. Berlin: avedition.

Mackenzie, Charles E. (1980). *Coded Character Sets. History and Development*. Reading, MA: Addison-Wesley.

Magritte, René (1929). "Les mots et les images." In: *La Révolution surréaliste* 12, pp. 32–33.

Maldonado, Tomás (1959). *Kommunikation und Semiotik*. Vol. 5. ulm. Ulm: Hochschule für Gestaltung Ulm.

Markoff, John (2005). *What the dormouse said*. New York, NY: Penguin Books.

Melville Bell, Alexander (1867). *Visible Speech. The Science of Universal Alphabetics*. London: Simkin, Marshall & Co.

Mitchell, Sandra (2008). *Komplexitäten. Warum wir erst anfangen, die Welt zu verstehen*. Frankfurt: unseld.

Munari, Bruno (2013). *Suplemento al dizionario italiano*. Mantova: Corraini Editore.

Neurath, Otto (1980). *International Picture Language*. Reading, UK: University of Reading.

———— (2010). *From hieroglyphs to Isotype*. London: Hyphen Press.

Noordzij, Gerrit (2005). *The stroke. Theory of writing*. London: Hyphen Press.

Revues de recherche en design. Un panorama (2014). Vol. 40–41. Azimuts. Saint-Étienne: École supérieure d'art et de design.

Saussure, Ferdinand de (1916). *Cours de linguistique générale*. Ed. by Charles Bally and Albert Sechehaye. Paris: Payot.

Schuller, Gerlinde (2009). *Designing universal knowledge*. Baden: Lars Müller.

Spencer, Herbert (1969). *The visible word*. 2nd ed. London: Lund Humphries/Royal College of Art.

Stöppel, Daniela (2008). *Visuelle Zeichensysteme der Avantgarden 1910 bis 1950*. München: Silke Schreiber.

Stötzner, Andreas (2000). *Signographie. Entwurf einer Lehre des graphischen Zeichens*. Grimma: Waechterpappel.

Tschichold, Jan (1953). *Formenwandlungen der Et-Zeichen*. Frankfurt: Stempel AG.

"Underware: From Typography to Grammatography" (2019). conference booklet. The Hague. URL: http://www.tokyoartbeat.com/event/2019/7100.en.

Venturi, Robert, Denise Scott Brown, and Steven Izenour (1968). *Learning from Las Vegas*. Cambridge, MA: MIT Press.

Wehde, Susanne (2000). *Typografische Kultur*. Tübingen: Niemeyer.

Wittgenstein, Ludwig (2010). *Tractatus logico-philosophicus. Logisch-philosophische Abhandlung*. Frankfurt: Suhrkamp.

Zali, Anne and Annie Berthier (1997). Vol. 1. L'aventure des écritures. Paris: Bibliothèque Nationale de France.

———— (1998). Vol. 2. L'aventure des écritures. Paris: Bibliothèque Nationale de France.

———— (1999). Vol. 3. L'aventure des écritures. Paris: Bibliothèque Nationale de France.

Beyond the Semantic

Typographic Representation
of Ancient Monetary Inscriptions

Morgane Pierson

Abstract. The PIM research project (meaning "Police pour les Inscriptions Moné-
taires") aims to produce a suitable tool for transcribing the information con-
tained on monetary inscriptions, beyond their semantic content. The textual
information and graphic features that a coin carries can provide many valuable
information regarding its origin and the society in which it was minted (Codine-
Trécourt and Guillaume, 2012). Since there was previously no digital font that
could fully and accurately render the monetary inscriptions, this project was ini-
tiated in 2013 by Florence Codine, curator in charge of the Merovingian coins
at the Bibliothèque nationale de France (BnF), and is currently supervised by
Frédérique Duyrat.

1. The PIM project

Since Gutenberg's invention of his printing system with movable type,
technological advances have continuously transformed transcribing
methods in scholarly research. Various transcription tools have facil-
itated researchers' access to sources, processing of data and academic
publishing. Digital humanities has opened up new possibilities for type
design as well as other research fields, which until the twentieth cen-
tury were part of book paradigm. However, despite recent technologi-
cal progress, researchers still suffer from the lack of suitable tools such
as digital typefaces, interfaces and encoding to support their work. The
absence of well-designed typefaces, and often using of images instead
of encoded text, have been two of the main shortcomings in conducting
research on various historical fields. Therefore, a significant contribu-
tion to digital humanities research will be made by creation and use of
fonts in digital publishing projects and different online platforms.

Morgane Pierson   0000-0002-0334-0292
Atelier National de Recherche Typographique (Nancy)
Bibliothèque nationale de France (Paris)
E-mail: pierson.morgane@icloud.com

FIGURE 1. Judean, Greek, Nabatean, and Phoenician coins, BnF

(a)

(b)

FIGURE 2. (a) Department of coins and medals, BnF, Paris. (b) Gallica Web site. Bibliothèque nationale de France, Paris

1.1.   The Bibliothèque nationale de France

The BnF houses one of the largest collections of coins, most of which, have already been digitised and are publicly available online through the Gallica website[1]. Thanks to this extensive digital resource, and software called NumiPal (Thevenin, 2018) (Fig. 3), specialists from the BnF's department of coins and medals were able to establish an inventory of the characters. NumiPal helps scholars to study the coins very closely and most importantly, annotate the inscriptions (Fig. 4). Once the annotation has been carried out, all the annotated allographs are recorded for each coin and for each allograph all the identified forms are inventoried with the reference number in the online software. This database makes it possible to find every form which have been assigned to a single allograph.

1.2.   The Atelier National de Recherche Typographique

In 2013, the department of coins, medals, and antiques at the BnF began a partnership with the Atelier National de Recherche Typographique (ANRT)[2], to develop a digital typeface that would bring together all identified stylistic variants of the inscriptions on the coins, in a consistent manner. This project began with Elvire Volk Leonovitch, a student at ANRT, and under the direction of Thomas Huot-Marchand (Volk Leonovitch, 2014). Initially, the main goal was to develop a digital font for the transcription of the Merovingian monetary inscriptions on screen and paper. While previously, image files had to be inserted in editorial projects to display the appropriate variant, the implementation of Unicode-encoded fonts presented a significant evolution for digital humanities—in particular for digital platforms such as online catalogues.

Based on the classification of the letters found on the coins from the BnF, which was conducted by a team of researchers, an accurate and relevant interpretation of the various letterforms can be deduced. However, it is important to find the best approach or possible compromise in response to different criteria of readability in contemporary readership and loyalty to historical models. The goal is therefore to combine the advantages of imitative transcription with those of interpretative transcription. In this 'diplomatic' approach, the ontograph, which is the 'standard' representation of the grapheme, and the allograph, which is a morphological variant of the letter are distinguished. Unicode does not allow the integration of the variants and focuses on providing a unique code for every character, language, program, and platform. Admittedly,

---

1. `https://gallica.bnf.fr/`
2. `https://anrt-nancy.fr/en/presentation-en/`
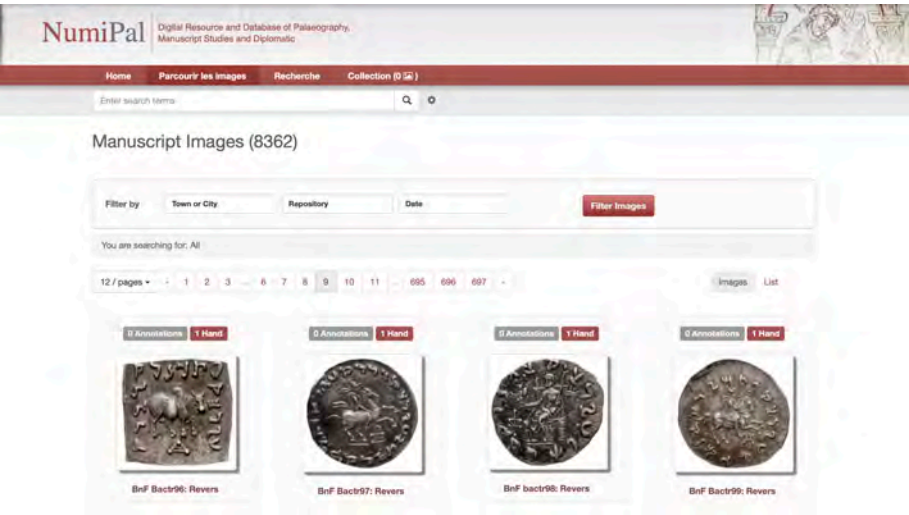
FIGURE 3. NumiPal website

FIGURE 4. Example of coin's annotations on NumiPal
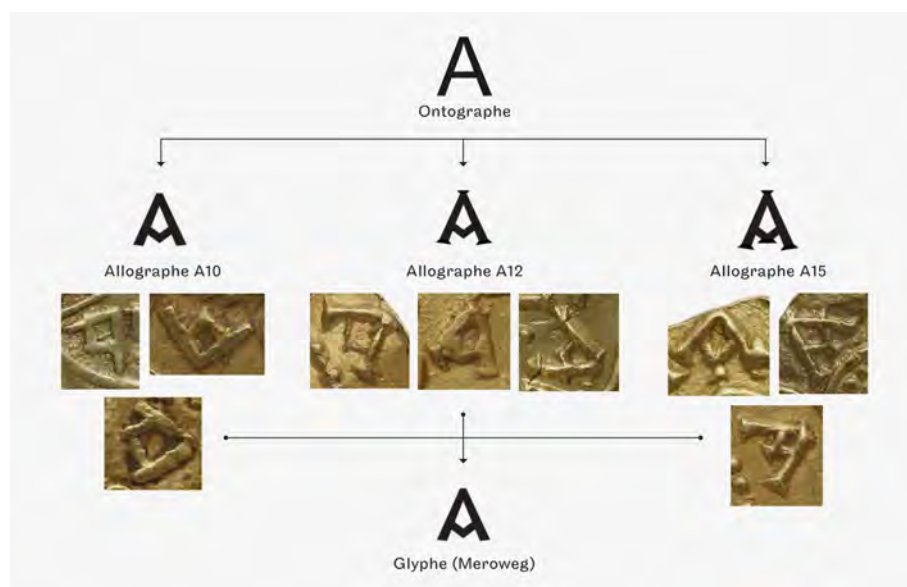
FIGURE 5. Merovingian ontograph and allographs <A>

it exists variant selectors (see Chinese, Emojis...) but their use and their implementation are too constraining and not adapted to the case of the monetary inscriptions. In the PIM project, the allographs share the same code as the concerned ontograph, and the viewing of the glyphs variants is done through the OpenType features in the font. From a technical point of view, the OT stylistic sets (SS01-SS20) were not used due to the limitation of only 20 variants for each glyph, which is not sufficient for numismatic. Instead, character variants (CV01- CV20) have been used, which allows the creation of 99 variants for one single glyph.

1.3.   The PIM Typeface

The Meroweg typeface was deliberately designed without serifs-like details to accommodate various letter structures. Stems are slightly flared and heavy to produce a visible typographic contrast and to distinguish it from other typefaces, used to typeset the text around it.

In 2019, the PIM project was extended to support other collections of coins from Italy, Greece, Spain, North Africa, and the Middle East. The author has been tasked with designing typefaces for Phoenician, Cypriot, Archaic Greek, Etruscan, Umbrian, Oscan, Palaeohispanic, Lycian, Palaeo-Hebrew, Kharoshthi, and Nabatean writing systems. In the beginning, it was estimated that this typeface family would consist of

Arial
10 pt / (12 pt)
Merowig
10,3 pt

petals. Again, a direct parallel can be found on a Coenwulf penny of the Canterbury moneyer Oba (Fig. 87). However, the reverse inscriptions READS DE VICO LVNDONIAE ('From the *vicus* of London').

The choice to describe London as a *vicus* (OE *wic*, meaning trading centre) rather than a *civitas* (city), or simply to give the name of London without further qualification, has direct parallels with a gold *solidus* in the BM collection, issued in the name of the Frankish ruler Charlemagne with the inscription +VICO DVRISTAT (Fig. 88). This coin is in itself quite controversial. It gives Charlemagne a crudely abbreviated form of his title 'Fing of the Franks and the Lombards', suggesting that it was issued before his adoption of the imperial title on his coinage in 812 (Grierson & Blackburn 1986), although Dolley and Morrison preferred to attribute the coin on stylistic grounds to Charles the Bald, despite the fact that he did not use this title. Another example with the

(a)   (b)

FIGURE 6. (a) Meroweg variants. (b) Example of Meroweg in use. (Volk Leonovitch, 2014)

1066 glyphs for each allograph, however, so far 2440 glyphs have been designed, and this number is expected to grow even larger as the project proceeds. Even though the relationship between the early writing systems is rather complex, working on such a corpus is a great way to study and compare the evolution of the alphabets and exchanges between cultures.

FIGURE 7. Family tree of the writing systems concerned in the PIM project

FIGURE 8. PIM writing systems, source: The Missing Scripts project, `http://theworldswritingsystems.org/`

Coins	Region	Unicode	Enc.	All.
Greek coins	Archaïc Greek	U+0370−03FF	28	130
	Old Italic (Ombrian, Oscan, and Etruscan)	U+10300−1032F	32	117
	Cypriot	U+10800−1083F	55	52
	Lycian and Lydian	U+10280−1029F	29	101
	Brahmi	U+11000−1107F	65	8
	Kharoshti	U+10A00−10A5F	66	173
Iberian and Punic coins	Palaeohispanic (Iberian corpus)	not yet encoded	59	178
	Phoenician-Punic (phenico-punic corpus)	U+10900−109AF	29	216
Phoenician, Levantine, Judean and Nabataean coins	Phoenician	U+10900−109AF	29	216
	Hebrew (Judean corpus)	U+0590−05FF	22	71
	Nabatean	U+10880−108AF	40	62

2.   Overview of the Writing Systems

2.1.   Phoenician

Integrating the legend in publications has always been a challenge for the numismatic researcher. Especially in the context of Phoenician which had greatly evolved over the centuries. For instance, in 1867 and through the initiative of Ernest Renan, the Académie des Inscriptions et Belles-Lettres commissioned the Imprimerie Nationale to engrave transcription characters to publish a study of all known Semitic inscriptions
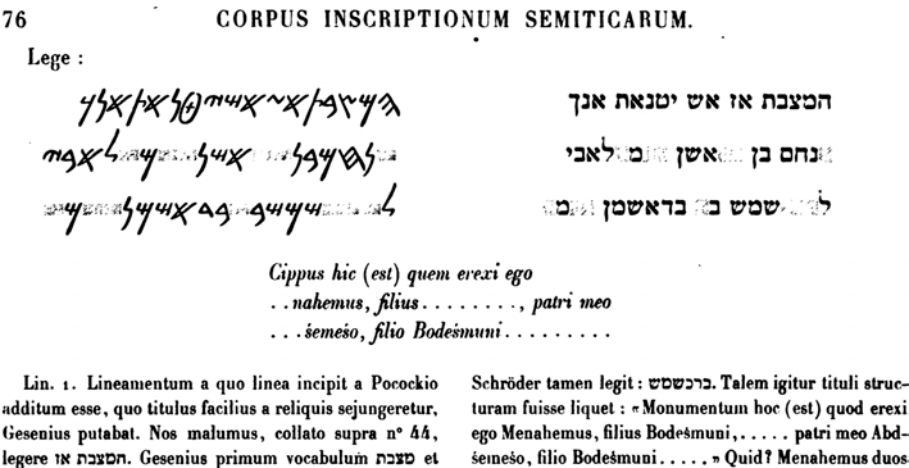
FIGURE 9. *Corpus Inscriptionum Semiticarum*, 1907
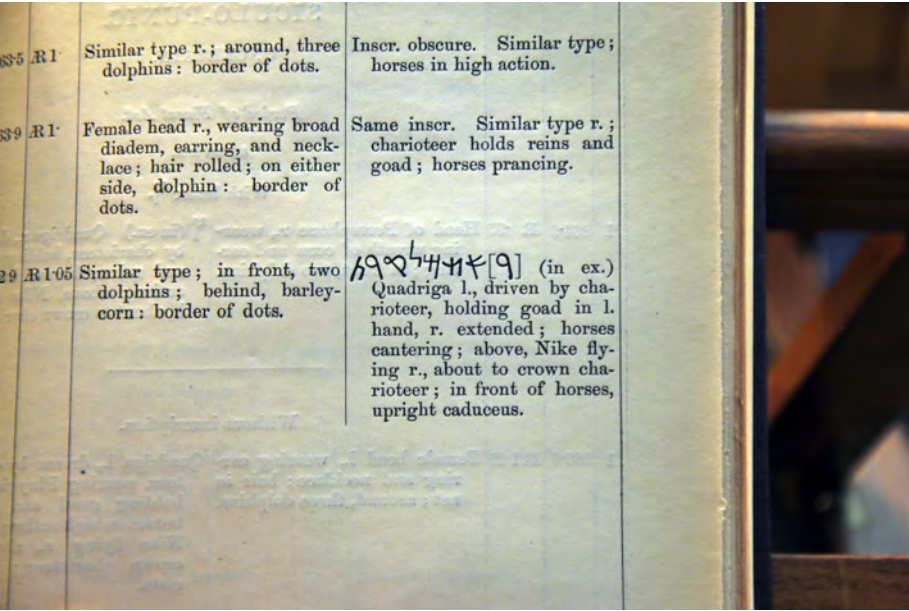
FIGURE 10. *Catalogue of Greek Coins*, Sicily, The British Museum, 1876 (Courtesy of the British Library)

(Académie des Inscriptions et Belles-Lettres, 1907) entitled *Corpus Inscriptionum Semiticarum*. In the case of the PIM project, the coins from the Phoenician cities with usable legends—all of which are from the Bnf collection—are dated from the 5th to the 1st century BC. Visually close to the *Phénicien classique* engraved by the Imprimerie Nationale, the ontographs of the PIM Phoenician typeface are based on the inscription of the Eshmunazar II sarcophagus.

The legends on the coins produced in the Phoenician cities during the high period (either under Persian domination, or a little less in the Hellenistic period) display neat and easily recognizable letterforms. It is deduced that authority responsible for minting had paid attention to their production. The care given to the coins projected the political power of these cities and helped them expand their network (Fig. 11). With the appearance of bronze coins under the Hellenistic domination (Ptolemaic dynasty, then Seleucid), the inscription gradually deteriorated, since bronze coins became dominant and more difficult to mint. The domination of the Greeks from 331 BC (from Alexander the Great) enabled their language to become widely used by the elites and from the 2nd century, coins were gradually minted under the influence of the dominant culture, which was Hellenistic.

The bronze coin shown in Fig. 12. has been minted under Antiochos IV, a Seleucid ruler at the Hellenistic period around 175 to 164 BC, who issued an incredible amount of bronze coins in his territories and produced as much coins as all its predecessors. With regard to the Seleucid coins, much of the monetary finds in excavations are from Antiochos IV's period. The presence of Greek and Phoenician characters is visible on those coins (as the lamed, allograph number 7, samek 9, dalet 3, noun 9, and mem 19), which shows the evolution of culture, and the place of the Greek language during these periods. With the Greek domination, the elites gradually became Hellenized and coexistence of Greek and Phoenician inscriptions signified a mixed and multilingual society— even though the majority of the population was illiterate.

The variations of the Phoenician letterforms in the BnF collections are significant and for an alphabet of 22 letters, 160 variants have been identified. Therefore, all these allographs have been included in the PIM typeface with a standard of the ontographs, which is more consensual and easier to identify. Due to the heterogeneous qualities of the coins, the aim was to find a suitable representation based on the inscriptions, references, and more importantly, analysis and the descriptions provided by researchers at the BnF.

Since scholars will be the primary users of such typefaces, it was essential to conceive an accurate tool to facilitate their research. For instance, the PIM project has aided researchers to determine that the allograph 'aleph 20' (fig.14) was only represented on coins from Carthage that feature an elephant. It was concluded from such observations that

Mint workshop: **Byblos/Gebal** جبيل**, Phoenicia**
Period: 350 - 333 **BCE**
Author: **the King 'Azba'al**
Material: **Silver**

𐤋𐤁𐤂𐤊𐤋𐤌𐤋𐤏𐤁𐤆

LAMED — BETH — GIMEL — KAV — LAMED — MEM — LAMED — AYIN — BETH — ZAYIN

𐤋𐤁𐤂𐤊𐤋𐤌𐤋𐤏𐤁𐤆[°] ['ʻ]zbʻl

Translation: 'Azba'al king of Gebal

FIGURE 11. Phoenician silver shekel, 350−333 BCE, BnF

Mint workshop: **Sidon** صيدا**, Phoenicia**
Period: 175 - 164 **BCE**
Author: **Antiochos IV (Seleucid Empire)**
Material: **Bronze (6,85 g)**

ANTIOXOY
ΣΙΔΩΝΙΩΝ

[coin] of Antiochos [coin] of Sidonians

𐤋𐤃𐤒𐤍𐤌

MEM 19 – NOUN 9 – DALETH 3 – SAMEK 9 – LAMED 7

[coin] of Sidonians

FIGURE 12. Phoenician bronze coin, 175−164 BCE, BnF

FIGURE 13. PIM Phoenician typeface showing the variants

FIGURE 14. Punic coin from Carthage and the allograph Aleph 20

FIGURE 15. Phoenician Mem variants

some allographs could be traced back to specific minting workshops. Cataloguing specific allographs also enables researchers to document the evolution of each letterform, and its geographical variations. This would enable numismatists to develop precise historical and geographical information from the study of letter variations, including the engraving workshop where the coin was minted. This approach to research, assisted by 'material turn' theories in which physical artifacts are considered meaningful embodiments of practices, seems to have regained momentum over the past decades in the humanities and social sciences.

Punic language, which was used mostly in North Africa, is related to a branch of Phoenician called Phoenician-Punic. In the PIM corpus, 88 allographs are in common with the Phoenician from a total of 241 allographs. For instance, a Punic silver coin, from 300 to 289 BC (fig. 16), has been studied in 1978 by G. K. Jenkins, in *Coins of Punic Sicily* in which two different reproductions of the inscription can be found: first, in the iconography section which is a real scale photography of the coin, and

FIGURE 16. Silver tetradrachm, Carthage, 300—289 BCE, BnF. Jenkins, *Coins of Punic Sicily*, 1978

second is the transcription in Jenkins' hand in the legends catalogue with a reference number (Jenkins, 1978, pp. 5–68). Presently, thanks to the new technology, it is possible to have a high-quality image of the coin and the transcription with a digital font. It is also possible to integrate the transcription in the text with the transliteration, and in this way, make it more readable. This also facilitates the creation of a list of the collection's inscriptions in order to be compared easily.

G.KENNETH JENKINS

COINS OF PUNIC SICILY *

Part 4 **

CARTHAGE SERIES 5-6

Introduction

As already stated in part 3 it seems clear from the evidence of hoards that Carthage series 5, Melqart head/horse head, should be roughly of the same phase as the Syracusan coins of Agathokles with Kore head/Nike and trophy, minted most probably after Agathokles' return from Africa and in fact between the years 305 and 295 B.C. For a summary of early third century hoards containing Carthage series 5 coins, see the table of hoards at the end of this instalment. It is evident enough that Carthage series 5 and the Agathokles «Nike» type tend to coincide. This conclusion is set off by a very slightly earlier hoard, Pachino 1957 (IGCH 2151), of the late fourth century, which contains neither the Agathokles Kore/Nike type nor the Melqart head/Horse head, but only the preceding phase of each mint — from Syracuse the quadriga tetradrachms of Agathokles and from Carthage series 3 Kore head/Horse head. On these general reckonings we may assume that Carthage series 5 should start about 300 B.C. There is no easy way of deciding howlong a series is involved; if it is accepted - as will presently be argued - that Carthage series 5 is to be envisaged as a parallel production by two separate mints , this will in any case tend to telescope the possible duration of the series. Provisionally we may think of a period of about a decade for the whole series, in which case it would come to an end byabout the time of Agathokles' death (289 B.C.). Third century hoards containing series 5 do not, apparently, include any Sicilian coins later than Agathokles. That in broad terms series 5 must be defined as twoparallel series seems virtually inevitable. In the first place we have a definition by legends. Series 5 a is the mint of the army signed ⵝⵎⵣⵃⵎⵀⵍⵏ or 'MMHNT or 'MHMHNT (People of the Camp). Series 5 b is the m i n t of the «quaestors» signed ⵝⵎⵣⵃⵎⵏⵏ or MHSBM. The only complication is that a few issues from the mhsbm mint are signed ⵝⵏⵙⵙⵃⵏⵏ or 'mmhnt instead but these as we shall see are clearly exceptional and in fact form an integral part of them hsbm mint series. The relative representation of the two series in hoards gives little indication as to the relation between the two series. In the Cefalù hoard there are five specimens of each; in the Megara Hyblaia

FIGURE 17. Reproduction of the Jenkins' article with the integration of the legends using the PIM typeface

2.2. Archaic Greek

Archaic Greek has been the subject of many studies and the entire variants were identified in *The Local Script of Archaic Greece* by Lilian Hamilton Jeffery (Fig. 19). Considering abondance of sources, two standards from different periods have been designed, allowing expansion of the use of the PIM typeface in other studies. The most recent letterforms are based on the 4 century BC and closer to the current form of Greek capitals (Jeffery, 1963). For the second standard, the characteristics of the letters are from 6th century BC (Kraay, 1966).
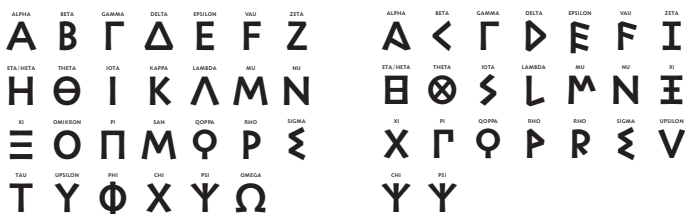
FIGURE 18. PIM Archaic Greek (left: 400 BCE—right: 600 BCE)
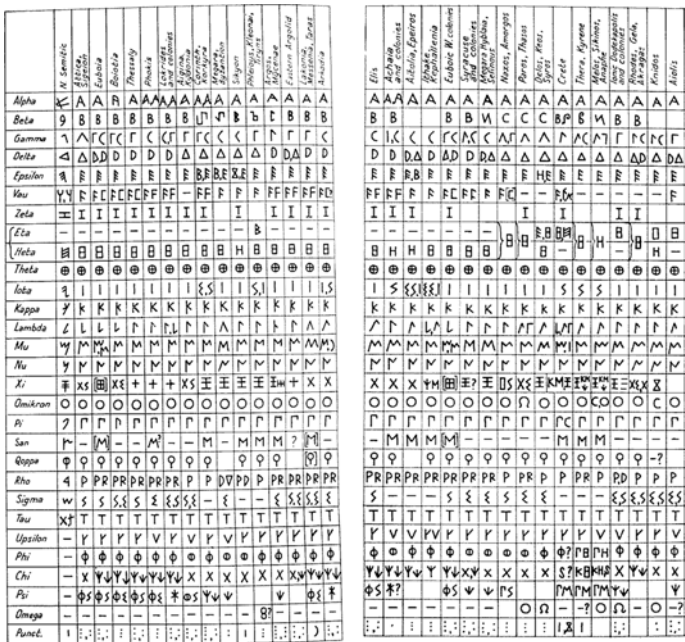
FIGURE 19. Jeffery, *The Local Scripts of Archaic Greece*, 1963

ALPHA	A A A A
BETA	B ⅃ ⅃⌐ B Ꝺ Ɔ И Ɔ B B
GAMMA	Γ < C Λ Ϲ Γ
DELTA	Δ ᗾ D
EPSILON	E Ɛ Ɛ B H
VAU (DIGAMMA)	F Ϝ Ϲ
ZETA	Z Ɪ
ETA	H ⊟ ᗸ Ɛ ▢ ⋈
HETA	Ⱶ ⊟ H
THETA	Ɵ ⊗ ⊕ ☉
IOTA	I Ϟ Ϡ Ϡ
KAPPA	K Ƙ
LAMBDA	Λ L Γ Ⱶ ∧ Γ
MU	M ᛘ ᛉ M
NU	N Ʋ Ʋ
XI	Ξ Ⴕ X Ϟ ⊞ Ϟ + ⱈ Ⴘ M ▢ K V ⊠
OMIKRON	O Ω Ϲ ☉ ◇
PI	Π Γ Γ Γ Ϲ
SAN	M M
QOPPA	Ϙ
RHO	P ꝶ R Ᏻ D ▽
SIGMA	Ϟ Ϟ Σ Ϟ
TAU	T Ͳ
UPSILON	Y V Ƴ Ᏻ
PHI	Φ Ⴔ Γ ⊟ H
CHI	X Ⴘ V Ϟ K ⊟ H
PSI	Ⴘ Φ Ϟ Ϟ Ж Ⴔ ↓ Γ M
OMEGA	Ω 8 Ω O

FIGURE 20. PIM Archaic Greek showing the variants

Comparing the same Greek coins from different periods and minting workshops, makes it possible to see the differences in the letterforms according to the period and the engravers, who were often illiterate. The coin shown on Fig. 20. depicts Heracles wearing a lion's skin and on the reverse side, there is an image of Zeus on a throne, and on his right, there is the inscription *Alexander* for *Alexander the Great.*

Mint workshop: **Ake/Ptolemais (Ἄκη), Phoenicia**
Period: **322 - 321 BCE**
Author: **Alexander III of Macedon**
Material: **Silver**

Mint workshop: **Perge (Πέργη), Pamphylia**
Period: **197 - 196 BCE**
Author: **Alexander III of Macedon**
Material: **Silver**

Legend:

ΑΛΕΞΑΝΔΡΟΥ

FIGURE 21. Greek silver coins, BnF

Mint workshop: Antioch on the Orontes Ἀντιόχεια ἡ ἐπὶ Ὀρόντου,
Seleucia in Pieria Σελεύκεια ἐν Πιερίᾳ
Period: 175 - 164 BCE
Author: Antiochos IV
Material: Silver (16,70 g)

ΒΑΣΙΛΕΩΣ ΑΝΤΙΟΧΟΥ ΘΕΟΥ ΕΠΙΦΑΝΟΥΣ ΝΙΚΗΦΟΡΟΥ

[monnaie] du roi Antiochos dieu qui apparaît,
qui apporte la victoire.
[currency] of king Antiochos god who appears,
who brings victory.

FIGURE 22. Greek silver coin, 175—164 BCE, BnF

2.3.   Etruscan, Oscan, and Umbrian

The Old Italic is a convention adopted for Unicode. It unifies a number of related historical alphabets from the Italian peninsula which were used for non-Indo-European languages. However, the unification of these alphabets into a single Old Italic script requires language-specific fonts because the glyphs most commonly used may differ depending on the language being represented (Everson, Jenkins, Judicibus, and Anderson, 2000). In the PIM project the main focus is on the Etruscan, the Oscan, and the Umbrian alphabets. Therefore, researchers will have access to different font files for each writing system.

FIGURE 23. Oscan caracters and their transcription using the PIM Oscan typeface.

Etruscan

ZE	VE	VE	VE	E	E	E	DE	GE	A	A	A	A	A

SHE	PE	EN	EM	EM	EL	EL	EL	KA	I	THE	THE	HE	HE

S	I	EF	EF	KHE	PHE	PHE	U	TE	TE	ES	ES	ER	ER

									1000	100	50	15	10

Oscan

DE	DE	DE	GE	GE	BE	A	A	A	A	A	A	A	A

EN	EN	EM	EL	KA	I	I	I	HE	ZE	VE	E	E	DE

II	EF	EF	U	TE	TE	ES	ES	ER	ER	ER	PE	EN	EN

									UU	UU	UU	II	II

Umbrian

KA	KA	KA	I	HE	ZE	VE	VE	E	E	E	DE	BE	A

EF	U	TE	TE	TE	ES	ES	ER	SHE	PE	EN	EM	EM	EL

												CHE	ERS

Figure 24. PIM Etruscan, Neo-Etruscan, Oscan, Umbrian.

One of the features of working on monetary inscriptions is that some-times, it is not possible to reconstitute the whole alphabet (Fig. 23). Fur-ther researches are required in order to find the appropriate ontograph and complete the typeface to make it suitable for subsequent research projects.

2.4. Paleo-Hebrew

Paleo Hebrew, also known as Proto-Hebrew, was the script that was used in the historic kingdoms of Israel and Judah (Yardeni, 2002). By comparing the letterforms of the Hebrew, the Paleo-Hebrew and its variants, with the Phoenician, it is possible to deduce the ductus and the traces order. For instance, with the letter Beth, the recurrence of a closed stroke on top, which is open in Hebrew, and a vertical stroke going down to finish almost horizontal can be noticed. In the letter Tsadi, there is a stroke that comes from the top to join in the middle of a long vertical stroke by a movement of up and down (Fig. 25). This kind of analysis is essential in this work in which the aim is not to make a faithful revival with the same shape, but to show the basic stroke which is more relevant.
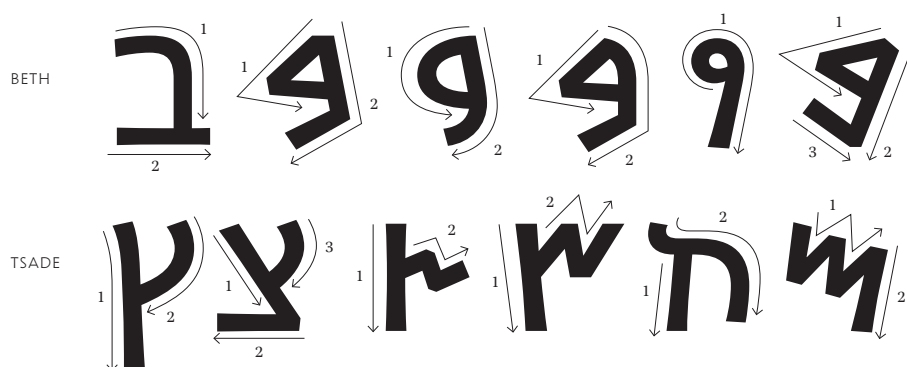
FIGURE 25. Traces order of Hebrew, Phoenician, and Paleo-Hebrew characters

The coin in Fig. 27. is from Jerusalem and dated around AD 67-68 and the inscription above the chalice shows that it is the shekel of Israel in Paleo-Hebrew characters. On the reverse, in a border of dots, is written Holy Jerusalem around a branch carrying three pomegranates. A modern Hebrew was added as a complementary font to translate the Paleo-Hebrew inscriptions, which would allow the researcher to transcribe, in the right language, and the right sounds, without using the transliteration.

	Hebrew	Paleo-Hebrew	Phoenician
ALEPH	א		
BETH	ב		
GIMEL	ג		
DALET	ד		
HE	ה		
VAV	ו		
ZAYIN	ז		
HET	ח		
TET	ט		
YOD	י		
KAF	כך		
LAMED	ל		
MEM	ממם		
NUN	נן		
SAMECH	ס		
AYIN	ע		
PE	פף		
TSADE	צץ		
QOF	קק		
RESH	ר		
SHIN	ש		
TAV	ת		

FIGURE 26. PIM Hebrew, Paleo-Hebrew, and Phoenician

Mint workshop: Jerusalem ירושלים,
Judea יהודה
Period: 67 - 68 AD
Author: Simon Maccabée שמעון התרסי
Material: Silver (14,19 g)

ᛚᛩᛝ
ᛚᚻᛡᛝᛜ

šql yšrali   שקל ישראלי

Shekel of Israel – year 2

ᛋᛜᛚᛝᛘᛡᚱᛙ
ᛠᛝᛡᛩᛩᚻ

yrwšlym hqdwšh   ירושלים הקדושה

Holy Jerusalem

FIGURE 27. Judean silver hemishekel, 67—68 AD, BnF

2.5. Nabatean

Some scholars have suggested that Syriac and Arabic writing systems
are driven from the Nabatean script (Gruendler, 1993). As the script
developed, a range of conjuncts and final forms were introduced. In the
case of the PIM project, the letters found on the coins were isolated,
however, if scholars require to introduce joined letters for epigraphic
transcriptions, it would be possibile to extend the typeface in a more
cursive direction. The typeface has been designed in accordance with
the Phoenician, Syriac, and Arabic letters (Fossey, 1927). A few variants
have been included from the sources that were attested to make it usable
for other studies.

FIGURE 28. Imprimerie Nationale, *Notices sur les caractères étrangers anciens et modernes*, 1927

FIGURE 29. Gruendler, *The Development of the Arabic Scripts*, 1993

Fig. 30 shows a Nabatean bronze coin with the inscription which reads *Aretas* [Aretas 4, King of Nabatean], and *Shaqilat*, who was the second wife and co-ruler of Aretas IV, accompanied with their portraits on the reverse. At least 4 different degrees of transcription is possible for this inscription. The first is an 'imitative' or 'diplomatic' transcription by using the variants of the typeface. The second is a 'semantic transcription' by using the ontograph, which is a more conventional form of the script. Under a scholar, this could be written in the correct direction from right to left, but sometimes the transcription is written from left to right. Then there is the transliteration, with the use of roman characters, and lastly, there is the translation.

Semitic alphabet	Phoenician	Nabatean	Syriac	Arabic	Letters
Aleph	𐤀	𐢀𐢀𐢀𐢀𐢀𐢀	ܐ	ا	ʾalif
Final Aleph		𐢀𐢀		ـا	
Beth	𐤁	𐢁𐢁𐢁𐢁𐢁	ܒ	ب	bāʾ
Final Beth		ـب		ـب	
Gimmel	𐤂	𐢂𐢂𐢂	ܓ	ج جـ	jīm
Daleth	𐤃	𐢃𐢃𐢃𐢃	ܕ	د	dāl
He	𐤄	𐢄𐢄𐢄	ܗ	ه	hāʾ
Final He		𐢄		ـه	
Waw	𐤅	𐢅𐢅𐢅𐢅	ܘ	و	wāw
Zayin	𐤆	ا	ܙ	ز	zāy / zayn
Heth	𐤇	𐢇𐢇𐢇	ܚ	ح حـ	ḥāʾ
Teth	𐤈	𐢈𐢈𐢈𐢈	ܛ	ط	ṭāʾ
Yodh	𐤉	𐢊𐢊𐢊𐢊𐢊𐢊	ܝ	ي يـ	yāʾ
Final Yodh		𐢊		ـي	
Kaph	𐤊	𐢋𐢋𐢋𐢋	ܟ	ك	kāf
Final Kaph		𐢋𐢋		ـك	
Lamedh	𐤋	𐢐𐢐𐢐	ܠ	ل	lām
Final Lamedh		𐢐𐢐		ـل	
Mem	𐤌	𐢍𐢍𐢍𐢍𐢍𐢍𐢍	ܡ	مـ	mīm
Final Mem		𐢍𐢍		ـم	
Nun	𐤍	𐢌𐢌𐢌	ܢ	ن	nūn
Final Nun		ܢ		ـن	
Samek	𐤎	𐢎𐢎𐢎	ܣ	س سـ	Simkath
Ayin	𐤏	𐢏𐢏𐢏	ܥ	ع عـ	ʿayn
Pe	𐤐	𐢑𐢑𐢑	ܦ	ف ق	fāʾ
Sadhe	𐤑	𐢮𐢮	ܨ	ص صـ	ṣād
Qoph	𐤒	𐢟	ܩ	ق قـ	qāf
Resh	𐤓	𐢓𐢓𐢓	ܪ	ر ـر	rāʾ
Shin	𐤔	𐢔𐢔𐢔𐢔𐢔𐢔𐢔	ܫ	ش	shīn
Final Shin		𐢔𐢔𐢔		ـش ش	
Tav	𐤕	𐢕𐢕𐢕𐢕𐢕𐢕𐢕𐢕𐢕	ܬ	ت ث	tāʾ / thāʾ

Figure 30. PIM Phoenician, PIM Nabatean, Noto Sans Syriac, and Adobe Arabic

Mint workshop: Nabatean, Arabia Petraea العربية البترائية
Period: 9 BCE - 40 AD
Author: Arétas IV (king of Nabatean)
Material: Bronze (5,36 g)

Shaqilath   *šqylt*   ﺕﻝﻱﻕﺵ   Aretas   *ḥrtt*   ﺕﺕﺭﺡ

FIGURE 31. Nabatean bronze coin, 9 BCE—40 AD, BnF

2.6.   Lycian

The Lycian was used to write an ancient Indo-European language of Western Anatolia. It is an alphabetical script, written from left-to-right, and is either derived from Greek or closely related to it. Before the Persian conquest, the Lycians were politically organized in a federal system, and even after their submission to the Persians, the institutions inside the federal system continued to be effective. The oldest Lycian coin seems to be from the 5th century BC, that is contemporary to Xerxès, son of Darius I. The Lycia symbol is a solar emblem represented by the triquetra which is seen on most of the reverse side of the coins (Morgan, 1926).
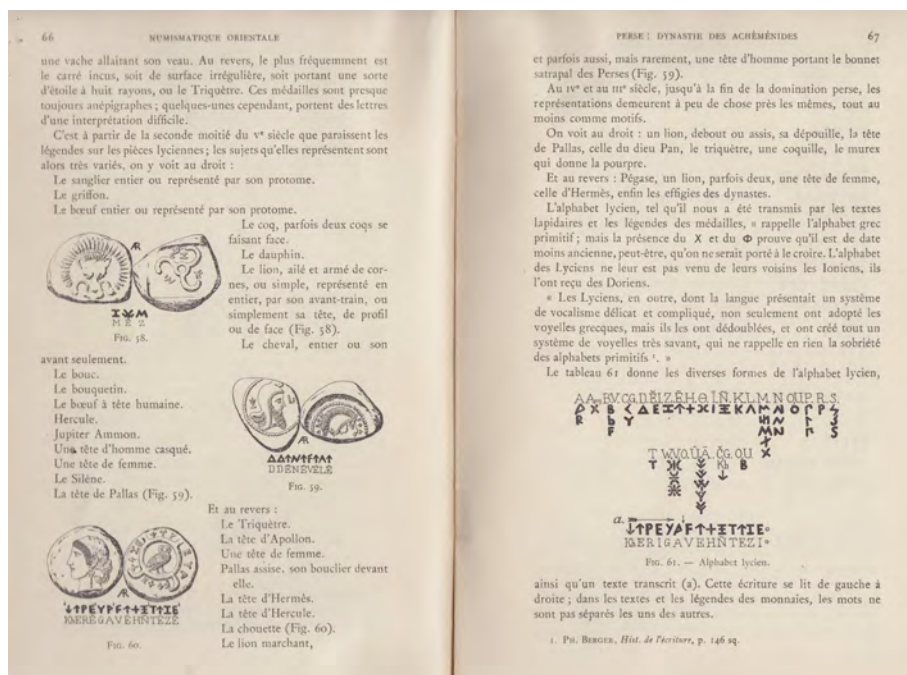
FIGURE 32. Morgan, *Manuel de Numismatique Orientale de l'Antiquité et du Moyen Âge,* 1926

Mint workshop: Lycia ⾢⾱⾲⾽⾸⾡ *Likya*
Period: 410 BCE
Author: Taththivaibi
Material: Silver (9,64 g)

ⴱⴲⵣⵣⴻⴼⴲⴻⴱⴻⴱ *Teθθiweibi*

FIGURE 33. Lycian silver stater, 410 BCE, BnF

a	ᴘᴘᴀᴘᴘᴘᴘᴘ	n	ᴺɴᴎᴎ
e	↑↑↑↑ᴧᴧᴧ↑↑↑↑↑	m̃	X
b	BᏏBBBBᏳB	ñ	ⲀⲀⲀⲀ
β	ᴍᴎᴎ	u	OoⵔO
g	ⲅⲩⲫⲩⲧⲩⲩ	p	ⲅⲅⲅⲅⲅⲅ
d	ΔΛ	k	◇
i	EᏋFEᏋⲌEᴣᴱ	r	ᴘᴘᴘᴘᴘᴘᴘᴘᴘ
w	FFFᴾᴵⲒⲈ	s	ⲋⲋⲋⲋⲋⲋⲋ
z	II	t	TT
θ	X)()(X)(X	τ	ⲨⲨ
j/y	l	ã	ⲦⲦⲦⲦⲦⲦⲦⲦⲦ
k	ᴋᴋᴋᴋᴋᴋᴋᴇᴋᴋ	ẽ	ⲮⲮⲮⲮⲮⲮⲮ
q	ⲬⲬⲬⲬ	h	+X
l	Λ^ᴧ	x	ⲦⲦⲩⲩⲦⲦⲦⲦⲦ
m	ᴹMMᴹᴹMᴹᴄ		

FIGURE 34. PIM Lycian

2.7. Cypriot

The Cypriot syllabary was used to write the Cypriot dialect of Greek from about 800 to 200 BCE. Structurally, the Cypriot syllabary consisted of combinations of up to twelve initial consonants and five different vowels (Anderson and Everson, 1999). In our corpus, only the coins from Amathus, Idalium, Marium, Paphos, and Salamis, have legends using the Cypriot syllabary. The local minting in the Cyprus Island begins in the 4th century BC and stop after the conquest of the island by Ptolemy I Soter in 312 BCE (Morgan, 1926).

A	✳	MI	(signs)	SE	(signs)
E	(signs)	MO	(signs)	SI	(signs)
I	(signs)	MU	(signs)	SO	(signs)
O	(signs)	NA	(signs)	SU	(signs)
U	(signs)	NE	(signs)	TA	(signs)
JA	(sign)	NI	(signs)	TE	(sign)
JO	(sign)	NO	(signs)	TI	(signs)
KA	(sign)	NU	(signs)	TO	(signs)
KE	(sign)	PA	(signs)	TU	(signs)
KI	(signs)	PE	(sign)	WA	(signs)
KO	(signs)	PI	(signs)	WE	(sign)
KU	(signs)	PO	(signs)	WI	(signs)
LA	(signs)	PU	(signs)	WO	(signs)
LE	(signs)	RA	(signs)	XA	(sign)
LI	(signs)	RE	(signs)	XE	(signs)
LO	(signs)	RI	(signs)	ZA	(signs)
LU	(signs)	RO	(signs)	ZO	(signs)
MA	(sign)	RU	(signs)		
ME	(signs)	SA	(signs)		

Figure 35. PIM Cypriot

Mint workshop: Salamis Σαλαμίνα, Cyprus Κύπρος
Period: 450 BCE
Author: Nicodamos (king of Salamis)
Material: Silver (3,24 g)

si-le-wo-se / ni-ko-ta-mo   ni-mi-la-se / pa

Figure 36. Cypriot silver coin, 450 BCE, BnF

3.   Accessibility and Utilisation

3.1.   License

The Open Font License[3] is used (SIL-OFL) and the publication of the fonts on a public repository (GitHub) will make it possible to easily supplement, correct, extend, and distribute the fonts.

3.2.   The Composer

The digital humanities have profoundly changed the methods of research in the human sciences, both from the point of view of access to sources and their distribution by various means of publishing. New digital tools will assist researchers to explore, disseminate, and question the established knowledge; however, it is important to continually reevaluate their efficiency and intuitiveness. Therefore, the PIM project continues with the development of the Alpha version of an online text editor by Sylvain Julé. This composer will make it possible to display, in an open and non-proprietary format, all the writing systems covered, facilitate their keyboard entry, and allow simplified visual access to the characters variants.

4.   Conclusion

The PIM project with a particular focus on type design, has been a productive way to study the early writing systems and understand how through the large number and various letterforms they have influenced each other. The digital humanities, one the other hand, has brought new perspectives to type design and scholarly research, with the use of digital fonts and creation of online catalogues and composers. However, despite such technological progress, practices related to typographic and graphic representation in the benefit of research have changed very little.

Once the process of inventory and classification of the glyphs is concluded, and the question of previewing or printing the work comes up, researchers often settle for ordinary characters and typefaces roughly imitate the inscriptions. Digital technology, has the potential to provide easier access to all practices, but the outcomes are often unsatisfactory, both in terms of morphological accuracy and encoding, and in the context of digital articles which are likely to be indexed and shared digitally. Often fonts with incorrect encoding, images extracted from other

---

3. https://opensource.org/licenses/OFL-1.1

Un menu contextuel permet d'accéder rapidement aux allographes disponibles, pour chaque ontographe sélectionné. Le codepoint Unicode reste le même, c'est le glyphe qui change, via une fonction OpenType intégrée à la fonte.

Un menu permet d'exporter le texte saisi en différents formats

Figure 37. PIM composer, Thomas Huot-Marchand

Phoenician   Punic   Paleo-Hebrew

FIGURE 38. PIM family typeface

existing typefaces (sometimes obsolete) and inserted into the text, and more often the use of 'resembling' characters from other writing systems have been used in scholarly publications (Jimenes, 2013). The PIM project aims to demonstrate how designing typefaces for ancient writing systems to be used in scientific publication, digital or print, can aid scholars to conduct more effective and extensive research while contributing to reconsidering methods of access to knowledge.

Greek	Etruscan	Oscan	Umbrian	Latin	Hebrew	Nabatean
AAAᕤ	�474ᐱA AᕤᕤᕤA	ᐱ �19ᐱᕤᐱ9ᐱᴎᴎ	ᕤ	A	א	ᕒ8ᕒ8ᕥᕒᕗᕲᕘᑯᕤᕘᕔ
BᒐᒍBᕽᕃᴎᏟᕽB		8	8	B	ב	ᒍᒍ9ᕗᒍᒍᒍ
ᒐ<ᑕ<ᑕᒐ	>	<<		CG	ᕄ	ᕁᕁᕛᕃᕁ
ᐃᕽᕽ	ᕃ	ᕒᕤᕒᕒᕒᕒ	ᕄ	D	ᒉ	ᕘᕘᕛᕛᕘᕘ
EᕃᕃᕽH	ᕳᕳᕳ	ᕳᕳ	ᕳᕳᕳ	E	ה	ᕒᒉᕽᑍᕤ
FFᒐ	ᕁᕒᒐ	ᒍᕒᒐ	ᒍᒍᒍ	FUVWY	ו	ᕘᕘᕘᕘ
ZI	ᕁ	ᕁ	ᕁ	Z	ᕁ	ᕤ
Hᕤᕳᕽᕤᕤ				H		
ᕽᕳH	ᕳᕳ	ᕳ	ᕳ		ᕤ	ᕤᕤᕤᕤ
ᕳᕳᕳᕳ	ᕳᕳ				ᕤ	ᕽᕽᕽᕽᕽ
ᕁᕆᕳᕲ	ᕁ	ᕁᕁᕵ	ᕁ	ᕁᒍ	ᕤ	ᕼᕼᕥᕘᕨᕵᕞᕤᕜᕼ
KK	ᕁ	ᕁ	ᕁᕁᕞ	K	כך	ᕦᕦᕦᕒᕒᕒᕒᕞᕞᕞ
ᕧᒐᕽᕊᕞ	ᒐᒐᒐ	ᒐ	ᒐ	L	ל	ᒍᒍᒐᒐᕽᕽ
MᴎᴎM	ᴎᴎ	ᴎ	ᕧᴎ	M	ᕦᕦᕦ	ᕜᕝᕘᕘᕙᕙᕙᕘᕐᕫᕘᕘ
NᴎᴎN	ᴎᴎ	ᕤᴎᴎᴎ	ᴎ	N	נן	ᒍᒍᒍ
ᕤᕤᕤᕤᕳᕳᕤᕼᕤᕧᴎᕤᕽᕤᕤᕤ				Z	ᕤ	ᕤᕤᕤ
ᕲᕲᕲᕲᕲ				O	ע	ᕥᕥᕥ
ᕾᕾᕾᕾᕈ	ᕤᕾ	ᕾ	ᕤ	P	ᕾᕾ	ᕾᕾᕾ
MM	M		M		ᕃᕃ	ᕃᕾᕃᕃ
ᕾ				Q	ᕘᕚ	ᕾ
ᕾᕾᕾᕾᕾᕲ	ᕘᕘ	ᕘᕤᕾ	ᕤ	R	ᕤ	ᕤᕘᕘ
ᕲᕲᕲᕲ	ᕲᕲ	ᕲᕲ	ᕲᕲ	S	ש	ᕘᕘᕘᕞᕞᕤᕫᕞᕘᕘᕘ
ᕦᕦ	ᕦᕞ	ᕦᕦ	ᕞᕞᕞ	T	ת	ᕤᕤᕤᕞᕞᕫᕤᕤᕤᕤ
ᕛᕛᕛᕾ	ᕛ	ᕛ	ᕛ			
ᕾᕛᕣᕳH	ᕾᕾ					
XᕛᕛᕛSKᕳH	ᕛ					
ᕛᕾᕤᕞᕧᕛᕛᕤᕧM						
ᕲᕤᕲᕲ						
	ᕤᕤ	ᕤᕤ	ᕤ			
			ᕾ			
			ᕤ			
		ᕛᕾᕛ				
		ᕛᕛᕛ				

Figure 38 (cont.). PIM family typeface

Acknowledgments

References

Académie des Inscriptions et Belles-Lettres (1907). *Corpus Inscriptionum Semiticarum. Pars Secunda. Inscriptiones Aramaicas Continens*. Vol. II Fasciculus Primus. Paris: Republicae typogrpapheo.

Anderson, Deborah and Michael Everson (1999). "Final proposal to encode Aegean scripts in the UCS." `https://www.unicode.org/L2/L2001/01370-n2378.pdf`.

Codine-Trécourt, Florence and Sarah Guillaume (2012). "Du plomb au pixel. Transcrire les légendes des monnaies du haut Moyen Âge." In: *Revue numismatique* 168, pp. 261–277.

Everson, Michael et al. (2000). "European Alphabetic Scripts, 7.10 Old Italic." `https://www.evertype.com/standards/iso10646/pdf/old-italic.pdf`.

Fossey, Charles, ed. (1927). *Notices sur les caractères étrangers anciens et modernes*. Paris: Imprimerie Nationale.

Gruendler, Beatrice (1993). *The Development of the Arabic Scripts, From the Nabatean Era to the First Islamic Century According to Dated Texts*. Atlanta, GA: Scolars Press.

Jeffery, Lilian H. (1963). *The Local Scripts of Archaic Greece*. Oxford Monographs on Classical Archaeology. Oxford.

Jenkins, G. K. (1978). "Coins of Punic Sicily. Part 4: Carthage." In: *Swiss Numismatic Review* 57.5–6.

Jimenes, Rémi (2013). "Gestion informatisée des écritures anciennes." In: *Document numérique* 16.3.

Kraay, Colin M. (1966). *Greek Coins*. London: Thames and Hudson.

Morgan, J. de (1926). *Manuel de numismatique orientale de l'antiquité et du moyen âge*. Basmadjian, K. J. Vol. 1. Paris: Librairie orientaliste Paul Geuthner.

Thevenin, Gaëlle (2018). "Projet de Polices des Inscriptions Monétaires: le cas des monnaies ibériques et carthaginoises." L'Antiquité à la BnF, `https://antiquitebnf.hypotheses.org/2074`.

Volk Leonovitch, Elvire (2014). *PIM. Police pour les Inscriptions Monétaires*. Nancy: Atelier National de Recherche Typographique.

Yardeni, Ada (2002). *The Book of Hebrew Script, History, Palaeography, Script Styles, Calligraphy and Design*. London, Newcastle: The British Library and Oak Knoll Press.

Sociocultural Motivation for Spelling Variation in Modern Hebrew

Yishai Neuman

Abstract. Ideological tendencies and cultural preferences may at times constitute powerful factors in motivating spelling variation in variable social environments. Such tendencies and preferences may stem from religious taboo or represent modern political or seemingly-historic nuances. Since Sebba's (2007) account *Spelling and Society: The culture and politics of orthography around the world* leaves Hebrew outside of scope, the following brief account offers an overview of categories in which variable spelling conveys ideological perceptions and sociocultural stances.

1.   When Spelling Disagrees With Orthography

Orthography and *spelling* are often used interchangeably, especially by linguists, who most often overlook the subject or treat it as a means to consider phonology. The study of graphemics as a socio-semiotic discipline, however, must distinguish inherently-variable spelling from inherently-invariable *orthography*, i.e., the 'officially-sanctioned spelling' (Greek *ortho* = 'correct'), be the sanctioning authority a state-governed official language academy (as in France, Spain, Israel and Egypt), a prestigious printing house (early modern England) or an editor of dictionaries (Germany, USA). This means that spelling variation includes orthography among other variants, and descriptive linguistic methodology, which justifiably ignores prescriptive dictums, cannot avoid taking into consideration orthography as a relevant factor in the spelling continuum despite its inherent prescriptive component. Thus, for the sake of socio-semiotic analysis, it must be noted that while spelling displays variation across time, space and social premises, orthography—once an established institution in a given culture—changes only in leaps, sanctioned by the concerned authoritative decisions. In the case of Hebrew, a one-state language, such decisions are voted in the Academy of

Yishai Neuman   0000-0001-8256-8158
Achva Academic College, Israel
E-mail: yn335@yahoo.fr

the Hebrew Language, an official institution, legally empowered and financially sustained by the State of Israel (Fellman, 1974). Decisions on orthography may follow prevalent spelling-tendencies across society in some cases and advocate changes in spelling in other cases, which may in turn be followed by some users and ignored by others, whether for lack of knowledge or for reluctant conservatism (Moreshet, 1968; 1969).

2. Graphemic Euphemism Regarding Sequences <yh> and <yy>

Religious taboo in writing concerns primarily avoiding pointing the tetragrammaton יהוה <yhvh> in pointed editions of the Hebrew bible from the tenth century on. Post-Biblical works avoid writing it down altogether except in citations of entire biblical utterances (Sharvit, 1992). A cultural side effect of not writing the tetragrammaton down is the custom among observant Jews, quite pervasive in those milieus, to avoid spelling even small sequences thereof in other words. Thus, words whose spelling combines two subsequent letters of the tetragrammaton are spelled using a special apostrophe between the "holy" letters to be avoided, e.g., בעי'ה <bʕy'h> 'problem' and מאפיי'ה <mʔpyy'h> 'bakery', instead of the general spelling בעיה <bʕyh> and מאפייה <mʔpyyh>. Another religious taboo concerns the spelling of אלהים <ʔlhym> /ʔelohim/ 'God', modified into אלקים <ʔlqym> by changing the letter *bey* ה <h> into *qof* ק <q> (ibid., p. 115) by virtue of their graphetic proximity (a slightly longer stroke in the latter); this new spelling has given rise to the new euphemism /ʔelokim/ (Neuman, 2009, pp. 625–626).

3. Intentional Respelling Expressing Disapproval

One of the discourse strategies in use for expressing slight disapproval, strong opposition or fierce contempt towards an idea or entity consists of intentionally respelling words whose messages one wants to denigrate. The guiding principle of the graphemic pun is changing the spelling while keeping pronunciation intact. Whereas graffiti were the sole scene for such variations (Sebba, 2007) until the internet revolution, nowadays this practice is widespread on social media platforms.

   To take a mild example, public transportation users who wish to express their dissatisfaction with the train services respell רכבת ישראל <rkbt yśrʔl> /rakévet israel/ *Israel Railways Ltd.* as רקבת ישראל <rqbt yśrʔl>, alluding to the root √r.q.b. 'decay'. Similarly, dissatisfaction with the Israeli Police motivates respelling משטרה <mšṭrh> /miʃtara/ 'police' into משטרע <mšṭrʕ>, whereby the last syllable /ra/ respelled רע <rʕ> means 'bad'.

Some respellings are fiercer than others. Indeed, one of the strategies of expressing strong disapproval of the Israeli Culture Minister, thus criticizing her policy, her general anti-cultural discourse ("I haven't read Chekov") and some of her questionable public manners, consists of changing שרת התרבות <śrt htrbvt> 'Culture Minister' into סרת התרבות <srt htrbvt> "culture-less".

Israeli political discourse offers the highly frequent respelling סמול <smvl> for שמאל <śmʔl> /smol/ 'left', a common practice by right-wing partisans to express fierce opposition to- and mockery of- left-wing ideas and partisans, although recently appropriated by left-wing partisans in the self-designated proactive Facebook page סמולנים <smvlnym> "leftists". Following similar thinking, since one of the landmarks of the Arab-Israeli Peace Process, conducted by an Israeli left-wing government in the mid '90s, was the city of Oslo (cf. the Oslo Accords), the toponym אוסלו <ʔvslv> *Oslo* has been respelled עוסלו <ʕvslv>, a kind of 'nonce spelling' (Bolinger, 1946, p. 336), whereby the letter *áyin* ע <ʕ> (corresponding to a pharyngeal consonant) connotes the feature [+Arab], i.e., *negative* in the respellers' set of values. This and other cases of 'phonemically-pointless áyin' probably represents the emergence of a new [+pejorative] thematic grapheme in colloquial writing of Israeli Hebrew.

Finally, some respellings are more personal than others. For instance, the fact that intentional spelling variations such as סמולן <smvln> 'leftist' are often accompanied by numerous ignorance-based spelling variations, one of the social media attested responses, not very frequent though, is the intentional derogatory would-be imitative respelling אנאלפבט <ʔnʔlpbṭ> "eliddiret" as an eye-dialect spelling for orthographic אנאלפבית <ʔnʔlpbyt> 'illiterate'.

4. Anti-*Plene* Graphemic Conservatism

Either pointing or *plene* spelling may help readers complete phonological information unavailable in unpointed "defective" spelling (Weinberg, 1985). Before the *plene* accommodations were sanctioned (using additional *yod* י <y> and *vav* ו <v>), unpointed Hebrew was overloaded with the zero grapheme and reading it required intense cognitive labor. Yet, the introduction of those "helping letters" was felt by some readers to be "lowering the standard for the lazy, slow, and ignorant, instead of just teaching them how to read and write correctly". Reacting by psychological or cultural inertia (Aronoff, 1994) to the *plene* accommodations, some spellers would rather avoid adding *yod* י <y> and *vav* ו <v> in a few highly frequent lexical items.

One such word is מאוד <mʔvd> /meod/ 'very', whose highly frequent reactionary conservative variant is מאד <mʔd>. Another example is

the word אמא <ʔmʔ> /íma/ 'mom', whose recently-introduced *yod* (אימא <ʔymʔ>) breaks the visual-word habits of many language users. While unorthographic *vav*-less מאד <mʔd> is typically old school, unorthographic *yod*-less אמא <ʔmʔ> is much more widespread (Cohen-Gross and Ilani, 2006–2007). The case of the word /mila/ is more complex, since its pointed spellings vary between different meanings: מִלָּה <mlh> 'word' and מִילָה <mylh> 'circumcision'. When *plene* orthography was first sanctioned in 1968, it was accepted that מלה <mlh> /mila/ 'word' be left unchanged in order to avoid homography with 'circumcision'. A few decades later, in 1994, the Academy of the Hebrew Language decided to adopt the *plene* spelling even for 'word', which assumes this semantic context would allow distinguishing both meanings in spite of their homographic spelling, whence מילה <mylh> /mila/ for both 'word' and 'circumcision'. Conservative spellers, however, maintain the spelling מלה <mlh> for 'word'. They include the liberal *Haaretz* daily newspaper, whose editor titled Or's (2004) critical article on prescriptive rigidity "Why <mlh> should be <mylh> from now on." In the conflict between Academy orthographic decisions and spelling traditions maintained by the intellectual elite, Tzivoni represents the prescriptive standpoint: "The Academy has set forth clear rules, but the influencing instances—particularly book editors and newspapers—refuse to obey them and make their own rules" (2011, p. 22). Without taking a stand here, it is worth noticing that reluctance from reform does not equal making up one's own rules—it rather constitutes maintaining a handed down spelling tradition against what conservatives view as unnecessarily made up spelling horrors.

Other non-*plene* spellings consist of *yod*-less /i/ in open syllables which affect particular morphological categories, two of the most salient being

- the future tense and infinitive of *nif'al* verb template like להכנס <lhkns> /le(h)ikanes/ 'enter (inf.)' instead of ordinary but more recently standardized *plene* להיכנס <lhykns>; and
- the past tense of *pi'el*, e.g., למדו <lmdv> /limdu/ 'taught (past, 3pl)' instead of ordinary but more recently standardized *plene* לימדו <lymdv>.

The first is quite pervasive among college-degree holders since even *yod*-less spelling is sufficiently transparent. The second category, on the other hand, is much more opaque since in the absence of *yod* it graphemically coalesces with another morphological category (*qal* stem); it is therefore much rarer, and generally characterizes spellers who graduated from high school by the mid-1970s, when active pointing was taken out of the baccalaureate curriculum.

A more widespread non-*plene* spelling consists of avoiding the orthographic double-*yod* יי <yy>—which many proficient spellers would consider nonce spelling—corresponding to the consonantal /y/ in ultra-frequent words whose single-*yod* spelling is not subject to opacity in

reading. One such word is הייתה <hyyth> /hayta/ '(she) was', whose general spelling is היתה <hyth>. Tzivoni comments from a prescriptive point of view: "A few respectable book publishers refuse spelling הייתה <hyyth> and use היתה <hyth>. Their resistance to הייתה <hyyth> is astonishing and incomprehensible" (2011, 105, n. 1). Another case of double-*yod* public intolerance is the final /ay/ spelling, whereby the general public keeps spelling עלי <ʕly> for orthographic עליי <ʕlyy> /alay/ 'on/about me', מתי <mty> for orthographic מתיי <mtyy> /matay/ 'when', די <dy> for דיי <dyy> /day/ 'enough'. The last anti-*plene* frequent spelling on this list is הכול <hkvl> /(h)akol/ 'everything', whose general spelling is הכל <hkl>. The lexical items presented in this paragraph are unorthographically spelled not-*plene* by the general public, including by major publishers, with the exception of ardent adherents to the Academy of the Hebrew Language.

5.   Proper Names: General Anti-*plene* Conservatism

The relatively long time-span of composition of the Hebrew biblical text is responsible for several chronological differences in applying the use of *matres lectionis* into its variable spelling in such way that later texts within the biblical canon are spelled more *plene* than earlier ones (Andersen and Forbes, 1986). While variable spelling, including *plene*, affects the general lexicon, the category of proper names is somewhat more conservative than others in that it tends to remain relatively "defective". This means that adding a *vav* ו <v> corresponding to a back vowel or a *yod* י <y> corresponding to a front vowel was much less current in some proper names.

Modern Hebrew orthography tends to adopt these spellings by maintaining their traditional biblical spelling without adapting it to the general rules of modern *plene* orthography. Thus, a few traditional proper names, widespread among Modern Hebrew speakers, display no *vav* ו <v> corresponding to /o/: יעקב <yʕqb> /yaakov/ 'Jacob', משה <mšh> /moʃe/ 'Moses', שלמה <šlmh> /ʃlomo/ 'Solomon'; and the name דוד <dvd> /David/ 'David' displays no *yod* י <y> corresponding to a the /i/, although some Israelis who go by that name take the somewhat avant-garde liberty of spelling it using an additional *yod* י <y> as in only three occurrences in Classical Biblical Hebrew (ibid., pp. 4–5), namely דויד <dvyd>, e.g., writer David Grossman.

The noun pattern *QóTeL* underlies common nouns whose pointed vs. *plene* orthographies diverge on an additional ו <v>, e.g., בֹּקֶר <bqr> /bóker/ 'morning' vs. בוקר <bvqr>. Some of these nouns are also used as proper names, whence room for variation concerning the *vav* ו <v> in unpointed yet willingly defective spelling (see § 3.2 supra). Thus, while the noun זֹהַר <zhr> /zó(h)ar/ 'glamour' is spelled *plene* זוהר <zvhr>, peo-

ple who go by that name (mostly first, seldom last) either spell it *plene* or insist on זהר <zhr>. Other proper names displaying this feature: נגה <ngh> /nóga/, נעם <nʕm> /nóam/, רתם <rtm> /rótem/, ארן <ʔrn> /óren/, נעה <nʕh> /nóa/, שהם <šhm> /ʃó(h)am/, with divergent tendencies in biblical names preferring the *vav*-less spelling vs. modern names showing preference for the *plene* spelling. Those who use the *vav*-less variant sometimes comment meta-graphemically "this is the *correct* spelling" and would often correct correspondents who would dare add the conventional *vav*. Parents often take the warrior's stand, as the mother of a 12-year old boy called אבינעם <abynʕm> /avinóam/, who commented in an interview (October 2017): "How can anyone with minimal self-respect spell it with a *vav*?" Others opt for the *vav* variant: "It's just easier to read. And those who insist on the *vav*-less spelling are a bit stuffy" (Landman, 2014, p. 140).

Similar variation with respect to *vav* in proper names may be found in proper names of the noun patterns *QoTla* and *QoTLat*, whose *plene* spelling adds a *vav* which is absent in the pointed spelling, e.g., שמרת <šmrt> /ʃomrat/, דברת <dbrt> /dovrat/, עפרה <ʕfrh> /ʕofra/. The case of אסנת <ʔsnt> vs. אוסנת <ʔvsnt> for /osnat/ is more complex since one of the phonemic variants is /asnat/. Here too, biblical origins may encourage preference for the *vav*-less variants, and the same meta-graphemic discourse applies for these morphological categories as well.

6. Eye-Dialect Respellings

The term 'eye-dialect' refers to pronunciation-oriented non-orthographic respelling, whether the pronunciation at hand is socially-unmarked, <wimmin> for <women>, or, in an extended sense of the term, socially-marked, e.g., <bo'l> for <bottle>. Eye-dialect in Hebrew is used in direct speech represented in fiction or on social media and texting. In fiction it may either characterize pronunciation as ethnic or foreign, i.e., socially-marked pronunciation, or it may indicate fast / colloquial speech, which is then unmarked (Ben-Shahar, 1995). While eye-dialect in fiction is generally anecdotal, although some formation patterns are discernable, on social media and in texting it usually conveys socially-unmarked colloquial speech, thus representing *anti-spelling* (analogous to *anti-language* in general sociolinguistics). Among the highly-frequent eye-dialect items is the term בית ספר <byt spr> /bet séfer/ 'school' commonly respelled בצפר <btspr> "skool". Taken a step farther, this alternative teasing respelling, originally conceived in teenagers' blogs and short text messages, later served for branding as [+young] a new (2002) establishment:

    "Habetzefer" was established by the Israeli Advertising Association which unites 50 advertising agencies in Israel. "Habetzefer"'s shares holders, are 40

leading advertising agencies of the country. Above all, this ensures that the "Habetzefer" curriculum is on par with the strict requirements of the advertising industry in order for our graduates to fit in the industry successfully. (`www.habetzefer.co.il/english`)

It remains to be seen whether the adoption of SMSpellings for branding products as [+young] is merely anecdotal or liable to become more productive.

7. Spelling Subsystem: Graphemic Marking of Lexical Foreignisms

One of the most salient features of Yiddish orthography is the graphemic dichotomy between European and Semitic lexical components, somewhat comparable to the "Native and foreign" graphemic distinction within Carney's (1994, 96ff) *Spelling Subsystems*. While the spelling of the Hebrew-Aramaic (hence 'patrimonial') lexical component of Yiddish follows classical Jewish sources, thus expressing loyalty to Jewish cultural heritage, as in the spelling systems of other Jewish languages, the spelling of the European component, mostly Germanic and Slavic, is much more phonemic, i.e., ideologically-neutral. Thus, on the verge of linguistic conversion to Modern Hebrew, after a few minor hesitations between contradictory tendencies, this graphemic dichotomy ended up remaining in Modern Hebrew with minor modifications, thus maintaining the traditional opposition between cultural continuity with classical sources vs. practical spelling of words bearing no cultural attachment (Neuman, 2013). Modern Hebrew phoneme-to-grapheme correspondences thus vary according to the feature [+foreign], and this dichotomy has led to two parallel graphemic sub-systems:

Phoneme	Hebrew autochthonous	Foreign
/a/	Final position: א <ʔ>, or ה <h>, or ע <ʕ>	ה <h>
	Medial position: zero <ø>	א <ʔ> <ø>
/i/	Closed unstressed syllable: zero <ø>. Elsewhere: י <y>	י <y>
/ay/	י <y> יי <yy>	יי <yy>
/v/	rarely ו <v>, frequently ב <b>	וו <vv>
/s/	rarely שׂ <š>, frequently ס <s>	ס <s>
/χ/	ח <ḥ> כ <k>	כ <k>
/k/	כ <k> ק <q>	ק <q>
/t/	rarely ט <ṭ> frequently ת <t>	<t> → ט <ṭ> <th> → ת <t>

All in all, the spelling of foreign words is less complex, and learners of Hebrew may figure them out more easily than the orthography of patri-

monial vocabulary. To illustrate the major categories of the dichotomy, here are a few examples, one for each. Concerning the notation of /i/, whereas the /i/ in מפקדה <mpqdh> /mifkada/ 'headquarters' takes no *yod* י <y> since its syllable is closed and unstressed, the /i/ of היפנוזה <hypnvzh> /hipnóza/ 'hypnosis' takes the *yod* י <y> since in spelling foreign words, the type of syllable is irrelevant; unsanctioned yet common spelling exceptions display *yod* י <y> in closed unstressed syllables only where homography is liable to cause ambiguity, e.g., מנהל <mnhl> /mena(h)el/ 'director' vs. מינהל <mynhl> /min(h)al/ 'office'. With respect to the sequence /ay/, in autochthonous לילה <lylh> /láyla/ 'night' it takes a single *yod* י <y>, which could technically be interpreted as the vowel /i/ or /e/, while the same diphthong in the foreign term סיידר <syydr> /sáyder/ 'cider' takes a double-*yod* יי <yy>, which is less ambiguous; less proficient spellers tend to apply the foreign graphemic rule also to Hebrew words, e.g., ליילה <lyylh> instead of לילה <lylh>. Similarly, while the /v/ in autochthonous הבנה <hvnh> /havana/ 'understanding, comprehension' corresponds to *bet* ב <b>, but could technically be spelled with a double-*vav* וו <vv>, the Cuban capital city Havana does take a double-*vav* וו <vv>: הוואנה <hvvʔnh>, leaving no room for hesitation in reading. Finally, the alveolar stop /t/ in the word /tik/ is either spelled as autochthonous תיק <tyq> 'bag' or as foreign טיק <tyq> 'tick', and this spelling distinction joins a morphophonemic distinction in the plural *tikím* 'bags' vs. *tíkim* 'ticks'. Spelling autochthonous words is more complex than spelling foreignisms, and being able to coherently apply this dichotomy is part of spelling proficiency.

This dichotomy clearly carries ideological values. Patrimonial lexicon in Yiddish constitutes a minority within the entire vocabulary, so spelling it as in classical texts carries the value of respect towards Jewish cultural heritage. Conversely to Yiddish, Modern Hebrew vocabulary is more than 90% autochthonous (Schwarzwald (Rodrigue), 1998), so spelling foreign words differently puts them in a visible *graphemic quarantine* (not without calling to attention the special [Pharaonic] Egyptian graphemics for non-Egyptian words, more phonetic than for autochthonous words). When added to the already existing morphophonemic quarantine, and given the ideological anti-foreign inclination of the linguistic pillar in Zionism, as in several other national movements in 19th and 20th centuries, namely the language-shift to Hebrew, it becomes clear that their identification as external to the autochthonous system makes it easier to gradually replace them (Masson, 1986). For example, both morphophonemic foreignness of /táksi/ 'taxi' and the graphemic relative foreignness of its spelling טקסי <ṭqsy>, the *tet* ט <ṭ> in particular, have allowed its maintenance in a stable structural segregation until the time came for its gradual yet successful replacement by the Hebrew term מונית <mvnyt> /monit/ (Neuman, 2013).

8.   Arabic Loanwords: Between Foreignisms and Semitisms

Judeo-Arabic established a special tradition of transcribing Arabic using the Hebrew alphabet, which, though unstable with respect to the notation of several sounds, contributed its own share to Modern Hebrew graphemics. What is relevant for the present synopsis of Modern Hebrew spelling variation is the distinction, using Hebrew letters, between Arabic emphatic phonemes /ṭ/ and /q/ and non-emphatic counterparts /t/ and /k/. Based on this distinction, the Hebrew notation of Judeo-Arabic phonemes follows this rule (Hary, 1996):

		Phoneme	Arabic script	Hebrew script
Alveolar	[−emphatic]	/t/	ت	*tav* ת <t>
	[+emphatic]	/ṭ/	ط	*tet* ט <ṭ>
Velar	[−emphatic]	/k/	ك	*kaf* כ <k>
	[+emphatic]	/q/	ق	*qof* ק <q>

Comparing the Judeo-Arabic graphemic treatment of /t/ and /k/ according to this chart with their treatment in the last two lines in the previous chart (lexical foreignisms) suggests a possible graphemic conflict if, while being foreign in Hebrew, Arabic loanwords in Hebrew follow the Judeo-Arabic spelling tradition. Indeed, whereas Judeo-Arabic [−emphatic] /t/ and /k/ take *tav* ת <t> and *kaf* כ <k>, as foreign words in Modern Hebrew they would take *tet* ט <ṭ> and *qof* ק <q>. The choice of their spelling in Modern Hebrew is partly conditioned by the feature [+learned] of the borrowing process (Neuman, 2015): words introduced into Hebrew via or accompanied by literacy, mostly by scholars or journalists, usually follow the customary Judeo-Arabic tradition, e.g., אינתיפאדה *Intifada* (an Arabic word meaning 'tremor', usually rendered by 'uprising') with a *tav* ת <t>, whereas popular loans initially display more fluctuation in spelling, though they quite often become normalized though scholarly intervention and end up acquiring an orthography that follows the Judeo-Arabic tradition. Thus, Arabic loanwords in Hebrew whose spelling was arranged by learned language users are spelled in Hebrew according to the Judeo-Arabic tradition. For example, the 19th century Palestinian Yiddish lexical Arabism /sábre/ 'cactus fig' (Kosover, 1966, p. 157) was respelled into Modern Hebrew צבר <ʦbr>, whence subsequent graphophonemic rephonemization into /ʦabar/ (Neuman, 2009, pp. 690−692).

In turn, the fact that European loanwords obey relatively strict graphemic rules while Arabic loanwords are much less subject to such restrictions may indicate that, on the ideological level, given that Zionism exhibits a combination of rejecting old Europe and yearning for a somewhat imagined "new East," Arabic loanwords might appear less foreign in Hebrew than the European loanwords. The unequal graphemic

treatment of European vs. Arabic loanwords is thus carrying a compo-
nent of identitary ideological discourse.

References

Andersen, F.I. and D.A. Forbes (1986). *Spelling in the Hebrew Bible*. Rome: Biblical Institute Press.

Aronoff, M. (1994). "Spelling as Culture." In: *Writing Systems and Cognition: Perspectives from Psychology, Physiology, Linguistics, and Semiotics*. Ed. by I. Watt. Dordrecht, Boston, London: Kluwer Academic Publishing, pp. 67–86.

Ben-Shahar, R. (1995). "The Phonetic Representation of Spoken Language in Modern Hebrew Literature." In: *TTR: Traduction, terminologie* 8, pp. 245–273.

Bolinger, D.L. (1946). "Visual Morphemes." In: *Language* 22, pp. 333–340.

Carney, E. (1994). *A Survey of English Spelling*. London, New York: Routledge.

Cohen-Gross, D. [כהן-גרוס, דליה] and N. Ilani [ונוגה אילני] (2006–2007). "מילוי? הכתיב בספרים בישראל - מכוון או מזדמן [Non-vocalized Orthography in Israeli books – planned or unplanned?]" In: חלקת לשון *[Smooth Tongue]* 37–38, pp. 33–47.

Cross, F.M. and F.D. Noel (1952). *Early Hebrew Orthography: A Study of the Epigraphic Evidence*. New Haven: American Oriental Society.

Fellman, J. (1974). "The Academy of the Hebrew Language: Its History, Structure and Function." In: *Linguistics* 120, pp. 95–103.

Hary, B. (1996). "Adaptations of Hebrew Script." In: *The World's Writing Systems*. Ed. by Peter T. Daniels and William Bright. Oxford: Oxford University Press, pp. 727–742.

Kosover, M. (1966). *Arabic Elements in Palestinian Yiddish: The Old Ashkenazic Jewish Community in Palestine, Its History and Its Language*. Jerusalem: Rubin Mass.

Landman, Sh. [לנדמן, שלומית] (2014). "מהדסה להדס, מאליעזר לאלעזר - מאפיינים לשוניים ותרבותיים בשמות פרטיים של המגזר היהודי במדינת ישראל [From Hadassah to Hadas, from Eliezer to Elazar, Linguistic and Cultural Characteristics of Given Names of the Jewish Sector in the State of Israel]." PhD thesis. רמת-גן: אוניברסיטת בר-אילן [Bar-Ilan University, Ramat-Gan].

Masson, M. (1986). *Langue et idéologie: Les mots étrangers en hébreu moderne*. Paris: Éditions du CNRS.

Moreshet, M. [מורשת, מנחם] (1968). "הערות לבעית הכתיב המלא [Comments on the Problem of Plene Spelling in Hebrew]." In: לשוננו לעם *[Our Language to the People]* 19, pp. 227–241.

————— (1969). "כתיב "מלא" המעיד על שיבוש לשון [Plene Spelling in Hebrew Indicating Language Errors]." In: לשוננו לעם *[Our Language to the People]* 20, pp. 54–84.

Neuman, Y. (2009). "L'influence de l'écriture sur la langue." PhD thesis. Université de la Sorbonne Nouvelle, Paris.

——— (2013). "Diachronic, Ideological and Linguistic Motivations in Spelling Foreignness (Xenographemics) in Yiddish and Hebrew." In: *The 46th Annual Meeting of the Societas Linguistica Europaea—special session on Conflicting Orthographies*. Split, Croatia.

——— (2015). "The popular-learned opposition in Modern Hebrew lexical Arabisms." In: *The North American Conference on Afroasiatic Linguistics (NACAL)*. Georgetown University, Washington DC.

Or, Y. [יאיר ,אור] (2004). "למה המלה <מלה> תהיה מעכשיו <מילה>?" [Why <mlh> Should be <mylh> from Now on (on orthography and standardization of Hebrew]." הארץ [Haaretz daily newspaper], 19.06.2004.

Schwarzwald (Rodrigue), O. (1998). "Word Foreignness in Modern Hebrew." In: *Hebrew Studies* 39, pp. 115–142.

Sebba, M. (2007). *Spelling and Society: The Culture and Politics of Orthography around the World*. Cambridge: Cambridge University Press.

Sharvit, Sh. [שמעון ,שרביט] (1992). "מסורות כתיב וכתיבה בספרות התנאים" [Orthographic and Spelling Traditions in Tannaitic Literature]." In: בלשנות עברית *[Hebrew Linguistics]* 33–35, pp. 101–122.

Tzivoni, L. [לאה ,צבעוני] (2011). עברית כהווייתה (חלק שלישי): כתיב בלי ניקוד *[Hebrew in Practice: Orthography]*. תל-אביב [Tel-Aviv]: צבעונים [Tzivonim].

Weinberg, W. (1985). *The History of Hebrew Plene Spelling*. Cincinnati: Hebrew Union College Press.

Emojis Are Everywhere

How Emojis Conquer New Contexts

Christa Dürscheid

Abstract. This article first presents facts and figures about emoji use, which, as is pointed out, is by no means restricted to private everyday communication (Section 1). Next, two studies are discussed, shedding light on the following questions: on the one hand, whether emojis are indeed preferred by younger people and, on the other, which impression the use of specific emojis with positive or negative connotations leaves with the addressee of text messages (Section 2). The heart of this essay follows in Section 3—it focuses on emoji use during the COVID-19 crisis (which, at the time of writing, is still ongoing). Here, observations concerning new forms of emoji use on Facebook and in types of video chat (such as Zoom and Skype) are collected. Among these, two are discussed in more detail: firstly, the possibility to react to Facebook posts with a hugging face, which is supposed to help users take a symbolical stance "against loneliness." Secondly, the fact that in video chats, emojis can now be sent as so-called real time reactions. This way, it is possible, for example, to send a thumbs down sign emoji while another person is speaking. In Section 4, an outlook is given, raising the question of how emoji use can be described at a linguistic level now that, given this new development in video chats, emojis are used also in oral communication and thereby cease to be mere complements to or substitutes for writing.

1. A Story of Success

Emojis are everywhere—especially whenever people exchange information with acquaintances, friends, or family via messenger services (such

---

Christa Dürscheid   0000-0001-9141-7562
Department of German Studies, University of Zurich
Schönberggasse 9, 8001 Zürich, Switzerland
`duerscheid@ds.uzh.ch`

as WhatsApp), post pictures of their restaurant visits on Instagram, or send holiday greetings via Facebook. Furthermore, emojis are not only used in private communication (as one may assume given these examples) but can also be found in business communications and in the context of mass media: for instance, companies embellish their newsletters with emojis; advertising agencies rely on emojis in the design of their advertisements and billboards; T-shirts, posters, games, books as well as films are marketed with emojis, and even police stations use them to render their Facebook posts more informal and thus (perhaps) more likeable (cf. Fig. 1).
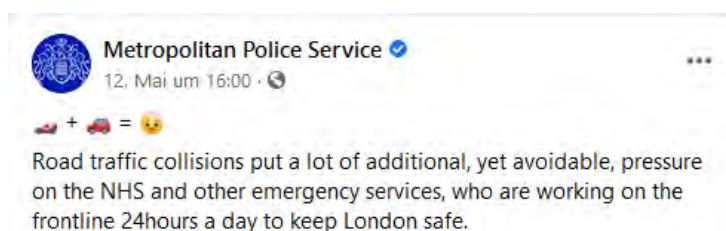
FIGURE 1. Emojis in Facebook

As research on the use of emojis has gained pace, there is an abundance of literature on the topic, which cannot be treated extensively within the scope of this short essay (but see Seargeant, 2019, who deals with the historical, political, social, and linguistic context of emoji use). Two points should nevertheless be mentioned:

Firstly, the word *emoji* comes from Japanese. It is a combination of *e* 'image' and *moji* 'character'.[1] The (coincidental) phonetic similarity with the word *emoticon* does not reveal anything about how emojis are used. This is evident from the example in Fig. 1, in which none of the three emojis express emotions: two depict vehicles while the third one is the "Face-with-Head-Bandage-Emoji".

Secondly, emojis are not only popular in private and more and more official contexts but are also a recurring subject in public discourse (cf. Fig. 2). For example, newspaper articles often raise the question of whether writing with emojis could have long-term effects on the use of language in general and discuss the consequences that could potentially ensue if written communication were to be based increasingly on images (e.g., photos, stickers, GIFs, emojis).

---

1. In Japan, the history of emojis reaches back to the last century. Shigetaka Kurita is regarded as their inventor. In the late 1990s, he designed—for the largest mobile phone provider in Japan at that time—small black and white graphics that were used to complement text.

Interestingly, these articles often focus on young people. Could they lose the ability to express themselves correctly in writing because of the heavy use of emojis in the messages they compose? Another question that is repeatedly debated relates to whether emojis could form the basis of a new universal language. From a linguistic standpoint, this question is usually negated, as it is argued that emojis can supplement writing but not substitute it. The crux of this claim is that there exists no fixed relation between emojis and what they represent (see Dürscheid and Meletis, 2019, pp. 172−176 for an in-depth discussion of this topic), making it infeasible to represent complex sentence structures using only emojis.[2] In this regard, we agree with Philip Seargeant's assessment: "Emoji may be a lot more intuitive than alphabetic writing systems, which you have almost no chance of interpreting if you can't read them. But they're still semiotically fairly complicated. And their meaning often isn't that transparent" (Seargeant, 2019, p. 20).[3]

Since emojis originated in Japan, it is unsurprising that the original meanings of many emojis reflect Japanese culture and language use. Take, for example, the poop emoji 💩, which is frequently added in Japanese text messages to wish someone good luck. By comparison, in western countries, this emoji is used in negative contexts or when writers comment critically on someone else's statements.[4] Scrolling through the long list of emojis on mobile phones, one instantly becomes aware of how many different emojis are currently available for use. Among them are emojis that represent the expression of certain feelings (e.g., laughing or sad face) but also emojis that stand for people of different professions, various types of food, sports activities, animals, vehicles, flags, and also symbolic signs (such as plus and minus, religious symbols, and the heart emoji, which is available in different colours).

Inserting these small colourful images into texts by means of few clicks is possible only because they are included in Unicode, the international character set that is the basis for all digital writing today (see `https://home.unicode.org/`). Of course, it had already previously been possible for writers to express what they mean by using additional graphic means: In the 1990s (and to some degree today still), people de-

---

2. Just consider 'writing' the following sentence using only emojis: *I would have liked to come yesterday, if I had the time.* Neither the grammatical information in this sentence (e.g., tense, mode) nor the logical connection between the two parts of the sentence can be expressed with emojis.

3. Note that Ph. Seargeant uses *emoji* as the plural of *emoj*. Indeed, in Japanese, the plural does not change, while in English, according to the Oxford English Dictionary, emoji and emojis both are acceptable plurals. We prefer *emojis* as the plural form in this essay.

4. More information about the meaning of emojis can be found at `https://emojipedia.org/` (26/8/2020). It was Jeremy Burge who launched this website in 2013; he also introduced the "World Emoji Day," which takes place each year on July 17th.

Figure 2. Emojis in public discourse

signed their emails and text messages with smileys in ASCII code such as, for instance, :-). Notably, when the first emojis were integrated into Unicode in 2010, many writers changed their habits und started using emojis instead of ASCII signs.

Currently, Unicode contains more than 3,000 emojis, with new ones being added on a yearly basis by the Unicode consortium, which is responsible for the admission. Given the multitude of proposals, it is obviously impossible for the consortium to approve every application for inclusion of an emoji. The approval process is guided by several criteria. For instance, a proposal for an emoji that is intended to promote a specific product (e.g., a brand of beverage) will not be successful. By contrast, if the applicants manage to provide evidence that a proposed emoji is of socio-political relevance, it has a far better chance of being accepted. It was, in fact, this criterion that led to the current situation in which many emojis (and variants of emojis) in Unicode represent people of different skin colours and diverse relationship constellations.

2.   Adolescents, WhatsApp, and Emojis

According to the 2018 *PEW* study, people in the US aged 18-49 years have reached a near saturation level of 97% in their adoption of the internet.[5] Interestingly, the number of people who have access to the internet only via their smartphones (instead of through traditional broadband services at home) has increased from 12% in 2016 to 20% in 2018. This suggests a noteworthy development towards "smartphone-only" internet users.

It is, of course, important to consider the purposes for which these people use the internet on their mobile phones, as this affects the question of whether or not they use emojis. For example, if someone has written a scientific essay and wishes to publish it on the internet or sends a business letter by email, he or she will probably not use emojis. This stands in stark contrast to messages sent via WhatsApp or posted on Facebook, Instagram, or Twitter, contexts in which it might even—to put it bluntly—raise eyebrows if no emojis are used at all. Assumedly, these applications enjoy particular popularity among young people. Therefore, let us briefly look at a series of German surveys, the so-called *JIM* studies (*Jugend, Information, Medien*), in which young people are regularly asked about their use of various media.

The most recent *JIM* study from 2019 shows that 93% of the 12- to 19-year-olds ($n = 1,200$) communicate via WhatsApp several times a week.[6] The survey also found that WhatsApp is the most popular internet application, followed by Instagram, Snapchat, and Facebook (in this order). This, notably, does not necessarily mean that adolescents use emojis more frequently than members of other age groups. In fact, there exists a study that makes the case for the opposite—if only on the basis of a very small sample ($n = 120$); in this study, the authors provide evidence that people above the age of 35 use more emojis than younger people (see Tschernig and Hertzberg, 2015). In the conclusion of their paper, they also address the question that is discussed so often both in public discourses as well as in research: What purpose do emojis serve in text messages? Since a growing number of studies deal with this matter (see, for example, Beißwenger and Pappert, 2019; Dürscheid and Frick, 2016; Herring and Dainas, 2017), only three aspects of this question shall be addressed in the following:

---

5. The *PEW* (Pew Research Center) presents itself as "a nonpartisan fact tank that informs the public about the issues, attitudes and trends shaping the world". It conducts "public opinion polling, demographic research, media content analysis and other empirical social science research" in order to provide information for current discourses. For more information, see `https://www.pewresearch.org` (26/8/2020).

6. Cf. `https://www.mpfs.de/studien/jim-studie/2019/` (26/8/2020).

Firstly, as has been argued above, emojis can be used to make texts "more informal and likeable". To put it differently, they can assume an indexical function, meaning emojis potentially ascribe certain characteristics to a text (and thus to the producer of the text). This is underlined in an online survey ($n = 385$) that is part of a psychological study conducted by Wera Aretz. The survey's results lead to the following conclusion: "The author of a text using positively connoted emojis [e.g., 😂, CD] is perceived significantly warmer and more likeable, an author using no emojis is perceived more assertive, and an author using negatively connoted emojis [e.g., 😨, CD] as irritated and angry" (Aretz, 2019, p. 37).

Secondly, emojis can also be used for an additional illustration of what is already stated explicitly in the text. This is the case, for example, when emojis such as ☀, 🏄 and 🏖 are added to utterances such as *We are really excited for summer*.

Thirdly, emojis can be used to substitute parts of words, entire words, or noun phrases (see *I'm on my* 🚲, *I'll take the night* 🚗). Important questions in this respect are whether writers do this to reduce typing effort or (just) see it as a kind of grapho-stylistic play. In any case, this type of use remains relatively rare. This is evident from the corpus studies of a Swiss research project (cf. `https://www.whatsup-switzerland.ch`) that is based on an extensive data collection of approximately 750,000 WhatsApp messages.

3. Emojis During the COVID-19 Crisis

Given that the pandemic has such a deep impact on our lives, it is unsurprising that it also affects the way emojis are used. Strikingly, as a result, a specific emoji is currently used much more frequently than before: the "face with medical mask emoji" 😷.[7] Interestingly, at the same time, the relative use of the positive smiley-face emoji has dropped. As stated on Emojipedia, "emoji showing more negative or ambiguous emotions, like anger or pleading, have been ticking up, suggesting people are more uneasy right now".[8] Thus, in an analysis of 68 million tweets from April 2020, the pleading face emoji ranked as the third most popular emoji (cf. Fig. 3). As shown in the table, from August 2018 to April 2020, the two emojis that top the ranking have remained the same, while there has been a change in third place.

---

7. Here and in the following, we refer to surveys conducted by Emojipedia and reported on their website. Cf. `https://blog.emojipedia.org/spread-of-the-coronavirus-emoji` (26/8/2020).

8. Cf. `https://blog.emojipedia.org/emoji-use-in-the-new-normal` (26/8/2020).

Top Ten Emojis used on Twitter

Source: Emojipedia analysis of 68 million tweets published May 2020.
https://blog.emojipedia.org/emoji-use-in-the-new-normal

Rank	Aug 18	Emoji %	Apr 19	Emoji %	Aug 19	Emoji %	Apr 20	Emoji %
#1		14.39%		13.96% (▼2.94%)		13.10% (▼6.22%)		12.45% (▼4.92%)
#2		6.41%		6.97% (▲8.70%)		7.60% (▲9.11%)		8.48% (▲11.57%)
#3		4.70%		4.25% (▼9.66%)		4.24% (▲0.55%)		5.17% (▲83.47%)
#4		4.45%		4.22% (▼5.23%)		3.81% (▼10.45%)		4.15% (▲15.30%)
#5		3.59%		3.60% (▲0.34%)		3.64% (▲1.28%)		4.13% (▲2.81%)
#6		3.31%		3.27% (▲48.36%)		3.60% (▲9.96%)		3.26% (▼10.60%)
#7		2.92%		2.77% (▼4.98%)		2.82% (▲79.28%)		3.25% (▼14.52%)
#8		2.20%		2.75% (▼16.99%)		2.70% (▼2.66%)		2.71% (▲24.97%)
#9		2.05%		2.13% (▲4.20%)		2.55% (▼7.29%)		2.22% (▼17.56%)
#10		1.95%		1.98% (▲4.74%)		2.17% (▲1.62%)		2.11% (▲19.09%)

FIGURE 3.   Emoji ranking `https://blog.emojipedia.org/emoji-use-in-the-new-normal/` (4/9/2020)

Note that for purposes of comparison, it would be interesting to learn whether the pandemic also effects users' emoji preferences on Facebook. On Emojipedia, no studies approaching this question are available. However, it is noteworthy that in the spring of 2020, Facebook introduced a new emoji that performs a virtual hug. It can be selected among other "online reactions" such as 👍 or ❤️ (cf. Fig. 4). According to Facebook, the hugging face emoji is supposed to symbolically take a stance "against loneliness" (cf. Fig. 5).
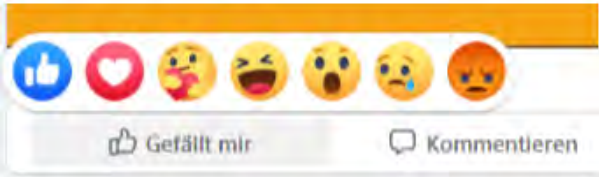
FIGURE 4. Online reactions on Facebook
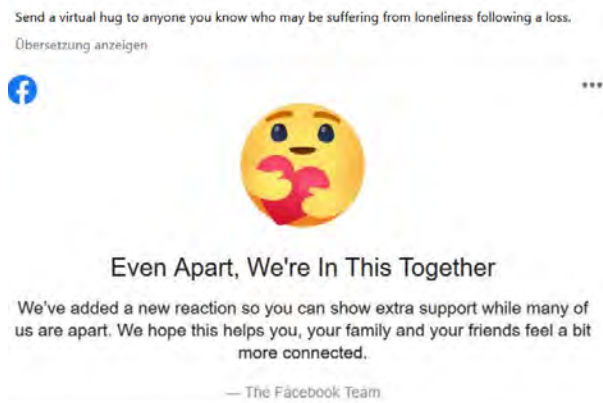
Figure 5. The hugging face emoji https://www.facebook.com/lincolnccfh/posts/2596013993946489 (4/9/2020)

As mentioned above, each year, a set of new emojis is integrated into Unicode. Due to the pandemic, the Unicode consortium has postponed the release of its next version, Unicode 14.0, for six months (see http://log.unicode.org/2020/04/unicode-140-delayed-for-6-months.html, (26/8/2020)). Specifically, Unicode 14.0 was originally planned to be released in March 2021, with new emojis being made available for the public in the fall of 2021. Given the circumstances surrounding COVID-19, this will now probably not happen until 2022.[9]

Nevertheless, the popularity of emojis will likely grow even more due to the Corona crisis. The reasons for this are obvious: On the one hand, if, in the future, personal encounters have to be kept to a minimum, people will resort to sending each other text messages even more often than before. This will increase the overall use of emojis (and perhaps more specifically of emojis that express emotions). On the other hand, people will more often talk to each other via telephone calls (as in the past) or will communicate via video conferences, which may lead to a decreasing use of emojis. However, video platforms such as Zoom, Microsoft Teams, Skype, or Google Meet also allow users to send text messages that may include emojis. Furthermore, during a call or video chat, users can select emojis to comment on something another person has said. Google Meet, Zoom, and Skype already provide several emojis that allow listeners to perform such so-called "real-time reactions" (cf. Fig. 6).

---

9. However, an interim solution for 2021 was announced on Emojipedia on July 24th, 2020: "With Unicode 14.0 delayed due to COVID-19, a minor emoji release known as Emoji 13.1 will fill the gap for phone users in 2021" (https://blog.emojipedia.org/there-will-be-new-emojis-in-2021-after-all, (29/8/2020)).

Thus, for instance, it is possible to send a thumbs up sign emoji while another person is speaking.

As evident from this screenshot, Google Meet users are invited to make further emoji suggestions that may be implemented in upcoming releases of the software. A question that arises in this context is whether (and how often) video chat participants actually make use of this option. In the next step, it would also be interesting to assess how this additional level of communication affects the person who is speaking, especially because emojis that express negative feelings can be sent as well. This last scenario is illustrated in the next screenshot that is taken from a one-to-one Skype conversation (cf. Fig. 7). While one person was talking, the other sent a frowning face emoji that appeared and briefly took up the whole screen before it disappeared again. Notably, this back-channel behaviour potentially irritates the speaker, which in turn could lead to her/him reacting immediately and changing the way the way s/he continues his or her turn.
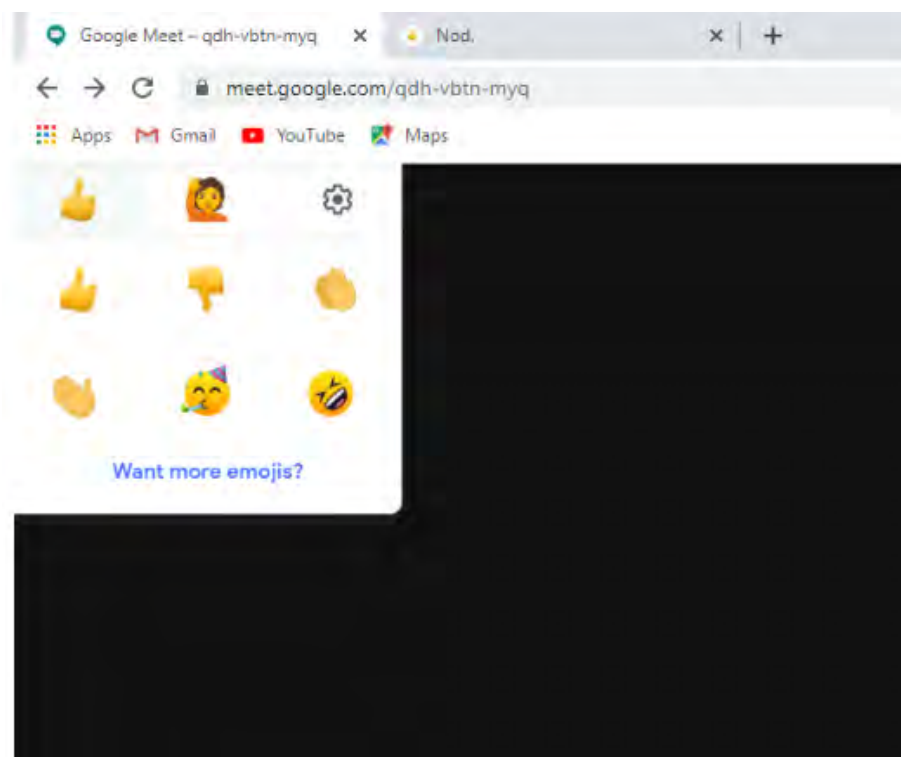
Figure 6. Emojis in Google Meet
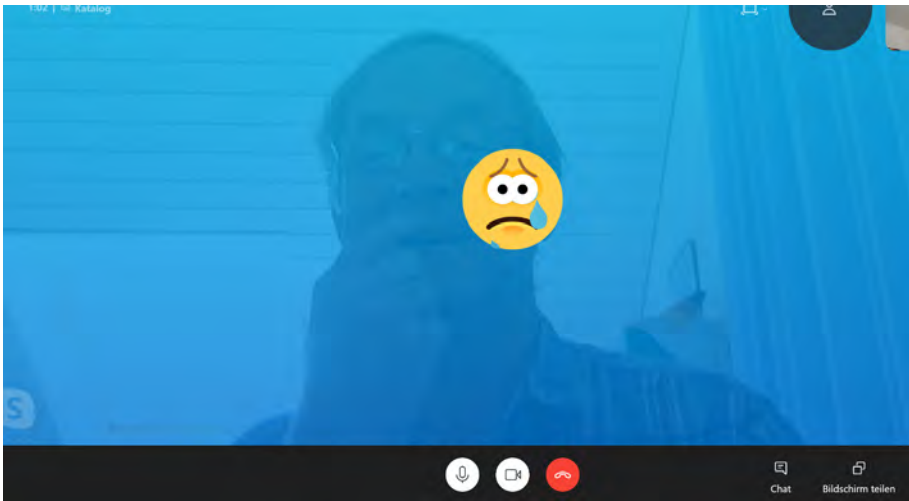
FIGURE 7. Real-time reaction in Skype

If more than two people are involved in the video chat, the emoji would not occupy the entire screen but (in Skype, for example) super-imposes only the camera image of the person who sent it. Nevertheless, not only the person who is currently talking but all participants can see it.[10] In a certain way, this kind of nonverbal reaction is comparable to noticing a listener's facial expressions while speaking in an 'offline', i.e., face-to-face conversation. However, whereas in a video chat, all partic-ipants will see this reaction (provided they are paying attention to the screen at the time when it is sent), this is not necessarily the case in an offline setting. To phrase it differently: online, it is not so easy to ignore this kind of back-channel behaviour, while in face-to-face con-versations, the speaker as well as the other participants may overlook such a negative reaction.

Examples like this contribute to the impression that emojis are now indeed everywhere: they not only appear in combination with text any-more but have also become a part of digital-oral conversations. Of course, one could argue that emojis can also be sent in the text chat that runs parallel to video (or only audio) conversations, and that this has been possible for a long time. Against this background, it is justified to ask how the described emoji reactions differ from what has been previ-ously practiced. Arguably, in text chats, emojis do not push themselves into the conversation in the same way that a real-time emoji reaction

---

10. Note that in Google Meet, for instance, emojis are not statically superimposed on the camera image but fly across the whole screen. This ensures that in video chats involving multiple participants, the reaction can really be seen by everyone.

does. Also, if the participants in a conversation have not opened the text chat window, they will not see the emojis at all. Besides, from a linguistic perspective, it is a fundamental difference whether emojis are used while reading and writing or while listening and talking. The latter constitutes a switch from the oral to the visual mode, while the former occurs entirely in the visual mode.

4.   Outlook

"The revolution we're experiencing at the moment […] is centred around digital communication, the internet and mobile technology" (Seargeant, 2019, p. 190). This statement is found at the end of Seargeant's book. We argue that from the perspective of the year 2020 (so far), we are currently not only in the midst of a digital-technological revolution but are also experiencing a non-digital development that affects our society in its very roots. The epidemiological situation we are facing has a massive impact on our daily lives—this also includes the way we use digital media. In the present essay, we mentioned only one example of this: Due to the Corona pandemic, video chat conversations supplemented by text chat have become omnipresent. As we have shown, this is accompanied by a new communication practice that some platforms offer: sending emojis as real-time reactions.

If this type of emoji use grows increasingly popular, it will no longer be sufficient to study emojis as a mere complement to or substitute for writing. In this case, linguists would have to address the question of which functions emojis serve in online oral communication and whether, possibly, the distinction between oral conversation (by default without emojis) and written conversation (often with emojis) must be reconsidered. Evidently, the current situation produces interesting new research questions—however, possibly ones we would prefer to leave behind as soon as we have reached the end of the Covis-19 crisis. Since if (or hopefully when) we finally return to offline meetings, the described back-channel behaviour will likely be discarded. Indeed, the image of someone holding up a sheet with an emoji on it to give a comment during an offline conversation certainly appears absurd. Or does it?

References

Aretz, Wera (2019). "Zeige mir Deine Emojis und ich sage Dir, wie Du bist: Die Nutzung und Wirkung von Emojis in der privaten Kommunikation." In: *Journal of Business and Media Psychology* 10.1, pp. 37–42.

Beißwenger, Michael and Steffen Pappert (2019). "How to Be Polite with Emojis: a Pragmatic Analysis of Face Work Strategies in an Online Learning Environment." In: *European Journal of Applied Linguistics* 7.2, pp. 225–253.

Dürscheid, Christa (2020). "Emojis sind überall. Schreiben in digitalen Zeiten." In: *Medien in Krisenzeiten*. Vol. 93. tv diskurs 3, pp. 62–65. URL: https://tvdiskurs.de/data/hefte/ausgabe/93/duerscheid-emojis-tvd93.pdf.

Dürscheid, Christa and Karina Frick (2016). *Schreiben digital. Wie das Internet unsere Alltagskommunikation verändert*. Stuttgart: Kröner.

Dürscheid, Christa and Dimitrios Meletis (2019). "Emojis: A Grapholinguistic Approach." In: *Graphemics in the 21st Century*. Ed. by Yannis Haralambous. Vol. 1. Grapholinguistics and Its Applications. Brest: Fluxus Edition, pp. 167–183.

Herring, Susan C. and Ashley R. Dainas (2017). ""Nice picture comment!" Graphicons in Facebook Comment Threads." In: *Proceedings of the Fiftieth Hawai'i International Conference on System Sciences (HICSS-50)*. Los Alamitos, CA: IEEE. URL: https://ella.sice.indiana.edu/~herring/hicss.graphicons.pdf (visited on 10 September 2020).

Medienpädagogischer Forschungsverbund Südwest (2019). *Jugend, Information, Medien. Basisuntersuchung zum Medienumgang 12- bis 19-Jähriger*. Tech. rep. URL: https://www.mpfs.de/fileadmin/files/Studien/JIM/2019/JIM_2019.pdf (visited on 10 September 2020).

Seargeant, Philip (2019). *The Emoji Revolution: How Technology is Shaping the Future of Communication*. Cambridge: Cambridge University Press.

Tschernig, Kristin and Katharina von Hertzberg (2015). "Altersgruppenspezifisches Nutzungsverhalten von Bildzeichen bei WhatsApp." URL: http://www.mediensprache.net/de/websprache/messaging/whatsapp/icons/index.asp (visited on 10 September 2020).

A Case in Point: Communication With Unknown Intelligence/s

Tomi S. Melka · Robert M. Schoch

Abstract. This article discusses from a semiotic perspective one important variable—anthropocentrism—present in various proposed messages intended to communicate with off-world intelligences. Our review of different scenarios reveals embedded flaws to various degrees. This should not be a reason for desisting in the pursuit of SETI-style (Search for Extraterrestrial Intelligence) passive "listening" or active "messaging" programs; however, in tandem with such SETI-style programs, a robust and efficient strategy for potential contact should be developed as well. Such a strategy will require adequate time for major structural improvements in both the semiotic and technological realms rather than attempted last-minute adjustments carried out, for instance, when a SETI-style program claims success and contact seems imminent.

The realization that humans often have great difficulties in interpreting their own cultural products and experiences (especially, the long-forgotten ones), as well as the communicative abilities of non-human residents on Earth, is deemed a critical aspect that must be overcome in order to undertake successful hypothetical communication with extraterrestrial intelligences (ETIs). Furthermore, we believe it is pertinent to raise the issue of the modality that any particular ETIs might utilize or recognize as a communication system. Arguably, the widely held assumption (often unstated) that ETIs will recognize and respond positively to either visual or auditory communication (where auditory communication is often encoded in visual graphic forms, such as writing systems), in many cases coded in and transmitted via electromagnetic waves or some other medium, is simply a form of anthropocentrism at a fundamental level.

1. Introduction

Searching for knowledge and reaching new, unknown realms has stood for challenge, scientific adventure, and self-fulfillment in humankind's

Tomi S. Melka
Independent Researcher, Las Palmas de G.C., Spain
E-mail: tmelka@gmail.com

Robert M. Schoch
Institute for the Study of the Origins of Civilization (ISOC),
College of General Studies, Boston University, Boston, MA 02215, USA
E-mail: schoch@bu.edu

course. As long as the human condition persists, the inner drive of exploration *beyond one more barrier* will continue and possibly grow (cf. Steven J. Dick, in Gardner, 2007, p. 3). Unidentified human events (lost or non-retrieved), non-human data-driven observations, and other scientific phenomena, distant or very distant from our world, have been and still are the focus of attention for scores of researchers. In this context, the probable existence of ETIs and intended inter-communication represents a research area highly subject to philosophical, theological, and epistemological factors. On the other hand, the present controversy surrounding several aspects of this topic cannot eclipse its mid- or long-term significance. The acronym *ETIs* (extra terrestrial intelligences) conveys in what follows a general practical term,[1] and without entering into fine semantic distinctions, it swaps occasionally with *alien/s*. It needs to be clear, at this point, that the following text is not the after-result of the UFO-craze or "watching countless film and television dramas in which creatures from other worlds" (Shostak and Barnett, 2003, p. 1) with oversize brains (or not) engage in massive local / global invasions, fight in space, or show their bizarre manners, clothes, and gadgets. Furthermore, the present authors do not mean to exercise in exotic and cool topics, neither instill tediousness nor ridicule (see also D. G. Brin, 2006).

The idea for the essay emerged from research in symbolic and writing systems and semiotics in general (see Melka, 2008; 2010; 2013; 2017; Melka and Místecký, 2020; Melka and Schoch, 2020; Zörnig and Melka, 2014). A number of obstacles, present during the process of interpretation and deciphering of unknown verbal and/or non-verbal information, certainly raise parallels for the far more complex and difficult task: that of identifying and retrieving messages from non-terrestrial sources. Take just one example, that of the classical script of Rapa Nui (Easter Island)—*rongorongo*. Despite numerous efforts by past and present researchers, the greatest part of its sign-sequences remains impregnable (cf. Vakoch, 2014a, p. xxi), whether in semantic and/or phonetic terms. Upon which, any resilient and open mind might ask: if modern humans do not consistently capture and interpret cogently the information made by an earlier human culture, how can they proceed with truly alien cultures, products of very divergent developmental pathways, and bound (very likely) to unrelated bio-chemical and/or cultural parameters? In a similar vein, Arthur C. Clarke (in *Praise for Lost Languages*, Robinson,

---

1. For instance, in his Abstract, André Kukla (2001) elaborates the term according to three criteria, "[the] abbreviation 'ETI' [will]… stand for three related concepts: (1) the abstract idea of extraterrestrial intelligence, (2) individuals who are both extraterrestrial and intelligent (as in 'There's an ETI in the closet'), and (3) the hypothesis that there are ETIs". For nuanced definitions and conceptions of extraterrestrial intelligence, see Dunér (2017, pp. 435–437).

2002, dust jacket; Robinson, 2017, p. 209) in commenting about human-made scripts that will probably never be deciphered, pointed out, "if we cannot always understand messages from our fellow humans, how successful will we be when we receive the first communication from Outer Space?"

Given the size and the depth of the subject, our focus here is directed toward a technical aspect of communication with the "unknown": the ingrained human-based semiotics, its outcomes and constraints thereof. The viability of visual and aural codes primarily sent through electromagnetic conduits, and also through other conceivable channels (although to a lesser extent), is examined. In the context of grapholinguistics, we believe it is pertinent to raise the question of whether or not the ETIs we might encounter will necessarily utilize (or recognize) visual and/or auditory communication systems (most human visual graphic communication systems are based on, or encode, auditory communication systems). Whether sent by physical means (such as plaques on spacecraft), broadcast via electromagnetic waves, or conveyed by some other means, will such messages hit or miss the mark? Furthermore, auditory speech in a human sense consists of sequences of sounds over time, with writings and scripts typically "mimicking" such a temporal or linear-like sequence (not just in "straight lines," but also sometimes forming spirals and other shapes). Will the ETIs also communicate using such temporal and linear sequences of "words" or "signs"? Our human inclination toward visual and auditory communication systems arranged in temporal or linear sequences, for the most part, can be viewed as one more instance of anthropocentrism (gestural communication is a form of visual communication), one that occurs at a fundamental level for us, but may not be shared by the ETIs. Even on our planet, non-human species may communicate primarily in other manners and via other modalities, such as by releasing various chemicals that are then detected by the recipients (that is, communication by odors and smells, which are also utilized by humans, but primarily at a more instinctual level, including the use of perfumes as "aphrodisiacs"), by taste, by touch, by body position and orientation (including kinesthetic aspects), and so forth. Be this as it may, given the state of affairs and understanding regarding human communication at this stage in the scholarly literature and the themes of the conference, in this article we necessarily focus on visual and auditory communication systems, even if transmitted through other channels. Of the visual *versus* auditory, some will argue that the visual (such as written sequences and engraved signs) have a much greater chance of surviving over long periods of time as compared to auditory messages, and therefore the visual messages are more likely to be intercepted by the ETIs.

The serious dilemma of whether humans should strictly listen or also transmit at this stage—known as *passive* vs. *active* SETI (Search for

Extraterrestrial Intelligence)[2]—will only be considered briefly here (cf. also D. G. Brin, 2006; Grinspoon, 2007; Musso, 2012, p. 44; Gertz, 2016). Experts in cultural and planetary risk assessment would have a much stronger say in this respect (cf. Tarter, 2000, p. 727; Neal, 2014).

Whether or not the idea of potential life on other relatively well-known celestial bodies (e.g., the Europa and Callisto moons of Jupiter; the Enceladus moon of Saturn) or in farther sectors of space (e.g., twenty, thirty, or more light-years away) is supported in the future, the current analysis will make its point. Details, arguments, and speculations on the prospects of the emergence of non-terrestrial life—simple, complex, intelligent, or sentient—can be consulted in the literature (see Shklovskii and Sagan, 1966; Tipler, 1980; D. G. Brin, 1983; Mayr, 1985; Fogg, 1987; Drake and Sobel, 1992; Dickinson and Schaller, 1994; Heidmann, 1995; Clark, 2000; Aldiss, 2006; Kukla, 2001; Cohen and Stewart, 2002; Webb, 2002; Shostak and Barnett, 2003; Ward, 2005; Davies, 2010; Shuch, 2011; Vakoch, 2014a; Bains and Schulze-Makuch, 2016; Zackrisson et al., 2016; Dunér, 2017; Kipping, 2020; Westby and Conselice, 2020).

While not as expensive as waging long-term wars, attempting to engage with exploration of space and non-terrestrial interlocutors, humanoid or not, is still costly for the finances of the state and its taxpayers given the technological requirements (cf. Matloff, 2005; Benford, Benford, and Benford, 2010; Billingham and Benford, 2011). In addition, such projects are also responsive to the generous donations of wealthy and concerned people (Tarter, 2000, p. 725; Ghosh, 2020).

In the same manner, the predictable or unpredictable ramifications of contact for humanity have been carefully discussed in the literature (cf. Davies, 1995; Kukla, 2001; Cohen and Stewart, 2002; Michaud, 2007; Gardner, 2007; Harrison, 2011; Baum, Haqq-Misra, and Domagal-Goldman, 2011; Vakoch, 2014a, Vakoch, 2014b; Michael, 2014). The *giggle factor* in the popular belief about contacting ETIs, the reigning skepticism in political and/or in certain scientific circles, and the constant financial worries are comprehensible regarding such an ambitious agenda (Tarter, 2000; Michaud, 2007, p. 359; Ćirković, 2013; Ghosh, 2020). Yet, the eagerness to recognize this possible situation implies that scientific and social circles should be better prepared in case it occurs. The axiom "Fortune favors the prepared minds" is most useful today as it was in the past (Michaud, 2007, p. 358, attributes the saying to the French

---

2. By way of parenthesis, *active* SETI (Search for Extraterrestrial Intelligence) is relative to the search and retrieval of ET messages *versus* METI (Messaging to Extraterrestrial Intelligence), which is concerned with the design and active transmission of messages from our home-world (cf. METI.org, 2020). CETI is another acronym in use that refers to Communication with Extraterrestrial Intelligences (see Westby and Conselice, 2020).

scientist Louis Pasteur). Thus, apart from refining and upgrading the virtue of patience and any subservient technology, the anthropocentric variable(s) favoring (or not) the contact and post-contact situation(s) should be examined.

As answers are sought out, the different scenarios presented below will draw attention to the utter difficulty of the endeavor. Possibilities should not be dismissed, though over-optimism regarding a comprehensive strategy for contact with alien races should be tackled for now with caution and reservation (cf. D. G. Brin, 1983; Billingham and Benford, 2011; Denning, 2014; Wolfram, 2018).

The language of the essay is simple and scientific at the same time. Soaking the readership with technical terminology is avoided, unless the immediate context requires it.

2.   Background

During the last two centuries, human scholars have devised strategies regarding how to potentially communicate with the "others" and leave behind the loneliness. The gamut ranges from kerosene-based visual signaling to naturally-developed human languages, mathematical conventions, radio signals, laser beacons, visual-symbolic codes, self-replicating robotic envoys, or to the dispatch of space probes carrying a range of messages and artifacts. The task of mentioning and explaining all of them is demanding and it certainly requires a book-format or a multi-tome edition.

We begin the references with the peculiar proposal of the Austrian astronomer Joseph Johann von Littrow (1781–1840) who considered for some time a method to carry a message to non-terrestrial beings living in the vicinity of our planet. Once some colossal furrows in geometric patterns had been dug out on the Sahara Desert, they had to be filled up with water, plus kerosene atop. The final act was to set in flames the kerosene in an attempt to convey a message to any off-world neighbor or at least to let them know of our existence (cf. Jarrell, 2007).

A number of later attempts and projects are cited in Michaud (2007, pp. 372–373) and Garber (2014, pp. 24–30), among others. The British scientist Francis Galton (1892; see especially Tredoux, 2018, Appendix D) suggested more than a century ago a language composed of "light flashes" in the guise of dots, dashes, and lines, similar to the Morse code, to attract attention from the "Martians". Around the same time (1899), an alternative communication plan—devised by the French amateur astronomer A. Mercier—included several reflectors to be placed on the Eiffel Tower so they could focus the received sunlight (interrupted with a movable screen) towards the targeted planet, Mars (Reddy, 2012, pp. 166–167; Vakoch and Dowd, 2015, p. 215). In 1920, H. W. Nieman

and C. W. Nieman proposed a mathematical approach to building up a common language. Later, in 1952, Lancelot T. Hogben presented the "Astraglossa [= Star Language], or First Steps in Celestial Syntax," based on *number concept* and *knowledge of celestial events*, to be viewed as universal standards. Cocconi and Morrison (1959) suggested in a seminal article the use of radio waves of 21.1 cm for interstellar communication. Hans Freudenthal (1960) proposed "LINCOS," a portmanteau for *Lingua Cosmica*, a complex and dense mathematical-logical code intended to be transmitted via radio signals at different wavelengths.[3] In the same year, Frank D. Drake (1961), then at Cornell University, engaged in *Project Ozma* to possibly detect signals from outer space civilizations nearby the stars *ε Eridani* and *Tau Ceti*. In 1961, another mathematician, Solomon W. Golomb, in a challenging action to prior "cosmic languages" based on terrestrial-like logic, suggested *prime number sequences* or *arithmetic progressions*.

The Polish writer Stanisław Lem (1999, p. 73) names among other projects, LOGLAN (a portmanteau of "logical" and "language") as a possible vehicle for communication due to its inherent features. Vito and Oehrle (1990) rekindled the idea of languages based on science, especially on chemistry. Lemarchand and Lomberg (1996) discuss symmetry properties and aesthetic principles that could offer some communicative advantages when conducting the search in space along a SETI-like program. More recently, Canadian scientists Dutil and Dumas (1999), drawing on Freudenthal's work (1960), developed a language based on a set of symbols, starting from simple concepts and moving on to increasingly complex topics, e.g., the building blocks of life on Earth, the range of human sensitivity to light and sound, the image of the biosphere, including the chemical compositions of the continents, oceans, and atmosphere, etc. The basics of the message were conceived as some kind of cosmic *Rosetta Stone*, to be sent via the Ukrainian radar transmitter at Evpatoria (see Grinspoon, 2007, on *Cosmic Call I* [= CC-1]). G. Matloff (2005), in the spirit of John von Neumann's self-replicating machines (cf. Burks, 1966), investigates the feasibility of deep-space intelligent probes as explorers and messengers to stars. Benford, Benford, and Benford (2010), while analyzing the cost effectiveness, considered the construction of high-power transmitters / beacons by senders and/or receivers as a viable means of communication—intentional or not—and also cosmic areas to focus on and avoid for the transmissions.[4] In turn, SETI scientist Douglas A. Vakoch (2011a) draws on semiotics and suggests iconic and pictorial narratives as a potential means to reach fruition in this sense. Atri, DeMarines, and Haqq-Misra (2011) suggest a

---

3. Cf. reviews by Hogben (1961) and Blum (1962).

4. See also Lemarchand and Lomberg (1996) regarding a "mutually guessable unique point" along the Milky Way for the communicating parties.

protocol for the construction of an interstellar message in order to maximize the probability that it is understood. The primary factors to be examined are *Signal encoding*; *Message length*; *Information content*; *Anthropocentrism*; *Transmission method*; and *Transmission periodicity*. Echoing Vito and Oehrle (1990), the team Atri, DeMarines, and Haqq-Misra (2011) propose reliance on "a simple physical or mathematical language to communicate both the encoding scheme and the content". In the endeavor of CETI-like projects, Westby and Conselice (2020, p. 17), draw on a very compelling variable, "It is clear that the lifetime of a[n extraterrestrial; *our note*] communicating civilization [= L] is the key aspect within this problem, and very long lifetimes are needed for those within the Galaxy to contain even a few possible active contemporary civilizations"; cf. also M. Shermer's (2002) arguments in this context.

All these efforts show (that) there is an incremental understanding of the cosmos and the existential parameters of life. Yet, the criteria used in devising and classifying the contact channels are generally based so far on (a) the *current* understanding of our—selfish—needs, (b) the *current* understanding of the physics of space, and (c) the *current* understanding of communication (cf. Michaud, 2007, p. 372;[5] Vakoch, 2011b, p. 377; Atri, DeMarines, and Haqq-Misra, 2011; Denning, 2014; Wolfram, 2018; Melka and Místecký, 2020, p. 210; Westby and Conselice, 2020). It seems that there is no definite solution to this, because no perfect and suitable contact *language* for the myriad of circumstances bounding another assumed civilization has been pinpointed or (yet) agreed upon. Although not directly related to the subject matter, Umberto Eco (1997) is worthwhile consulting due to important hints about multiple settings. In this direction, embedding deliberately (or not) features that rely on the human world-vision into these codes is considered to be the primary difficulty.

3.   Hello ETI!

The pictorial message (Fig. 1) is actually an icon, not only in scientific circles, but also in the broader popular culture. The idea rests on the assumption that a sufficiently intelligent alien agent, or a civilization for that matter, after leaving behind secrecy (cf. Ball, 1973; Fogg, 1987), would be able to net, deduce, and respond to the arranged graphics displayed on the plaque. At present, it must be assumed that the topology of space-time where recipients are found is similar to Earth's, and most importantly, all the variables in producing intelligent life-forms must be

---

5. Talking about similar interstellar ventures, Michaud (2007) calls attention to the anthropocentric factor as it may clearly illustrate the dangers of self-interest and "[…] our own cultural assumptions".
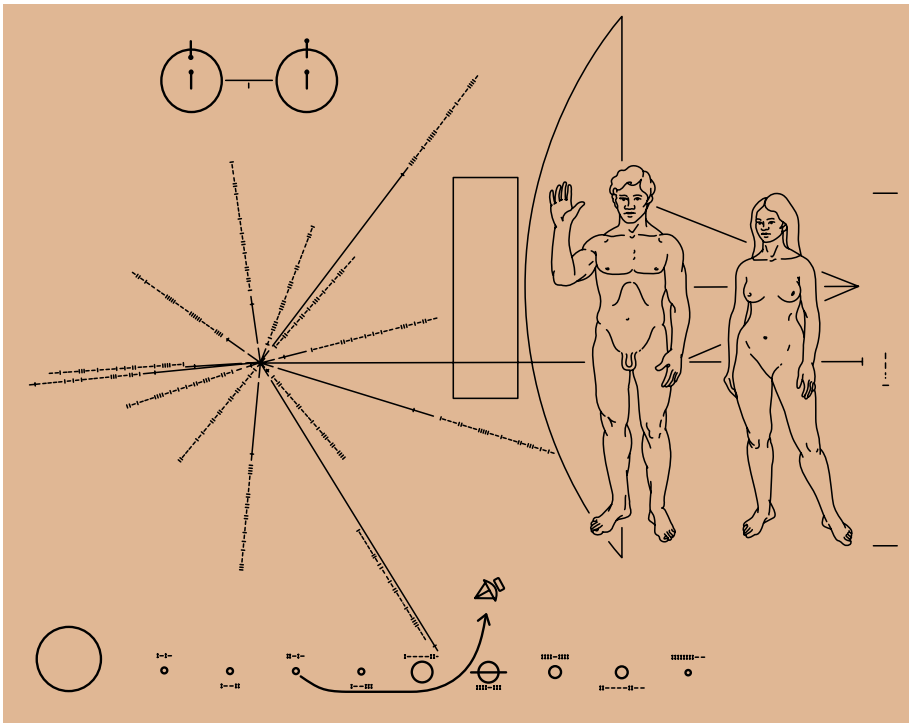
FIGURE 1. The apparently "two-dimensional" message impressed and encoded into the plaque of the *Pioneer 10* space probe of 1972 (cf. Sagan, Sagan, and Drake, 1972, p. 883; Gombrich, 1982, pp. 150–151; Davies, 1995, pp. 55–56; Chandler, 2007, p. 176; BBC, 2010; Rosenthal, 2016; Wolfram, 2018), standing for three-dimensional life-forms, artifacts, atomic, planetary and stellar bodies, was first intended to be intercepted by any *scientifically educated* being in Outer Space. An important and inevitable caveat is that the human-depicted images, objects, and gestures are not only mediated by conventions, but meaning is largely *activated* by cultural convention, as noted in Alex Potts (1996, p. 20). For instance, would the male and female human beings stand better represented in their nudity (critics may perceive some evidence for soft-core pornography), or being properly clothed or half-clothed (critics would disagree on the specific kind of apparel [→ lingerie / bathing suit], as it might be ethnically biased or chosen via personal criteria)? Reprinted after Wikipedia (Vectors by Oona Räisänen (Mysid); designed by Carl Sagan and Frank D. Drake; artwork by Linda Salzman Sagan— Vectorized in CorelDRAW from NASA image GPN-2000-001623.)

assumed, which will develop language(s), communication means, and a keen interest for this purpose (cf. D. G. Brin, 1983; deGrasse Tyson, 2006; Smith, 2009; Głaz, 2014, p. 369).

Nonetheless, a small detour warns specialists that meaning in a linguistic structure is not easy to retrieve even for taggers built by gifted

humans. A sense of disambiguation is required in the syntax of certain phonetic-based utterances, e.g., "You might use all your might" or "May may leave now on leave" (Sproat, 2008, p. 34). Likewise, visually speaking, several human-generated image-constructs, e.g., optical illusions or Rorschach inkblot tests[6] require proper skill, contextualization, relaxation, sobriety, and a fine pair of discerning eyes.

In principle, if meaningful dialogue is sought, the data displayed in Fig. 1 need a priori to be exactly reconstituted by the potential thinking aliens. For all practical purposes, such a reality is far from simple. A number of comments as to the "premature" or the incomplete end of the goal—the transmission of the message pictorially impressed on the plaque of *Pioneer 10* spacecraft and of other memos—are organized below, while referring to Gombrich (1982, pp. 150–151), Chandler (2007, pp. 176–178), Denning (2014), Saint-Gelais (2014), and to the work of social scientists, hard science fiction writers and literary critics,[7] and film producers. As stated earlier, we should *assume* that the astronomical and biological variables—against all odds—favor the creation of reasonably advanced civilizations[8] prepared to receive records from Earth and communicate in an educated manner according to *a mutually acceptable channel* (Golomb, 1961, p. 202). Consider however that without *implicit design coordination* between the transmitter and receiver, the reality of an end-to-end digital interstellar communication system at radio frequencies sounds about *impossible* as noted by Messerschmitt and Morrison (2012). Given that candidates for such an enterprise might theoretically emerge, a number of remarks (bearing some healthy skepticism) are presented.

To start with, Golomb (1963)—in a succinct manner—and later, Jonas and Jonas (1976)—in a more elaborate manner—drew in on mixed arguments which could be condensed to the question: "does the ETI share the same sensory apparatus as we do in order to transcribe and process important (and less important) data?" Some intricate connotations on the *deep and shallow linguistic structure* of the denomination per Noam Chomsky are omitted. ETI tentatively correlates to any life-form with a mixture of a goal-directed movement (inner and/or outer); the capacity of ratiocination (the ability to process external stimuli / data,

---

6. Human-made *optical illusions* or *Rorschach inkblots* are simply designed to induce an intuitive or eloquent response from their viewers; clearly, they are not intelligent or conscious agents *per se*.

7. For instance, here are worth mentioning Sheila Finch (1986, p. 2), who is among the first science fiction authors, if not the first, to have introduced the term *xenolinguist*, a human expert in extraterrestrial forms of communication, and Adam Głaz's article (2014) on the inherence of linguistics of the "first contact" in fictional works.

8. The terms imply herein a particular form of ET intelligent life, the one capable of technology and willing to communicate; or in the words of Cabrol (2016, p. 663), "As it stands, SETI does not search for all life or for all intelligent life. It focuses exclusively on technologically advanced life".

and postulate inferences from them, mostly critical to survival and thriving) and largely bound (or not) to a special technology for elaboration and enhancement of those data. On the other hand, for those who have the benefit of doubt, it may be similarly asked: "does ratiocination inevitably or even necessarily eventuate as a communication system?" Granted that complex social structures seek cooperation and expansion in material and/or intellectual terms, we may have to accept the possibility that not all non-terrestrial cultures would be xenophobic and isolationist. A major and obvious caveat is that plausible communication is dependent on the prior knowledge of the involved parties. Establishing links with someone or something we have never run across before presents tough challenges. To yield and to paraphrase a science fiction writer, "Man's yardstick is limited to the things he knows about, limited by the circle of his own experiences" (Simak, 1951). Essentially correct—although humans seem to have a natural drive to expand their "circle" in search of deeper and further knowledge, which would comprise the "unconventional" area of interaction with aliens, so to speak. Hence, any experienced researcher is inclined to think that no one can safely teach the craft of an instant and effective communication with the *other*(*s*), especially on a cosmic scale. It can be learned only by constantly doing it and by accepting the repeated failures as part of the process: the concern at this juncture is that *failures* could last dozens of years, if not more. In analogy, our ability to "communicate" at some level with domestic animals—dogs, sheep, goats, cattle, horses, cats, and so on—has required centuries and millennia of mutual interactions and the (genetic) modification of the animals involved. Even communicating with our closest "relatives," the great apes, is no easy nor trivial matter; likewise, understanding great ape gestural communication strategies has required intensive study on the part of humans (Byrne et al., 2017; Fröhlich and Hobaiter, 2018; Tomasello and Call, 2018).

The representational conventions on the above plaque: the physical outfitting of male and female human, the fourteen (14) pulsars of the Milky Way with respect to Sun / Earth, the route-map of our Solar System, the molecular structure of H_2 with its two hydrogen atoms engaged in *hyper-fine transition* (= its two lowest energy states, and related to radio emissions at the wavelength of 21 cm), for all its merit of diagrammatic inception, artistry, and use of binary mathematical language, may reflect anthropocentric bias (cf. Baum, Haqq-Misra, and Domagal-Goldman, 2011; Wolfram, 2018).[9] Terms, such as "anthropocentrism"

9. An independent reviewer noted that "the plaque reflects the style of 1970s America". The original designers of the plaque, Sagan, Sagan, and Drake (1972, p. 881), while acknowledging that "The message inadvertently contains anthropocentric content," expressed also their hope, "Nevertheless we feel that an advanced technical civilization would be able to decipher it."

and "anthropocentric," are essentially employed in this article in the context of the *human-centered cognitive and moral abilities / attitudes*, with *all other beings and whole systems mattering* [only] *for their instrumental value to humans*[10] (for detailed analyses and various positions, refer to Hayward, 1997; Goralnik and Nelson, 2012; Kopnina, Washington, Taylor, and Piccolo, 2018).

Supposing the message[11] makes it through space against all detractors' reasoning and falls in the "hands" of the recipients, the next issue will be *meaning* retrieval. The ETIs will get better estimates of it as long as their biochemistry is / was (quite) similar to the human one and their knowledge of astronomy, physics, chemistry and mathematics are / were substantially close to that of the senders.[12] With enough practice, the decoding *may* or *can* become transparent but the "aliens," to be sure, would need far more samples than the single tablet of *Pioneer 10*. However, there cannot really be much done to correct this now, aside from expanding the sampling in future missions. This option is possible, but experts need to mull over the fact that—*for now*—these are one-way shipments. Even if good luck is on humans' side, given the chances of ET intelligence (see Aldiss, 2006, pp. 33–34, or Webb, 2002) and the literal immensity of space, answers cannot be expected any time soon, and certainly not a successful engagement in a ping pong correspondence (cf. Smith, 2009; Benford, Benford, and Benford, 2010; Shuch, 2011; Vakoch, 2014a; Harbour, 2019; Westby and Conselice, 2020).

An argument as to the validity of the interstellar message construction is to slip back in time and explore real-world human-made symbols, inscriptions, and purported codes. Many scholars have pondered past mysteries and dabbled over the years in archaeological decipherment as well as in cryptanalysis with varied degrees of success (cf. Doblhofer, 1993; Higenbottam, 1973; Pope, 1999; Garrett, 2001; Robinson, 2002; Bauer, 2002). The suggested commonality between the domains of decipherment of ancient scripts / secret codes and that of CETI is not to be viewed as a single, unified approach rather than as *heuristic*, from which some lessons could be learned.

Remember, e.g., some fanciful decipherments of the Cretan *Phaistos Disc* (cf. Fischer, 1997a; Faucounau, 1999; see also Sproat's critique (2007), and Fig. 2), the *only* known "long" document so far with that sort

---

10. The last statement *in italics* paraphrases the caption of the tag "Anthropocentrism" in Goralnik and Nelson (2012, p. 150, Figure 1).

11. Described as "… the most enterprising and optimistic diagram ever created" in BBC's (2010) documentary.

12. See the (relatively) optimistic view of Fogg (1987, p. 378), "Doubtless, communication between alien races may pose translation problems, but these are unlikely to be insoluble. Although evolved in isolated and unique environments, the same constraints will operate for any intelligence when solving problems".

of "printed" (pressed into the clay) signs, apparently encoding speech patterns. A brief comment here: the original human / alien intention to pass on *information* may ironically result en route in *disinformation*.[13]

Finney and Bentley (2014) raise analogous concerns as they quote the case of the decipherment of Maya glyphs and extrapolate within the broad context of interstellar messages,

> If we have been unable to translate ancient human scripts without some knowledge of the spoken language they represent, what prospects [do] we have of being able to comprehend radio transmissions emanating from other worlds for which we have neither 'Rosetta Stones' nor any knowledge of the languages they encode? (ibid., p. 75)

Regardless of whether or not the unmanned Pioneer 10 spacecraft (together with its message) will ever be recovered by intelligent recipients, the whole concept has to do with its "… largely … symbolic significance" (Davies, 1995, p. 56) in the endeavor of interstellar communication (see also Shostak and Barnett, 2003, pp. 87–137; Frank Drake in BBC's 2010 documentary; Harrison, 2014, pp. 175–176, and Rosenthal, 2016). In a parallel fashion, the apparent disappointment or other concerns related to ETI detection and engagement may still assist humankind "… by enhancing our understanding of how we represent ourselves and how we measure the limits of our self-knowledge" (Denning, 2014, p. 98).

Other graphic examples are found in Fig. 3. As per human standards, the following venture was certainly incepted to let know, and not to entertain nor baffle the ET end-users. The saying "A picture [= image] is worth a thousand words" is truly enlightening, and we admit it is adequate for healthy and knowledgeable humans; but not for the eyes of a giant anteater, a mule, or for a roster of creatures as nearly alien as them.

We would do well to point out that the potential interceptors may have a rough time in interpreting the pictures and numbers of Fig. 3, despite the fact that, as to corpus' criteria, the multiple and enticing nature of the package of 1977 does better than the former *Pioneer 10* plaque (cf. Heidmann, 1993; Harrison, 2014, p. 176). Specifically, Richard Saint-Gelais (2014, p. 93) highlights the importance of the "… number and the variety of messages" sent, which "… will give the recipients more opportunities to compare and test their abductions …"

---

13. Before we get too "excited" about the communication with ETIs, consider that cultural gaffes / misunderstandings are a possibility (at all times); suffice to remember various scenarios in human-to-human interaction(s). The observation is important and, e.g., it comes consequentially to the point when one reads Eric Frank Russell's (1905–1978) story *Allamagoosa* (1955) about data fudging and human failed communication in Outer Space. *Allamagoosa* (a British lexical coinage) stands in the informal US speech for *whatchamacallit* or *thingamajig*.

FIGURE 2. Side B of the so-called *Phaistos Disc* (Wikipedia), a document that is extremely short in texts "written" in similar signs. Given its present status, serious scholarship heavily doubts that it will ever be deciphered (cf. Sproat, 2007). Hypothetically speaking, if ETIs delivered us a moderately short ping, encoded in *Phaistos Disc*'s symbols in order to communicate, it would potentially bring us to a standstill, although it might at least demonstrate that the ETIs are "out there".

However, skeptics might claim that matters are quite complex in terms of elucidation. For instance, although ETIs may stumble across the "Golden Record" and have proper record-playing machines at home, they would have to discern for themselves the meaning of the accompanying indicators, such as "cm" and "*y*," plus the binary sex symbols: "♂" = human male and "♀" = human female. Similarly, whilst deeming the satirical mood of the UK-based anonymous street artist who goes by the name of Banksy (Fig. 4), a few scholars may speculate whether ETIs would have had it easier (or harder) in explaining the image of Fig. 4 when compared with that of Fig. 3b. What becomes clear is that notwithstanding Earth's aspiration for communication, not only isolated human-conceived graphics may result in futile attempts but also arrays of other messages, if contextualization and the attending logical chain are wrong. The supermarket shopping carts on behalf

(a)   (b)
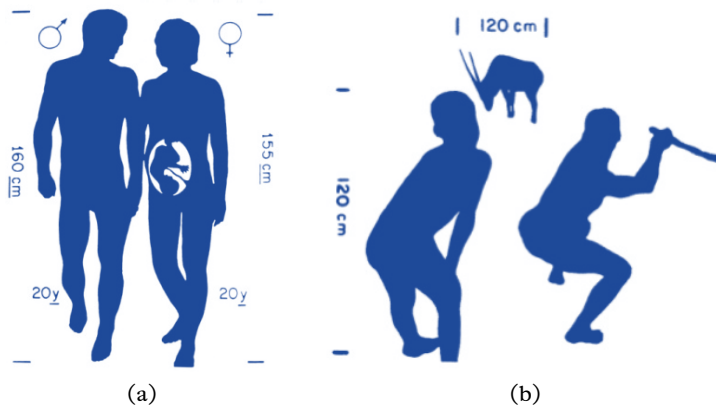
FIGURE 3. These silhouetted images are part of the package (= "Golden Record," a phonograph record in a 12-inch gold-plated copper disk) of the *Voyager* space probes 1 and 2 of 1977, including diagrams, pictures and sounds from Earth (Evamy, 2003, pp. 60–61; cf. Shostak and Barnett, 2003, p. 89; Wolfram, 2018; https://voyager.jpl.nasa.gov/golden-record).

of wild animals may add at first a harmless little laugh but they still convey the intended irony of the artist to his informed peers. Since "aliens," we assume, will be ignorant of human pre-history, history, modus operandi, local handicrafts, and sense of whimsy, the disjointed and non-interactive data—whether encoding real-life subjects and activities or out-of-place / out-of-time absurd situations—can cripple in advance any interstellar experiment. Vakoch (2000) similarly emphasized that there is no ease at all in interpreting outgoing pictorial messages for extraterrestrial intelligences.

There is a gap of over three decades between *Pioneer 10* space capsule of 1972 / *Voyager* space probes of 1977 and "A Message from Earth," emitted in 2008 from the radar telescope at Evpatoria, Ukraine (Atri, DeMarines, and Haqq-Misra, 2011; Harrison, 2014, p. 181, cf. Zaitsev, 2008a; for prior dispatched transmissions from Evpatoria Planetary Radar [= EPR]; cf. Grinspoon, 2007, and Harrison, 2014, pp. 178–180). Leaving aside the useful debate of whether EPR-messages are technically detectable (or not) by ETIs (Billingham and Benford, 2011), and the redundancy factor (earlier mentioned as *corpus criteria*), the present concern is the quality and cultural neutrality of its contents. Despite the insights collected during the last three decades, the 501 personal letters, photographs, and drawings selected to be transmitted in a digital time capsule, again confirm anthropocentric bias. Thus, instead of being stripped of undue human effusion by enhancing the mixed scientific-symbolic languages, it is held that one actress submitted pictures of opposing political candidates, one to epitomize *good* and the other *evil*

FIGURE 4. *Trolley Hunters*, screen-print by street artist Banksy (2007; see Artificial Gallery, 2006-2010). MAB's (2020) evaluation is, "A biting satire on the inability of modern man to provide for himself … It depicts three cavemen bearing primitive [= prehistoric; *our note*] weapons and crouched in the act of hunting a herd of supermarket trolleys". And we might add that the trolleys are empty of food.

(Harrison, 2014, p. 181). It may be questioned *how feasible* it would be for complex organisms endowed with intelligence (best-case scenario) or microbial life-forms (worst-case scenario) to comprehend the concepts of "good" and "evil" if a high resolution picture or a video-clip of a king cobra (*Ophiophagus hannah*) and an Indian grey mongoose (*Herpestes edwardsi*) during a fortuitous duel had been included. As a matter of fact, while a mongoose might see a chance for food within the scenario, a cobra exercises the right to self-preservation (see National Geographic, 2010). "Good" vs. "evil" are formal constructions embedded in the moral values of *humanity* (cf., e.g., Goralnik and Nelson, 2012, p. 145), a species very alien both to wild mongooses and king cobras. Some scholars may justifiably wonder what the real aliens (ETIs, for instance) might make of the antagonizing pairs, be those politicians or animal life-forms. On top of that, 21st century Earth scientists are still far away from the achievements of the *Foundation*'s scholar Harri Seldon and followers who used mathematical models for predicting the future behavior of very large groups and the future of history itself, as narrated in the saga of Asimov (1988). If history could be laid in mathematical terms, so could other notions related to morality and raw sentiments.

A complementary source at this point, both in terms of negative or positive outcomes, is Hofstadter in the subsection "Levels of Understanding of a Message",

Here is where things become very unclear. Will beings of an alien civilization have emotions? will their emotions—supposing they have some—be mappable, in any sense, onto ours? If they do have emotions somewhat like ours, do the emotions cluster together in somewhat the same way as ours do? Will they understand such amalgams as tragic beauty or courageous suffering? If it turns out that beings throughout the universe do share cognitive structures with us to the extent that even emotions overlap, then in some sense, the record [= the message sent; *our note*] can never be out of its natural context; that context is part of the scheme of things, in nature. And if such is the case, then it is likely that a meandering record, if not destroyed en route, would eventually get picked up by a being or group of beings, and get deciphered in a way which we would consider successful. (Hofstadter, 1999, p. 163)

In defense to critical voices, it may be alleged: since other supposedly intelligent beings on Earth, such as dolphins, whales, octopuses, crows, chimpanzees, or orangutans[14] are not keen on building radio-telescopes and space probes, then, the task is left to the *Homo sapiens* breed with all his current baggage of knowledge, preferences, and whims.[15] Furthermore, if most technological civilizations adopt the stance that *listening* is way better than *transmitting* for a bevy of motives, then it is hard indeed to consider a practical interstellar communicating.

However complicated or nearly-impossible the task may be, the message compilers are required in the end to reduce "anthropocentrism" and strike a balance with self-interpreting symbolically- and mathematically-inclined signs, where systematic interplay of repetition and variation between them will give recipients opportunities to make a series of correct conjectures (see Saint-Gelais, 2014, pp. 91–92). At this point, the *Sónar Calling Project* rises to the occasion: during three days in mid-October 2017, several messages were sent from Tromsø (Norway) to the exoplanet GJ273b, located about 12.4 ly away and orbiting Luyten's star (Vakoch, Matessa, DeVito, and Kaiser, 2018). A tutorial—sent in binary code at two frequencies, 929.0 MHz and 930.2 MHz—made use of a minimal number of key mathematical concepts to introduce fundamental physical concepts like time, frequency, and wavelength.[16] Emulating and improving on previous experiments (e.g., *Golden Record*; *Across the Universe* message;[17] *A Message from Earth*), the tutorial comprised also in-

---

14. Cf. Chick (2014, pp. 211–212), or Herzing (2014).

15. Cf. also Chick (2014, p. 225, footnote 61), Bains and Schulze-Makuch (2016, pp. 17–18) and Cabrol (2016, p. 662); see, however, Raup's (1992, pp. 258–259) exposé on non-conscious alien organisms "who" may have the capability to emit and receive radio (or radar-like) dispatches.

16. In the words of Vakoch, Matessa, DeVito, and Kaiser (2018), "For example, after introducing numbers, basic arithmetic functions, and Pythagorean triples, we describe sine waves through the ratios of sides of a right triangle".

17. The message consisted of the song "Across the Universe" by the Beatles transmitted from Robledo de Chavela, near Madrid (Spain) on February 4, 2008 by NASA

novative features such as a "cosmic clock" to assist extraterrestrials in confirming that their understanding of time from the incoming scientific message maps onto the passage of time they can observe throughout the transmission itself (ibid.). During nearly eight months (October 2017–May 2018), METI International, in collaboration with the Catalonia Institute of Space Studies and Sónar Festival (Barcelona), engaged thirty-five Sónar festival associated musicians (plus three pieces chosen from public submissions) to beam short musical pieces to the exoplanet GJ273b from Tromsø (Norway). The design of the messages had an in-built propaedeutic[18] protocol (= tutorials or progressing explanations of their creative processes). In a parallel fashion, in order to understand Earth's ecosystems, one participant compressed digital audio files and juxtaposed a key to their decoding and reversal of data compression (see `https://www.sonarcalling.com`). The idea of self-teaching tutorials is by all means a strong plus-point; the position of the planet itself is another advantage as it may "heal" somehow the rift of the astronomical distances (i.e., the smallest interaction sender ↔ recipient may take here only 25 ly).[19] On the other hand, the major unknowns in this equation would be: (1) *the presence of intelligent beings living in a favorable bio-habitat*, and (2) *equivalence*, both in terms of their anatomical / neurological systems, and of their receiving antennae and sonic technology (= D/A converters, amplifiers, speakers, etc.). IF (a big one) there is intelligent life on GJ273b whose bio- or synthetic sensors are capable of sweeping correctly the message/s, and IF the extant alien technologies meet "symmetrically" the demands of the "Sónar Calling Project," then, there is a chance the Sónar human messengers did not take a leap in the dark. Yet, if these two isomorphic conditions are not given in the case of planet GJ273b, we have to commend their ingenuity, optimism, and earnest passion in devising the "Sonar Calling Project"—*something of a consolation prize*,[20] nonetheless.

---

in the direction of the star Polaris (the *alpha* star in the constellation of *Ursa Minor*), located about 430 ly away from Earth (cf. Zaitsev, 2008b, pp. 1111–1112).

18. From the Greek language, *teaching beforehand*.

19. While mulling over "alien communication" and a shareable "language," Wolfram (2018) suggests, "And in a sense just as we might say that we're only going to consider aliens who live within a certain number of light years of us, so also we may have to say that we'll only consider aliens where the language defining their cultural context is within a certain 'translation distance' of ours"; see, however, Westby and Conselice (2020, p. 16) who estimate that "communicating civilizations in the Galaxy today… would be at a maximum distance given by $17,000^{+10,000}_{-33,600}$ *lt-yr* [= *light years*], making communication or even detection of these systems nearly impossible with present technology".

20. The terms are from Denning (2014, p. 101).

4. Discussion

Since researchers and other concerned groups are sending (or planning to send) improved wording coded after natural and artificial languages, signals, and plain pictures or holograms that (may) contain exposed or half-exposed humans—probably in order to transmit their life-like physiological characteristics—, in the next delivery, it may be tentatively suggested that a picture of a real-life human pair ($\rightarrow$ sexually dimorphic) standing on an undisclosed beach be included.

Fair enough... yet, more than one person is tempted to inquire: "what are the chances of "decipherment" by the aliens of the message that encodes the human couple?" For a start, do they stand for a broad category such as "man" and "woman," or do they specifically represent the particular tandem that enjoys meditation and sun-tanning (cf. Chandler, 2007, p. 45), i.e., are they an *icon* or a *symbol* (cf. Vakoch, 1998)? Are they going to be considered copy-cats of their senders: everyone on Earth has by default the same physical characteristics? Would aliens also deem the possibility that the senders invariably *hop around* in a pair-wise or in a symbiotic fashion? Most assuredly, the ETIs are not familiar with the nature of the described phenomenon (that lying on a beach and getting sun-tanned more often than not causes relaxation among humans, especially among those coming from frost-bitten lands); neither are they aware of René Magritte's painting *La Trahison des images* [The Treachery of Images], the affixed text *Ceci n'est pas une pipe* and its connotations (Chandler, 2007, pp. 69−70).

They are likely unaware as well of the habit of wearing bathing suits or of the naturists' cheerful practices of a segment of the human population. To the mind/s of those who decided to include the couple's picture, those are eventually two attractive, thoughtful, and half-dressed young people enjoying a sunbath on unnamed seashores. Yet, to the mind/s of the contacted aliens (presuming somehow that they are *not* post-biological entities), the graphic information will be entirely vague and incoherent. If we exclude somehow details on the human way of life, social organization, genome, morale, technology, communicative systems, etc., apart from astronomical, geological, biological data of our planet,[21] the ETIs would *not* be left any wiser regarding the symbolic

---

21. See especially Heidmann (1993), who advocated for sending the entire *British Encyclopedia*, a huge buffet of scientific and cultural offerings from Earth. One perceived problem is that humanity speaks a multitude of languages, with the "English Only" probably conveying a skewed picture of the reality of human societies; cf. also Harbour's (2019) opinion, "Encyclopedias vary so widely between countries that no current one could command universal consent—though maybe we could lessen this problem sufficiently by sending abridged encyclopedias in, say, Arabic, Chinese, English, and Hindi, possibly with smaller documents in less widely spoken languages from elsewhere, such as Cherokee and Fijian".

FIGURE 5. The painting *La Trahison des images* [The Treachery of Images] by René Magritte (1898–1967), on display at the Los Angeles County Museum of Art, is reprinted after `https://publicdelivery.org/magritte-not-a-pipe/`. The main goal of human languages is to code and decode meaning and establish communication. In a smart and arbitrary interplay, however, the words (= the written French caption, "This is not a pipe.") betray the represented object, complicating the meaning implied by the author (see in a similar context, Foucault, 1983, pp. 20–22; Vakoch, 1998; Saint-Gelais, 2014, pp. 85–86).

couple and any subtlety around them. Then again, if copious and adequate data are provided and by a clever twist of fate they are decoded, the results may be utilized for malicious ambitions or a possible raid in the not-too-distant future.[22] Some of the informed aliens won't be out there to spread enlightenment or "to save us from our own follies" (Aldiss, 2006, p. 35). In fact, it may be seriously doubted that aliens— once their target is acquired and settled—will show any sense of wonder and awe as to the tandem, as some people on Earth would… *ergo*, in the ETIs' scheme, as if in a renewed pirate episode, Earth might after all be

---

22. See, e.g., Raybeck (2014, p. 143) who refers to possible "untoward motives" of the ETIs, or Gertz (2016, p. 1), who considers METI-like programs as "unwise… and potentially catastrophic…" since they may lure would-be predatory and dangerous aliens.

a cache to be graciously or rudely exploited, e.g., for servitude, for ultra-rare minerals, for gene harvesting, or in sexual terms. With this hoopla started, they must be taught not only to handle the spotlight well but also how to practice safe sex. Alien viruses or bacteria—incompatible with normal human DNA—probably won't harm Earths' inhabitants but some compatible or freshly engineered alien pathogens may be more annoying and lethal than those already existing on our planet. The point becomes relevant when the "*historic transfer of* [contagious] *diseases to the Americas*" during the *first contact* and *post-first contact* situations with natives by Spanish, Portuguese, Dutch, and English explorers/settlers is considered (see H. F. Dobyns, 1993). Similarly, there could be far worse scenarios where malevolent ETIs could insidiously promote total anarchy and tear apart every inch of the fabric of human society. Notwithstanding current paranoia and sensitivity in equal dosages, the probability of such a perspective should not be neglected by professionals (cf. Tarter, 2000, p. 727; D. G. Brin, 2006; Baum, Haqq-Misra, and Domagal-Goldman, 2011; Musso, 2012; Gertz, 2016).

Bottom-line: this is not a funny story nor banal commentaries, but rather a reflection on the impact and repercussions that Earth-bound visual and other-than-visual messages may cause in an *interstellar contact*, and later in the pursued *exchange protocol*. Earth languages and symbolics have demonstrated on many occasions to be a source of misunderstanding among human individuals. Correspondingly, the *first contact* between human cultures themselves was introduced and followed in the past by military confrontations, skirmishes, and other more-than-disagreeable effects. Many indigenous ethnicities in what are known today as the Americas, Africa, and Oceania, suffered not simply a *cultural shock* but rather an *existential* one when they interacted with the then-Europeans' abusive ways—apparent remorse, positive and gentlemanly dealings, and evaluations took place later or much later (Golomb, 1963, p. 17; Dick, 1996; Harrison, 2011, pp. 72−73; cf. also Michael, 2014 [2011], for pros and cons regarding the post-first contact perspective).

Despite the improvement of technology and a multi-disciplinary approach, thorough changes are hardly expected in the interstellar messaging in the next years. What makes part of scholarship think those ETIs, however *scientifically respectable* they might be (Cohen and Stewart, 2002, p. 4), should be omniscient and get straight the meaning of any Earth-related posting? As it turns out, wishful thinking is not enough along this task of astronomic proportions. Cool scientific reality demands evidence. What SETI-like programs have so far are at best, *sheer statistics on biogenesis*; a *semiotic theory* formulated by humans (which fails to win unanimous support among the humans themselves); a *range of ground- and space-based suitable optical* and *radio-telescopes*; the discovery of thousands of *exoplanets* (circling low-mass M dwarfs and solar-type stars such as our Sun) with different probabilities of sustaining life as we know it; a number of

hard science fiction books about the *radical otherness of* "aliens"; and the heuristic guidance of *Drake's Equation* on the existence of intelligence beyond Earth whose deliberate radio messages are detectable (cf. D. G. Brin, 1983; Dick, 1996; Clark, 2000; deGrasse Tyson, 2006; Cohen and Stewart, 2002, pp. 116–144; Watts, 2006; Shuch, 2011; Gomel, 2014; Cabrol, 2016; Schoch, 2017; `https://exoplanetarchive.ipac.caltech.edu/`; Kipping, 2020; Westby and Conselice, 2020).

The liberty is taken at this time to expand a little more on the subject of Fig. 3, by the same token of Gombrich's (1982) remarks on *Pioneer 10*. A number of premises directly related to the discussion are the default set at this juncture. *First*, it is anticipated that Earth is not an orphan planet. In the vastness of known space,[23] thinking that other planets do not exist (indeed, thousands have been identified)[24] or that properties of life are unreal proves utterly wrong (cf. Clark, 2000; Bertka, 2009). Any Earth chauvinism is liable to end in the same way as the postulations *Earth is flat* or *Earth is the center of the universe*. If such overstatements are played time and again, the British master of comic fantasy, Terry Pratchett, might rise from the after-life and write a new, droll book on the topic. The astrophysicist deGrasse Tyson (2006, p. 16), whilst standing up for *compelling arguments* that *we are not alone*, similarly points out, "To declare that Earth must be the only planet in the universe with life would be inexcusably egocentric of us". *Second*, consider that the cosmos is not human- or communicative-friendly in itself. Beamed signals (of every stripe), automated probes, and/or human beings may degrade there due to various—predictable or unpredictable—factors, as they regularly pass away here on Earth, or as domestic signals corrupt or fade out, again due to several factors. *Third*, it may be assumed that the potential intelligences are multi-cellular (or the extraterrestrial equivalent of multi-cellular)[25] and engaged in complex, technologically-driven structures and not equivalent to single-celled organisms on Earth. Bigger brain-power requiring physical support from more-than-a-single cell equivalent body appears necessary to process intelligence, at least at a complex level; cf. Bains and Schulze-Makuch (2016). Granted that complex social structures seek cooperation and expansion in material and/or intellec-

---

23. Max Tegmark (2003, p. 41) comments that the vastness of known space stretches to "about 4×10^{26} meters away—a distance that defines our observable universe…". However, this question cannot be set at rest since "…the observable universe grows by a light-year every year as light from farther away has time to reach us" (ibid.).

24. NASA (`https://exoplanetarchive.ipac.caltech.edu/`) reports more than 4,150 confirmed exoplanets. As recently as April 2020, Vanderburg et al. (2020) rescued from the false positive status another exoplanet.

25. If not so, at the moment of contact humans would require potent magnifying lenses or other instruments, unless aliens socialize in the form of hive-like colonies, a preferred theme as various science fiction works have divulged.

tual terms, we have to accept the possibility that not all non-terrestrial cultures would be xenophobic and/or isolationist. *Fourth*, it is uncertain if the ETIs, in any possible habitat, with a different biochemical metabolism than ours, would find more accessible the included pictures about human reproduction or human predation habits, than, e.g., a message composed in the long-gone Cretan "hieroglyphs" (see Fig. 6), the paradigmatic phrase coined by H. P. Lovecraft (1999, p. 150), "Ph'nglui mglw'nafh Cthulhu R'lyeh wgah'nagl fhtagn" [In his house at R'lyeh dead Cthulhu waits dreaming], or Pythagoras's equation (see Fig. 7). We see no objection to believing that, given these examples, it is not known which would be "weirder" to them, if not perfectly pointless. Perhaps they might have a way of getting along with the *Cthulhu* tongue, virtually unpronounceable to many living humans. Just based on these Voyager-related pictorial samples (Evamy, 2003, pp. 60–61), it would be an astonishing coincidence or a sheer feat, if the printed information was retrieved and correctly interpreted by brute intellectual force. In a similar manner, it should be considered that the *addressees* do not think the Earthmen are purposely deceiving or attacking them by sending messages of this quality. *Fifth*, there might be a particular scenario which cannot be ruled out. If the message is intercepted by a civilization located at the range, say, of 1,200 light years (= ly) away,[26] and an affirmative answer is released, at the time it reaches Earth, some things may have changed. *Why*? Excluding the problem of interpreting ET language/s or symbols, humans will face a home-grown one: the uses and meanings of symbols are not consistent across cultural and time boundaries. Signs may shift in mode over time due, e.g., to further stimuli from the natural environment, technological obsolescence, or from socio-political pressures (cf. Chandler, 2007, p. 45; Fontana, 2003, p. 27). A general pattern is noticed in a given social context: as a culture increases in longevity, there is a tendency to regard the beliefs of previous generations as being *archaic* or *superstitious*. Their symbols are rationalized and sanitized, interpreted literally or simply abandoned altogether by the next cultural elite. Deprived of their context, such symbols diminish in power and have to be rediscovered afresh (Fontana, 2003, p. 28). To sum up, when ETIs' response is ferried back, portions of the cultural message of a *Pioneer 10*-like space probe may need a decipherment by our descendants after some 2,400 years in order to proceed with the exchange. The area of lexicology offers dozens of examples in like

------

26. In this sense, we should not be oblivious to the fact that part of the METI community is (recently) prioritizing the close stellar neighborhood in order to reduce the time of information-exchange; cf. the messaging projects concerning potentially habitable planets around dwarf star TRAPPIST-1, located thirty nine (39) ly away from Earth (in the constellation Aquarius), see Gillon, Triaud, and Queloz (2017), and the case of the exoplanet GJ372b, circling Luyten's star, at 12.4 ly away from Earth, see Vakoch, Matessa, DeVito, and Kaiser (2018).

manner, though quoting two would suffice: *flabellum* would not be understandable to many modern humans, without consulting a fine, thick dictionary, or a real specialist in the celebration of the Eucharist (a *flabellum* it is a type of fan used practically to drive away insects, and also has honorific connotations); *dolium* would sound equally unclear given the limits of year 2020 CE. Going back further in time, we learn (that) *dolium* was a Roman earthenware jar for wine, oil, etc. In either case, the terms are not immediately evident on casual reading. Their past or ancient context has dissipated, or may be lost if not refreshed or carefully investigated. Imagine, then, the difficulty in having to carry out a double decipherment: that of the note from the off-world and of our own message. We are at the mercy of probabilistic variables, with no guarantee for a successful solution.

Sixth, by stating all the above, we must consider the theorists' side that endorses poor chances or the utter improbability of communication due to the uncommonness of shared evolutionary traits and/or technologies. It is awkward to perceive matters in absolute terms, as it is awkward to unilaterally perceive them. While agreed that this might be inevitable in certain cases, on the other side, there should be circumstances where joint channels of interaction can be found. The alleged "ETIs" either may be in a bacterial stage (the probability is *very high*; cf. Crawford, 1996), or sporadically in a pre-industrial stage, or even in an industrial or a post-industrial stage. What is feared is that they could belong to an advanced Kardashev *type II* or *III* civilization (cf. Michaud, 2007, p. 36; Wright, Mullan, Sigurðsson, and Povich, 2014, pp. 13–14; Ćirković, 2015), let alone a disturbingly hyper-advanced *type IV* or *V*. We are told that such eventual super-technological civilizations, once they go beyond the self-destruction phase,[27] are dedicated to harness the whole power of a star (→ Type II), of a massive black hole, a galaxy (→ Type III), a string of galaxies, or even of an entire universe (→ Type IV).[28] In weight of numbers, theoretical considerations here go beyond figures of thirty-forty zeroes, if not approaching a googol (or a googolplex). The outlook is daunting and by any present estimate it beats a human understanding. The human motives to communicate perhaps may not really mean much to that civilization (as some aerobic or anaerobic germs may not mean much here on Earth), or vice versa, humans are not going to be able to understand, (or worse) imagine the motives and variables concerning their culture or the universe *en bloc* (see also Ball, 1973).

---

27. Cf., e.g., Crawford (1996); Westby and Conselice (2020, p. 15).

28. "Type V" is an extremely speculative proposition concerning a *civilization* or *entity* capable of manipulating and harnessing the energy of the multiverse (= the whole known universes).

Is there the possibility of finding "out there" what is already available on Earth? The average alien, comparable to the Earth-based intelligence, "not too dumb and not too smart" (Gardner, 2007, p. 102), with whom scientists have good odds to interact and benefit, may simply *not* exist. It is unlikely that circumstances have been flawlessly "cooked up" to give rise to the sought-for symmetrical intelligence (cf. Musso, 2012, p. 49, for a differing opinion). Yet, in the absence of hard facts, since anything can turn out to be equiprobable, the speculation should be very cautious like in a long *trial-and-error* exercise, where the perceived error should be analyzed and decreased whenever *possible*.

(a)

(b)
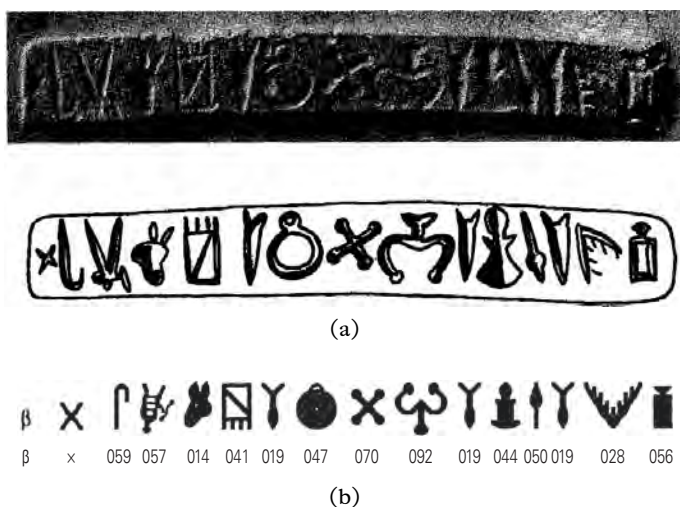
FIGURE 6. (a) Segment of Cretan "hieroglyphs" carved in a steatite seal, inventoried as ·294 [3] CR S (4/4) 01 β (Olivier, Godart, and Poursat, 1996, pp. 276–277); (b) the bottom drawing replicates the glyphs, accompanied by nomenclature index numbers

4.1. Further Examples of Designed Communication

Similar concerns to those in Section 3 are correctly paralleled in Shostak and Barnett (2003, p. 153). In an image (ibid., p. 153) intended to convey a three-dimensional (= 3D) environment, a "blue" human being is holding in her/his arms another "red" one. Quibbles aside, we note (a) that
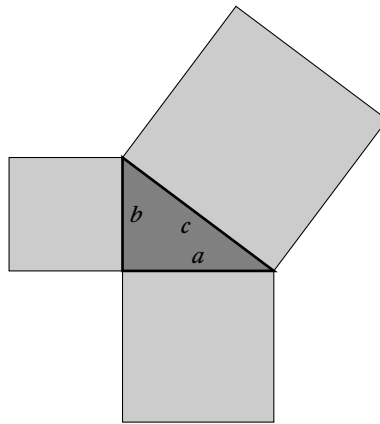
FIGURE 7. Pythagoras's theorem $a^2 + b^2 = c^2$, is well-known for its elegance and simplicity in the mathematical world. Several theorists may think that the formula has a universal application in other bio- and ecosystems of the cosmos. Aldhouse-Green (2004, p. 2) states, "Images contain conceptual messages that may be accepted, negotiated, challenged or denied," which, very aptly, may fit the interstellar negotiations. While this particular case $a^2 + b^2 = c^2$ is viable for intellectual organisms used to the tradition of Earth mathematics and geometric figures, it may not apply to, e.g., intelligences living (or self-exiled) in magnetic fields, who may lack for that matter the Euclidean concepts of linearity or angularity (see, in a broader context, Rescher, 1985; Denning, 2014, pp. 107–108; and Dunér, 2017, pp. 436–437).

a backdrop rectangular grid[29] is chosen on account of a standard human projection of 3D sketches, the idea behind the picture is to show *altruism*—again in keeping with human standards; (b) that these particular body positions are chosen among a myriad of conceivable positions (cf., e.g., Hewes, 1957, on "steady postures"); (c) in the same way, Fernsler (2010, p. 25) in commenting on various factors related to *nonverbal communication* (after Kinsey Goman's book, 2008) highlights *Culture* as a decisive one,

> Not only can gestures mean conflicting things in different cultures but people from various regions of the same country may have quite different body language: Just consider the contrast between the fastpaced, quicktalking New Yorker and the Southerner.

Now, attempting to bridge the cultural, gestural, and linguistic gap among different species is commendable; achieving the goal is another

---

29. Consider, for a moment, that a few Earth-based "aliens," such as honey bees (*Apis melifera*) or common wasps (*Vespa vulgaris*), are hard-wired to make hexagonal structures in their hives.

matter (cf. Harrison and Elms, 1990; Michaud, 2007). Even if the aliens recognize the message as an intended platform for communication and its physical dimensions, altruism *may be* (or *not*) a noble, traditional norm among them (cf. Vakoch's compilation, 2014b, and Gertz, 2016, for a number of arguments and counter-arguments). Vakoch (2011a) likewise offers a series of pictorial displays which express altruism and reciprocity; cf. Harrison (2011, p. 70). In turn, Cohen and Stewart (2002, p. 300) suggest that *empathy is heavily influenced by culture*, and so could be *altruism* as a synonym to unselfishness. Selfish urges, by analogy, may (or not) prevail among ETIs as a behavioral pattern, though these urges have perhaps a better chance to be (very) active (cf. Brin, 2011), as they may be tied to a universal self-preservation measure / instinct.[30] This will be positively known from empirical observations, which for the moment (year 2020 CE) are wanting.

Stanley Schmidt (1995, pp. 175–176) has an interesting instance from a slightly different context: endeavoring communication with non-human aquatic mammals, dolphins. In his novelette *Pinocchio*, we find tabulated a number of verbal expressions, transcribing the dialogue between the dolphin and researcher.

```
GOOD                          *      FRIENDLINESS.
MORNING,      *
MASON.        *                *
              *                *      MODERATE
              *                *      CHEERFULNESS.
              *                *
              *  IS THIS SANDY? *     CURIOSITY.
              *                *
              *                *      EAGERNESS.
              *                *
              *                *      SONAR.
```

Unconventional as it is, to say the least, it is not quite clear even after the second glimpse. Schmidt offers assistance in this respect: the first two columns of the (computer) display give a very free verbal translation of what he is saying, or both messages if the said things are at once. Some of the sounds carry connotations to compensate for the lack of an expressive face and the third column has the comments on those.

Evidently, *Pinocchio* (= the target dolphin) has earned the right to "speak" his mind; nonetheless, the conversation between dolphins and

---

30. While theorizing on the appearance of intelligence in potential non-terrestrial habitats, Kukla (2001, p. 41), insinuates indirectly that *altruism* may not be the most noble value among the candidates, "Alternatively, there might be something about evolutionary processes generally that militates against the appearance of more than one intelligent species per planet. (Perhaps intelligence is inevitably accompanied by a xenophobia so intense that the first intelligent species to appear exterminates all the near-intelligent competitors)".

the upstanding researcher/s is not unproblematic. The transcription is amusing once or twice, but if constantly rendered, patience may run out, angst increases, and with it an entropy-dominated model is likely to happen. At this instant, none is to be blamed: the closest thing (we) humans have to communicating like *Pinocchio* would be *nostrils*, functioning single-handedly, in unison, intermittently, or in a shuffled mode. Excluding the nasal sounds, we may not be able to distinctly articulate through the projecting part of the face even a simple phrase such as "Give me a cookie". It is an established fact that *human mammals* have a different anatomy as they have vocal chords, while *dolphin mammals* have nasal air-sacks near the blowhole and they are waterborne creatures. Despite several pesky facts getting in the way of trans-species communication, the basic human desire to fathom other realities, beings, and dimensions cannot be said to be preventable (v. *supra*).

Then… there are people of a different linguistic and social background whose connecting with each other appears next to an *impossible mission*; or if somehow it is accomplished, it touches the realm of absurdity and hilarity (refer below to an excerpt from John Irving's book, 1994, p. 250). It is perhaps no surprise that there are cases of Earth men who have never learned how to talk to women, or Earth women who cannot make (to one extent or another) a rational dialogue with their mother-in-laws. The statement is not meant as a gentle or harsh reproof here; although it echoes fairly well the opening sentence of Saint-Gelais' (2014) essay, "Communication, as we all know, is a touchy business between human beings". Consider in this vein that man-to-man, man-to-woman, and woman-to-woman interactions are—for all their idiosyncrasies, gender, and cultural differences—of the same species, while engaging dolphins is altogether an inter-species model. M. Schetsche (2005) correctly observes,

> Mutual understanding between cultural strangers on Earth is based on anthropocentric constants, which enable us to insinuate that the opposite person has similar physical needs, sensory possibilities, modes of perceiving the world, motivations, etc.

When the scenario is extrapolated to electromagnetic radiation exchanges or to direct contact with ETIs, several scholars begin to approach or realize the strain and imposing complexity of the situation, where human pre-assumptions and stereotypes about the "others" are intrinsically bound.

> Outside a *kaffeehaus* on *Plankengasse*, a man spoke to him. 'Grajak ok bretzet', he seemed to say, and Trumper paused, trying to place this queer language 'Bretzet, jak?' the man said and Trumper thought, Czech? Hungarian? Serbo-Croatian? 'Gra! Nucemo Paz!' the man shouted. He was angry about something and waved his fist at Trumper.

Bogus [= Trumper; *our note*] asked, 'Ut boethra rast, kelk?' Old Low Norse never hurt a soul.

'Gra?' the man said suspiciously. 'Grajak, ok,' he added with more confidence. Then he shouted eagerly, 'Nucemo paz tzet!'

Bogus was sorry he didn't understand, and began to say in Old Low Norse: 'Ijs kik…'

'Kik?' the man interrupted, smiling at Bogus. 'Gra, gra, gra! Kik!' he cried, trying to shake Trumper's hand.

'Gra, gra, gra! replied Bogus, and shook hands with the man who weaved and mumbled 'Gra, gra'. Nodding with greater conviction than before he tumbled away and stumbled off the kerb, veering across the street stooped over; like a blind man groping for the opposite sidewalk, he aimed his feet and protected his crotch with his hands. (Irving, 1994, p. 250)

A different—or, better, an inverse approach is taken by René Heller (2017). After simulating the receipt of an alien message, the researcher challenged in English via two social networks anyone who could decode it. It should parenthetically be inserted that the author presumed that the altruistic aliens (from a star about 50 ly from Earth) had great scientific abilities and similar logistic resources for the dispatch in question. Consider, however, that the real-life experts might not all and always agree on how best to measure the conditions for sending (or receiving) effectively a transmission that spans across fifty light years.[31]

The message was devised of around 2 million binary digits and comprised a representation of the non-terrestrial being, the first 757 prime numbers (serving as a clue for its decoding) and other concise data related suggestively to the aliens' world, planetary system, and physiology. By using some fundamental natural constants, e.g., *the speed of light*, *the gravitational constant* (= the big G), and *the Planck constant*, the author followed a common trend among many SETI researchers in finding an optimal coding method, independent of human-conceived units (in this sense, see also Denning, 2014, pp. 105–108, for interesting counterarguments).[32] After filtering out misinterpretations and errors (over 300),

---

31. Translated into kilometers the selected distance would be *ca.* 473,040,000,000,000 (= *ca.* four hundred seventy-three trillion forty billion kilometers). If the conception and processing of this digit is somewhat difficult for a normal human brain, we have to contend with celestial bodies that surpass the range 1,000 ly, or more. Such digits, e.g., the 1,000 ly span converted to kilometers, *ca.* 473,040,000,000,000 × 20 = 9,460,800,000,000,000, i.e., *ca.* nine quadrillion four hundred sixty trillion, eight hundred billion kilometers, would probably sound as clear as mud to many of the Earth's inhabitants. Human experts, however, will attach to these astronomical distances, a sense of awe and technological impossibility for the time being.

32. In the light of the mathematical-based concepts embraced (essentially) by astrophysicists, and intended as some "virtual bilingual" in messaging projects, we think Denning (2014) is justified in posing like-minded questions: is the "language of math"

sixty-six submissions (including 71 individuals) were found to be accurate. Since the test was originally devised by a human (cf. Heller, 2017), it could have involved some *mandatory* or *unavoidable perspective* on how to build and broadcast an interstellar message (v. *supra*). In this context, how far short are humans in knowing an extra-terrestrial *modus operandi*, their *ethics*, or *ambassadorship*, it cannot be stated at this time (cf. Michaud, 2007, p. 373; Głaz, 2014), though the plausible answer perhaps is—very short raised to *n*-th power.[33] Yet, we should not agonize over the situation, rather than admit the facts. The plus-side of Heller's effort is that collective intelligence seems to be a key driving force in decoding "unknown" messages or signals. All in all, the missive also reveals or reinforces a few things about human nature, its limitations and hopes in achieving information-bearing exchanges with other technologically capable entities.

Now if scholarship searches for a real-life historical analogue, the first to be highlighted is the narrowband ($\leq 10\,\text{kHz}$) radio signal detected on 15 August 1977 by the "Big Ear" radio telescope, at the time operated by Ohio State University as part of the SETI project. Said detection is known as the "*Wow*! Signal," whose discoverer Jerry R. Ehman (one of the project scientists) in analyzing the data on a computer printout, used a red pen to circle the anomaly and wrote next to it "*Wow*!" (Gray and Marvel, 2001, p. 1171; Schoch, 2017). The question is whether the *Wow*! signal had been modulated and varying—as is a standard modern radio signal, so as to encode and broadcast information—, it seems to be possible. The answer, on the other hand, i.e., knowing for certain its possible information-bearing capacity, is out of reach due to the "averaging" of the 1977 equipment over ten-second intervals (ibid.). At this point, whether the *Wow*! signal originated (or not) from a terrestrial source, or whether the generating source was natural or artificial, it is prudent to say that the issue requires further investigation (cf. Gray and Marvel, 2001). If we simply derive from the statistics that thousands of billions of stars make up the Milky Way and other galaxies spread in abundance across portions of the known universe, then it is conceivable that somewhere a planet-bound (or star-bound) mature civilization could have

---

(commendable as it might be) a universal criterion or a specific human projection in an interstellar decipherment venture? Specifically, whilst it stands true that modern astronomy and physics use Western mathematics, other mathematical systems have existed on Earth, with very different ways of understanding and expressing the world, e.g., Sumerians, Babylonians, Mayans, etc. Simply by learning about (radically) different forms of mathematics here on Earth, we would extend the range of analogies SETI researchers can draw upon, and thus could be of use. It would demonstrate the diverse possibilities for mathematical representation. But if human math and science do not look like extraterrestrial math and science, then the *Rosetta Stone* analogy will not hold up (see ibid.).

  33. Cf. the scenario in S. Lem's "first-contact" story *His Master's Voice* (Lem, 1999).

developed the technological means to transmit narrow-bandwidth emissions, producing the *Wow*! signal, or a *Wow*!-like one.

Otherwise, suggestions on receiving other fictitious alien messages have been offered in the not very distant past. Examples would consist of the 1960s television drama "A for Andromeda" written by John Elliott and Fred Hoyle. In that case, radio signals emanating from the Andromeda Galaxy are picked up by the then new radio telescope at Jodrell Bank, near Manchester (Great Britain). The signals included directions for the construction of a computer. This computer enabled the scientists to build a beautiful alien woman—impersonated by Julie Christie in her first appearance on TV screens (see Aldiss, 2006, p. 35; Baxter, 2011, pp. 361–363) [the broadcast was intended for popular consumption]; H. Campaigne (1966), who presented twenty nine (29) radio-messages from "outer space"—the test was limited to a selected audience; Zerwick and Brown (1968) with *The Cassiopeia Affair*, where American radio-astronomers detect a pulsed signal at the hydrogen frequency coming from a star in Cassiopeia 30 ly away (Baxter, 2011, p. 351), and Stanisław Lem's *His Master's Voice* (Lem, 1999), apparently, with a readership unbounded in terms of education, gender, nationality, and cryptoanalytical skills. One alert voice in this connection is Carrigan (2004) who contends that possibly some incoming ETI messages, intentionally or otherwise, may be contaminated (think of the computer viruses).

Clearly, in writing these lines or in quoting sources with a sense of rationality / dry humor, the present authors are not for quitting or "attacking" any project to bridge differences, but rather for adopting any practical and successful strategy based on a cross-disciplinary approach (see, e.g., Ascheri, 2001; Race et al., 2012; Cabrol, 2016). Then again, based on Cocconi and Morrison (1959); Drake (1961), and on earlier suggestions of the 20th century, it becomes apparent that scientific SETI is a recent endeavor (Denning, 2014, p. 95, n. 3; Cabrol, 2016, p. 669; Harbour, 2019). Improved methods and future findings may hold the key to reduce indeterminacy and foster a substantiated contact with ETI. For now, whether passive or active SETI should prevail during the enterprise, we would favor caution. Also, given the status of technological infancy of Earth's various cultures (cf. Carrigan, 2004), "listening" and a "delayed reply" would be preferable (cf. Tarter, 2000, p. 727; Gertz, 2016, p. 10). In this line of argument, we may also refer to Heller and Pudritz (2016, p. 276) who—after inspecting various "… regions of the Milky Way from which extraterrestrials might observe non-grazing transits of Earth in front of the Sun"—point out that "even if our species chose to remain radio-quiet to eschew interstellar contact, we cannot hide from observers located in Earth's solar transit zone, if they exist". We feel confident, however, that Heller and Pudritz's (2016) detectability equation would be feasible, were it not for the still inconclusive major variable "if they exist".

The current sub-section focuses on a domain that teems with aliens and co-related interplay, *science fiction*. Fictional ETIs (credible, trivialized or over-the-top, alive or already dead) are contacted via sundry protocols in many works of the genre, literary or cinematographic (cf. Tenn, 1952; Simak, 1951; Clement, 1954; Lem, 1970; 1999; Sagan, 1985; Crichton, 1987, pp. 27–30; Barlowe, 1987; *The Day the Earth Stood Still*, 1951; *Alien*, 1979; *Stargate*, 1994; *Independence Day*, 1996; *The First Contact* [of the Star Trek yarn], 1996; Watts, 2006; *Avatar*, 2009; Gomel, 2014; Baxter, 2011; 2015).

Such contacts have produced mixed outcomes for the fate of separate individuals or that of humanity, in general. Most certainly, more contacts in the near future may be expected (see Shostak and Barnett, 2003; Watts, 2006). The involved imagination in these pieces has often been wider than the hard scientific approach (cf. Dickinson and Schaller, 1994, p. 13[34]; deGrasse Tyson, 2006, p. 17). Regardless of that, this genre of fiction provides grounds as to plausible extremes anticipated in the outer reaches of space. The SETI Institute, the NASA Astrobiology Institute, the ESA (European Space Agency), or similar campaigning organizations should be far more realistic about the odds of a contact and the subsequent human-ETI course of action thereof. There could be scenarios with plausibly intelligent beings following very distinct evolutionary pathways (see Davies, 1995, pp. 82–83; Ward, 2005), which could produce very different models of understanding and explaining the structure of perceived reality (cf. Lem, 1970). Suffice to say that many of the things (on Earth) do not come on a schedule in everyday life. Consider that even on this planet there have been many manifestations outside the territory of *normal* expectations. Finding a black swan in Australia over three hundred years ago was a real shock because it overturned the paradigm of the white ones (Taleb, 2007). Finding life—without input from photosynthesis—in deep-sea hydrothermal vent systems has profoundly impacted the human view on the geological, geochemical and ecological history of the Earth (Martin, Baross, Kelley, and Russell, 2008, p. 812). More recently, detecting new hardy creatures and species in the abyssal depths or finding extremophile Earth microbes that not only thrive on arsenic—highly toxic by human standards—but rather are "willing" to incorporate it into their genetic code (see Wall, 2010), is quite exciting and makes a good number of scientists feel a bit taken aback.

Researchers, for all practical purposes, should start first examining the Earthly neighborhood and identifying with the *local aliens* (cf. Crichton, 1987, p. 28) through mutually comprehensible channels, before or

---

34. "Extraterrestrials have been featured in hundreds of Hollywood movies—some good, some bad and some really rotten. From bug-eyed monsters to 'Blob', they come in all shapes and sizes. Entertaining they may be, but believable? Hardly ever" (Dickinson and Schaller, 1994, p. 13).

while venturing successful or satisfactory contact elsewhere (cf. Paj-mans, 2004; Doyle, McCowan, Johnston, and Hanser, 2011, pp. 408–409; Harrison, 2011, p. 69; Denning, 2014, p. 110; Raybeck, 2014, p. 143; Robinson, 2017, p. 209; Wolfram, 2018). *Local aliens* do not strictly trans-late into other-than-human living organisms but also into any lost or unsolved cultural trail left by human beings (e.g., the archaeological site of Göbekli Tepe, in Örencik, Şanlıurfa Province, modern Turkey; the *Linear A* markings; several panels of "Cueva de las Manos," located in what is today Province of Santa Cruz, Patagonia, Argentina, featuring stencils of human hands alongside other rock paintings; the classical script—*rongorongo*—of Easter Island, see Figs. 8a, 8b, 8c, and 8d). The accumulated experience will largely assist in grasping the range of pa-rameters that best define the construction of ETI-outbound messages and their decipherability.

5.   Conclusions

Caution and fact-based assessments are needed to control any over-stretching of arguments. Despite this course of action, a few conclusions may be *somewhat devastating* or *hard to digest*—although *useful*, in the end—for a number of those involved in interstellar or inter-species commu-nication. So far, a rather restricted, anthropocentric idea of communi-cation is available; and up to now the success in contacting ETIs is null. A major issue is that the conception by humans of a cross-species, cross-cultural message (linguistic or not), free of any human-related semiotic trace or perspective—sounds for now as the ultimate oxymoron.[35] All in all, this must not deter the implicated parties by renouncing the en-deavor, rather than push them to further improve the "traditional" com-municative means and look in the long run for novel semiotic and tech-nological channels (cf., e.g., Cabrol, 2016; Wolfram, 2018).

There is such a lot of nonsense in part of the science fiction literature and in commercial Hollywood-type movies (or not), that many people think that the contacted aliens will verbalize, if not grammatical Eng-lish, something like (or unlike) English, which will be English after all, once the "universal translators" are turned on or some strange biological / robotic / cyborg-like creatures with impressive translating qualifica-tions are resorted to. Small surprise if critical scholarly voices and/or

---

35. While we are theoretically in agreement with Cabrol (2016, p. 667), "To find ET, we must expand our minds beyond a deeply rooted Earth-centric perspective and reevaluate concepts that are taken for granted," the question that still remains is: How can we achieve this in the (still) absence of bona fide messages from outer space; alternately, in the absence of a physical encounter between humans and ETIs, or of the detection of alien engineered artifacts / cultural footprints?
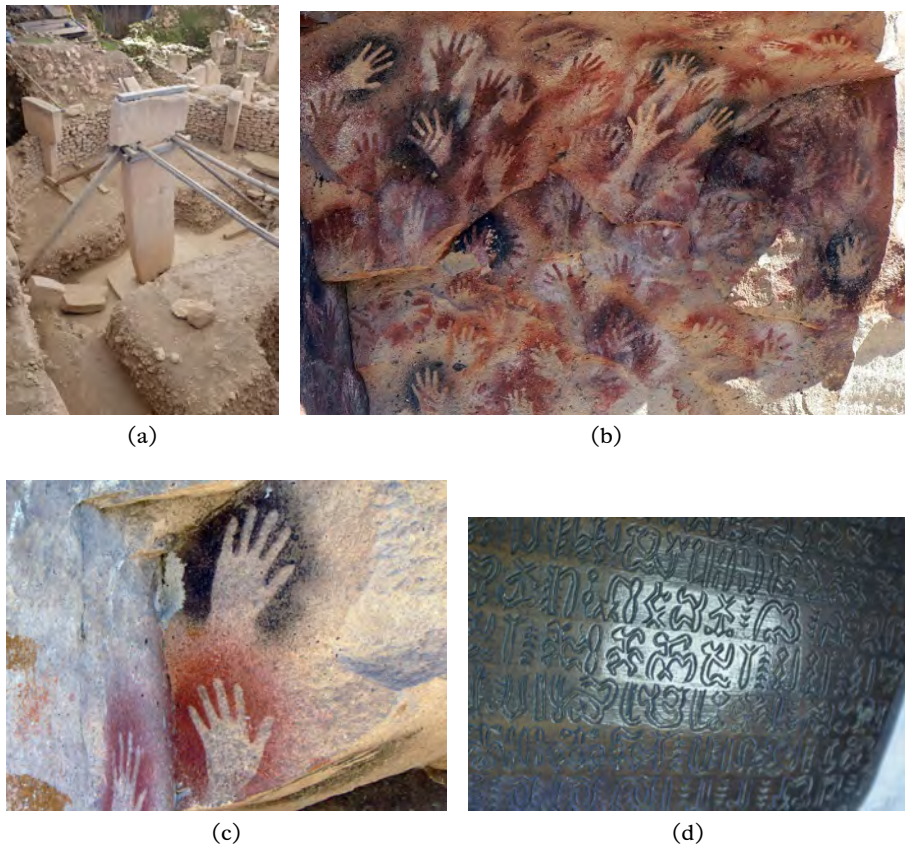
FIGURE 8.   (a) One of the most exemplary "local aliens" awaiting full "decipherment" from human scholars is the ancient site of Göbekli Tepe, located in the southeastern Anatolia region, modern Turkey. The image captures a partial view of the site, specifically the T-shaped "Pillar 18" and the immediate setting. Photograph © Robert M. Schoch (January, 2020). (b) A partial picture from the "Cave of the Hands," province of Santa Cruz, Patagonia, Argentina, shows most of the exterior drenched in "hand" stencils; cf. Melka (2017). Reprinted by permission (© J.A. Acosta Fabio, 2008). (c) Narrowing the specification of the source—"Cave of the Hands," province of Santa Cruz, Patagonia, Argentina— "hand" motifs are observed to occur on any planar surface; cf. Melka (2017). Reprinted by permission (© J.A. Acosta Fabio, 2008). (d) The classical *rongorongo* script coming from Rapa Nui (Easter Island) has defied a cogent interpretation / decipherment since its documented discovery in 1864. The present is a partial image of the back side (= *verso*) of tablet "Aruku Kurenga," one of the few original items preserved in a remarkably fine state; cf. Melka (2017). The complete text runs to about 1,290 glyphic elements (Barthel, 1958, p. 16; Fischer, 1997b, p. 427; Orliac and Orliac, 2008, p. 253), with the average height size between ten to *ca.* twelve mm and the tablet-weight consisting of 626 grams (Orliac and Orliac, 2008). The © photograph was taken by M. Harris (2009) at the General Archives of the Padri dei Sacri Cuori (SSCC), Rome, Italy.

standing jokes gain acceptance among the academic and popular circles regarding such stereotypes (see Fig. 9).

FIGURE 9. A screenshot of the alien duo Kang and Kodos from planet Rigel VII featured in a number of episodes of *The Simpsons* TV series (Wikipedia, 2020). The producers of the show have agreed to take / treat the characters humorously and illustrate the point that Rigellian (the alien language from planet Rigel VII), by an astonishing coincidence, is identical to English (cf. Johnson, 2020).

Similarly, it is unknown whether humans will meet safe, cuddly, well-intentioned, or predictable living things out there—however, we do not think trained experts anticipate this to be the case all across the ex-plored space. It is, likewise, unknown if ETIs will be amoral, callous, re-senting, obnoxious, and invasive in proportion to what are understood as civilized standards. *Intelligence* and *morality* have produced—over the centuries—benevolent as well as nasty and flawed results here on Earth, too. The present human values *simply* are not and cannot be universal, unless projected or imposed in whatever domain to be prospected and taken possession of (cf. Gorman, 2009).

When *communication* with ETIs is mentioned or envisioned, scientists should come to grips with the human constraints with respect to the many nuances and implications of this very concept. Additional re-search and progress in space exploration and technological media will be a bonus. Two additional frameworks that merit further serious analy-sis are semiotics / linguistics and cognitive psychology, given their po-tential to loosen and minimize the anthropocentric measure. In the light of the premises, it would be better, even nearly-optimal, to get to know ETIs, their socio-ethical values or artifacts in first person, their home-world, colonized outposts, or previously visited cosmic bodies—if not fully, then parts or relics of their existence—(cf. also Davies, 2012; Wright, Mullan, Sigurðsson, and Povich, 2014; Cabrol, 2016, Wolfram,

2018).[36] Unless sheer serendipity or some unanticipated circumstances favor these scenarios, the more realistic and somewhat less expensive way in 2020 would be upgraded, repeated radio-signaling, laser beaconing,[37] and interlocution via the principle of *inverse cryptography*, via *self-interpreting messages*, or *messages with … anti cryptographic properties in mind* (Callimahos, 1966, p. 83;[38] Dixon, 1973; Lemarchand and Lomberg, 1996; Benford, Benford, and Benford, 2010; Billingham and Benford, 2011; Atri, DeMarines, and Haqq-Misra, 2011; Denning, 2014, p. 102; Saint-Gelais, 2014, p. 89; Vakoch, Matessa, DeVito, and Kaiser, 2018; Harbour, 2019; https://www.sonarcalling.com). Otherwise, matters are still bound to be rated as *intellectual distraction*—valuable and delightful as it eventually might be—or soft *science fiction*.

Acknowledgments

References

Acosta Fabio, José Adrián (2008). "Patagonia Común: Cueva de las Manos." URL: http://patagonia.comun.blogspot.al/2008/07/cueva-de-las-manos.html (visited on 3 May 2016).

Aldhouse-Green, Miranda (2004). *An Archaeology of Images: Iconology and Cosmology in Iron Age and Roman Europe*. London, New York: Routledge.

---

36. Wolfram (2018) looks at the problem in a "different" light: his prospectus for the "beacon project" suggests the deployment of "Earth" beacons (= cultural · technological artifacts / human-related expressions) that may be recognizable and understandable by ETIs as artificially made. We have to point out that the author (2018) also admits the "complicated intellectual and philosophical issues" regarding this undertaking.

37. Given that Earth technology makes a significant breakthrough in the future in self-replicating traveling probes / nanobots, our "bet" is that these emissaries would prove more efficient in detecting and/or contacting biological (or not) life-forms in other parts of the known space.

38. In the words of the author, "A communication specially designed, not to hide meaning, but to be as easy as possible to comprehend".

Aldiss, Brian (2006). "Intelligent Aliens Are Purely Imaginary." In: *Extraterrestrial Life*. Ed. by Sylvia Engdahl. Originally published as "Desperately Seeking Aliens," *Nature* (22 February 2001) 409, pp. 1080–1082. Detroit: Greenhaven Press / An imprint of Thomson Gale, pp. 30–35.

Artificial Gallery (2006–2010). "Banksy—Trolley Hunters." The screenprint dates originally to 2007. URL: http://www.artificialgallery.co.uk/banksy/trolley-hunters/.

Ascheri, Valeria (2001). "Extraterrestrial Life and Communication Perspectives." In: *First Steps in the Origin of Life in the Universe. Proceedings of the Sixth Trieste Conference on Chemical Evolution, Trieste, Italy, 18–22 September 2000*. Ed. by Julian Chela-Flores, Tobias Owen, and François Raulin. Dordrecht: Kluwer Academic Publishers, pp. 349–352.

Asimov, Isaac (1988). *Foundation* series. London: Grafton Books / Collins Publishing Group.

Atri, Dimitra, Julia DeMarines, and Jacob Haqq-Misra (2011). "A Protocol for Messaging to Extraterrestrial Intelligence." In: *Space Policy* 27.3, pp. 165–169.

Bains, William and Dirk Schulze-Makuch (2016). "The Cosmic Zoo: The (Near) Inevitability of the Evolution of Complex, Macroscopic Life." In: *Life* 6.25, pp. 1–27.

Ball, John A. (1973). "The Zoo Hypothesis." In: *Icarus* 19.3, pp. 347–349.

Barlowe, Wayne D. (1987). *Barlowe's Guide to Extraterrestrials*. 2nd ed. New York: Workman Publishing Company, Inc.

Barthel, Thomas S. (1958). *Grundlagen zur Entzifferung der Osterinselschrift*. Vol. 64. Abhandlungen aus dem Gebiet der Auslandskunde. Hamburg: Cram, de Gruyter & Co.

Bauer, Friedrich L. (2002). *Decrypted Secrets: Methods and Maxims of Cryptology*. Berlin: Springer.

Baum, Seth D., Jacob D. Haqq-Misra, and Shawn D. Domagal-Goldman (2011). "Would Contact with Extraterrestrials Benefit or Harm Humanity? A Scenario Analysis." In: *Acta Astronautica* 68.11–12, pp. 2114–2129.

Baxter, Stephen (2011). "SETI in Science Fiction." In: *Searching for Extraterrestrial Intelligence: SETI, Past, Present and Future*. Ed. by H. Paul Shuch. Berlin, Heidelberg, Germany / Chichester, UK: Springer / Praxis Publishing, pp. 351–371.

———— (2015). *Xeelee: Endurance*. London: Gollancz.

BBC (2010). "The Beauty of Diagrams, 6 of 6—A BBC documentary series presented by Professor Marcus du Sautoy." URL: http://www.infocobuild.com/books-and-films/science/the-beauty-of-diagrams.html (visited on 24 January 2020).

Benford, Gregory, James Benford, and Dominic Benford (2010). "Searching for Cost-optimized Interstellar Beacons." In: *Astrobiology* 10.5, pp. 491–498.

Bertka, Constance M., ed. (2009). *Exploring the Origin, Extent and Future of Life: Philosophical, Ethical and Theological Perspectives*. Cambridge, UK: Cambridge University Press.

Billingham, John and James Benford (2011). "Costs and Difficulties of Large-scale 'Messaging', and the Need for International Debate on Potential Risks." arXiv:1102.1938.

Blum, Joseph (1962). "Book Review: *Lincos, Design of a Language for Cosmic Intercourse*." In: *NSA Technical Journal* 7.1, pp. 91–95.

Brin, David (2011). "A Contrarian Perspective on Altruism: The Dangers of First Contact." In: *Searching for Extraterrestrial Intelligence: SETI, Past, Present and Future*. Ed. by H. Paul Shuch. Berlin, Heidelberg, Germany / Chichester, UK: Springer / Praxis Publishing, pp. 429–451.

Brin, David G. (1983). "The Great Silence—The Controversy concerning Extraterrestrial Intelligent Life." In: *Quarterly Journal of the Royal Astronomical Society* 24, pp. 283–309.

——— (2006). "Shouting at the Cosmos... or How SETI Has Taken a Worrisome Turn into Dangerous Territory." Lifeboat Foundation—Special Report. URL: http://lifeboat.com/ex/shouting.at.the.cosmos (visited on 26 June 2017).

Burks, Arthur W., ed. (1966). *Theory of Self-Reproducing Automata: John von Neumann*. Urbana, London: University of Illinois Press.

Byrne, R.W. et al. (2017). "Great Ape Gestures: Intentional Communication with a Rich Set of Innate Signals." In: *Animal Cognition* 20, pp. 755–769.

Cabrol, Nathalie A. (2016). "Alien Mindscapes—A Perspective on the Search for Extraterrestrial Intelligence." In: *Astrobiology* 16.9, pp. 661–676.

Callimahos, Lambros D. (1966). "Communication with Extraterrestrial Intelligence." In: *NSA Technical Journal* 9.1, pp. 79–86.

Campaigne, Howard H. (1966). "Extraterrestrial Intelligence." In: *NSA Technical Journal* 11.2, pp. 101–102.

Carrigan Jr., R. A (2004). "The Ultimate Hacker: SETI Signals May Need to be Decontaminated." In: *Bioastronomy 2002: Life among the Stars*. Ed. by R. Norris and F. Stootman. Vol. 213. Proceedings of IAU Symposium. San Francisco: Astronomical Society of the Pacific, pp. 519–522.

Chandler, Daniel (2007). *Semiotics: The Basics*. London, New York: Routledge, Taylor & Francis Group.

Chick, Gary (2014). "Biocultural Prerequisites for the Development of Interstellar Communication." In: *Archaeology, Anthropology and Interstellar Communicationby*. Ed. by Douglas A. Vakoch. Washington, DC: Office of Communications, National Aeronautics and Space Administration, pp. 203–226.

Ćirković, Milan M. (2013). "Who Are the SETI Sceptics?" In: *Acta Astronautica* 89, pp. 38–45.

Ćirković, Milan M. (2015). "Kardashev's Classification at 50+: A Fine Vehicle with Room for Improvement." In: *Serbian Astronomical Journal* 191, pp. 1–15.

Clark, Stuart (2000). *Life on other Worlds and How to Find it*. London, Berlin, Heidelberg: Springer.

Clement, Hal (1954). *A Mission of Gravity*. New York: Pyramid Publications.

Cocconi, Giuseppe and Philip Morrison (1959). "Searching for Interstellar Communications." In: *Nature* 184, pp. 844–846.

Cohen, Jack and Ian Stewart (2002). *Evolving the Alien*. London: Ebury Press.

Crawford, Ian (1996). "Forum: Where are all the Extraterrestrials?" In: *New Scientist* 2050, p. 52.

Crichton, Michael (1987). *Sphere*. New York: Alfred A. Knopf.

Davies, Paul (1995). *Are We Alone? Philosophical Implications of the Discovery of Extraterrestrial Life*. New York: Basic Books / Harper Collins Publishers.

————— (2010). *The Eerie Silence: Renewing Our Search for Alien Intelligence*. Boston, New York: Houghton Mifflin Harcourt.

————— (2012). "Footprints of Alien Technology." In: *Acta Astronautica* 73, pp. 250–257.

deGrasse Tyson, Neil (2006). "The Likelihood of Extraterrestrial Life." In: *Extraterrestrial Life*. Ed. by Sylvia Engdahl. Detroit: Greenhaven Press / An imprint of Thomson Gale, pp. 15–20.

Denning, Kathryn E. (2014). "Learning to Read: Interstellar Message Decipherment from Archaeological and Anthropological Perspectives." In: *Archaeology, Anthropology and Interstellar Communicationby*. Ed. by Douglas A. Vakoch. Washington, DC: Office of Communications, National Aeronautics and Space Administration, pp. 95–113.

Dick, Steven J. (1996). *The Biological Universe: The Twentieth-Century Extraterrestrial Life Debate and the Limits of Science*. Cambridge: Cambridge University Press.

Dickinson, Terence and Adolf Schaller (1994). *Extraterrestrials: A Field Guide for Earthlings*. Camden East, Ontario: Camden House Publishing.

Dixon, Robert S. (1973). "A Search Strategy for Finding Extraterrestrial Radio Beacons." In: *Icarus* 20.2, pp. 187–199.

Doblhofer, Ernst (1993). *Die Entzifferung alter Schriften und Sprachen*. Originally published 1957 under the title *Zeichen und Wunder*, Wien: Paul Neff Verlag KG. Stuttgart: Philipp Reclam.

Dobyns, Henry F. (1993). "Disease Transfer Contact." In: *Annual Review of Anthropology* 22, pp. 273–291.

Doyle, Laurance R. et al. (2011). "Information Theory, Animal Communication, and the Search for Extraterrestrial Intelligence." In: *Acta Astronautica* 68.3–4, pp. 406–417.

Drake, Frank D. (1961). "Project Ozma." In: *Physics Today* 14, pp. 40–46.

Drake, Frank D. and Dava Sobel (1992). *Is Anyone Out There? The Scientific Search for Extraterrestrial Intelligence*. New York: Delacorte Press.

Dunér, David (2017). "On the Plausibility of Intelligent Life on Other Worlds: A Cognitive-Semiotic Assessment of $f_i \cdot f_c \cdot L$." In: *Environmental Humanities* 9.2, pp. 433–453.

Dutil, Yvan and Stéphane Dumas (1999). "Message to ET." In: *Astronomy Now* June 1999, pp. 53–54.

Eco, Umberto (1997). *The Search for the Perfect Language*. Trans. by James Fentress. Oxford, UK / Cambridge, USA: Blackwell Publishers Ltd.

Engdahl, Sylvia, ed. (2006). *Extraterrestrial Life*. Detroit: Greenhaven Press / An imprint of Thomson Gale.

Evamy, Michael (2003). *World without Words*. New York: Watson-Guptil.

Faucounau, Jean (1999). *Le déchiffrement du disque de Phaistos & les Proto-Ioniens: Histoire d'un peuple oublié*. Paris: L'Harmattan.

Fernsler, Terrence (2010). "Relevant Reviews—The Secrets and Science of Body Language. What Veiled Signals are People sending you? Understanding Nonverbal Communication is Crucial to your Success." In: *Nonprofit World* 25. URL: http://www.snpo.org (visited on 2 February 2020).

Finch, Sheila (1986). *Triad*. Toronto: Bantam Spectra Books.

Finney, Ben and Jerry H. Bentley (2014). "A Tale of Two Analogues: Learning at a Distance from the Ancient Greeks and Maya and the Problem of Deciphering Extraterrestrial Radio Transmissions." In: *Archaeology, Anthropology and Interstellar Communicationby*. Ed. by Douglas A. Vakoch. Washington, DC: Office of Communications, National Aeronautics and Space Administration, pp. 65–79.

Fischer, Steven R. (1997a). *Glyph-Breaker*. New York: Copernicus.

——— (1997b). Rongorongo: *The Easter Island Script, History, Traditions, Texts*. Oxford: Oxford University Press.

Fogg, Martyn J. (1987). "Temporal Aspects of the Interaction among the First Galactic Civilizations: the Interdict 'Hypothesis'." In: *Icarus* 69, pp. 370–384.

Fontana, David (2003). *The Secret Language of Symbols: A Visual Key to Symbols and their Meanings*. San Francisco: Chronicle Books LLC.

Foucault, Michel (1983). *This Is Not a Pipe*. Trans. by James Harkness. Berkeley, Los Angeles, London: University of California Press.

Freudenthal, Hans (1960). *Lincos: Design of a Language for Cosmic Intercourse (Part I)*. Amsterdam: North-Holland Publishing Co.

Fröhlich, Marlen and Catherine Hobaiter (2018). "The Development of Gestural Communication in Great Apes." In: *Behavioral Ecology and Sociobiology* 72.194, pp. 1–14.

Garber, Stephen J. (2014). "A Political History of NASA's SETI Program." In: *Archaeology, Anthropology and Interstellar Communicationby*. Ed. by Douglas A. Vakoch. Washington, DC: Office of Communications, National Aeronautics and Space Administration, pp. 23–48.

Gardner, James (2007). *AI, ET, and the Emerging Mind of the Cosmos*. Franklin Lakes, New Jersey: New Page Books / The Career Press, Inc.

Garrett, Paul (2001). *Making, Breaking Codes: An Introduction to Cryptology*. Upper Saddle River, New Jersey: Prentice Hall, Inc.

Gertz, John (2016). "Reviewing METI: A Critical Analysis of the Arguments." arXiv:1605.05663.

Ghosh, Pallab (2020). "Astronomers Want Public Funds for Intelligent Life Search." In: *BBC News. Science & Environment*. URL: https://www.bbc.com/news/science-environment-51223704 (visited on 15 February 2020).

Gillon, Michaël, Amaury H.M.J. Triaud, and Didier Queloz (2017). "Seven Temperate Terrestrial Planets around the Nearby Ultracool Dwarf Star TRAPPIST-1." In: *Nature* 542, pp. 456–460.

Głaz, Adam (2014). "Rorschach, We Have a Problem! The Linguistics of First Contact in Watts's Blindsight and Lem's His Master's Voice." In: *Science Fiction Studies* 41.2, pp. 364–391. URL: https://www.jstor.org/stable/10.5621/sciefictstud.41.2.0364 (visited on 26 May 2020).

Golomb, Solomon W. (1961). "Extraterrestrial Linguistics." In: *Word Ways—The Journal of Recreational Linguistics* 1.4, pp. 202–205. URL: http://digitalcommons.butler.edu/wordways/vol1/iss4/5 (visited on 22 April 2017).

———— (1963). "When is Extra-terrestrial Life Interesting?" In: *Engineering and Science* 26.5, pp. 15–17.

Gombrich, Ernst H. (1982). *The Image and the Eye: Further Studies in the Psychology of Pictorial Representation*. Ithaca, New York: Cornell University Press / Phaidon Books.

Gomel, Elana (2014). *Science Fiction, Alien Encounters, and the Ethics of Posthumanism: Beyond the Golden Rule*. New York: Palgrave Macmillan.

Goralnik, Lissy and Michael P. Nelson (2012). "Anthropocentrism." In: *Encyclopedia of Applied Ethics*. Ed. by Ruth Chadwick. Vol. 1. San Diego: Academic Press, pp. 145–155.

Gorman, Alice (2009). "Cultural Landscape of Space." In: *Handbook of Space Engineering, Archaeology and Heritage*. Ed. by Ann G. Darrin and Beth Laura O'Leary. Boca Ratón, FL: CRC Press / Taylor & Francis Group, pp. 335–346.

Gray, Robert H. and Kevin B. Marvel (2001). "A Very Large Array Search for the Ohio State 'Wow'." In: *The Astrophysical Journal* 546, pp. 1171–1177.

Grinspoon, David (2007). "Who Speaks for Earth?" SeedMagazine.com. URL: http://seedmagazine.com/content/article/who_speaks_for_earth/ (visited on visited on 29 June 2017).

Harbour, Daniel (2019). "Writing Systems and METI: Off-the-shelf Encoding of Human Physiology, Language, Cognition, and Culture." Ms, Queen Mary University of London.

Harris, Martyn (2009). "High-resolution © Picture(s) of Tablet "Aruku Kurenga" taken at the General Archives of the Padri dei Sacri Cuori (SSCC), Rome, Italy." Images in the collection of TSM.

Harrison, Albert A. (2011). "The Search for Extraterrestrial Intelligence: Astrosociology and Cultural Aspects." In: *Astropolitics: The International Journal of Space Politics & Policy* 9.1, pp. 63–83.

———— (2014). "Speaking for Earth: Projecting Cultural Values across Deep Space and Time." In: *Archaeology, Anthropology and Interstellar Communicationby*. Ed. by Douglas A. Vakoch. Washington, DC: Office of Communications, National Aeronautics and Space Administration, pp. 175–191.

Harrison, Albert A. and Alan C. Elms (1990). "Psychology and the Search for Extraterrestrial Intelligence." In: *Behavioral Science* 35.3, pp. 207–218.

Hayward, Tim (1997). "Anthropocentrism: A Misunderstood Problem." In: *Environmental Values* 6, pp. 49–63.

Heidmann, Jean (1993). "A Replay from Earth: Just send them the Encyclopedia." In: *Acta Astronautica* 29, pp. 233–235.

———— (1995). *Extraterrestrial Intelligence*. Trans. by Storm Dunlop. Cambridge: Cambridge University Press.

Heller, René (2017). "Decryption of Messages from Extraterrestrial Intelligence Using the Power of Social Media—the SETI Decrypt Challenge." arXiv:1706.00653.

Heller, René and Ralph E. Pudritz (2016). "The Search for Extraterrestrial Intelligence in Earth's Solar Transit Zone." In: *Astrobiology* 16, pp. 259–270.

Herzing, Denise L. (2014). "Profiling Nonhuman Intelligence: An Exercise in Developing Unbiased Tools for Describing Other 'Types' of Intelligence on Earth." In: *Acta Astronautica* 94.2, pp. 676–680. URL: http://www.wilddolphinproject.org/wp-content/uploads/2016/06/Herzing-Non-Human-Intell-Acta.pdf (visited on 25 June 2020).

Hewes, Gordon W. (1957). "The Anthropology of Posture." In: *Scientific American* 196, pp. 123–132.

Higenbottam, Frank (1973). *Codes and Ciphers*. London: English Universities Press.

Hofstadter, Douglas R. (1999). *Gödel, Escher, Bach: An Eternal Golden Braid*. New York, NY: Basic Books, Inc.

Hogben, Lancelot T. (1952). "Astraglossa, or First Steps in Celestial Syntax." In: *Journal of the British Interplanetary Society* 11.6, pp. 258–274.

———— (1961). "Cosmical Language'—A Review of Hans Freudenthal's Lincos, Design of a Language for Cosmic Intercourse." In: *Nature* 192, pp. 826–827.

Irving, John (1994). *The Water-Method Man*. Ealing, London: Corgi Books.

Jarrell, Richard A. (2007). "Littrow [Littroff], Johann Joseph (Edler) von." In: *The Biographical Encyclopedia of Astronomers*. Ed. by Thomas Hockey. New York: Springer, pp. 699–700.

Johnson, Kang (2020). "Simpsons Wiki." URL: https://simpsons.fandom.com/wiki/Kang (visited on 20 January 2020).

Jonas, Doris and David Jonas (1976). *Other Senses, Other Worlds*. New York: Stein and Day.

Kinsey Goman, Carol (2008). *The Nonverbal Advantage—Secrets and Science of Body Language at Work*. San Francisco: Berret-Koehler Publishers.

Kipping, David (2020). "An Objective Bayesian Analysis of Life's Early Start and our Late Arrival." In: *Proceedings of the National Academy of Sciences* 117.22, pp. 11995–12003.

Kopnina, Helen et al. (2018). "Anthropocentrism: More than Just a Misunderstood Problem." In: *Journal of Agricultural and Environmental Ethics* 31, pp. 109–127.

Kukla, André (2001). "SETI: On the Prospects and Pursuitworthiness of the Search for Extraterrestrial Intelligence." In: *Studies in History and Philosophy of Science* 32.1, pp. 31–67.

Lem, Stanisław (1970). *Solaris*. Trans. by Joanna Kilmartin and Steve Cox. New York: Walker and Company.

———— (1999). *His Master's Voice*. Trans. by Michael Kandel. Evanston, Illinois: Northwestern University Press.

Lemarchand, Guillermo A. and Jon Lomberg (1996). "Are There Any Universal Principles in Science and Aesthetics that Could Help Us to Set the Unknown Parameters for Interstellar Communication?" In: *Astronomical and Biochemical Origins and the Search for Life in the Universe, Capri, Italy, July 1–5, 1996*. Vol. 161. International Astronomical Union Colloquium, pp. 4–12. URL: http://www.jonlomberg.com/articles/seti_and_aesthetics.html (visited on 23 July 2017).

Lovecraft, Howard P. (1999). "The Tale of Inspector Legrasse." In: *The Call of Cthulhu*. Ed. by S.T. Joshi. New York City, NY: Dell, pp. 147–159.

MAB (2020). "Trolleys BANKSY." URL: https://www.myartbroker.com/artist/banksy/trolleys/ (visited on 6 February 2020).

Martin, William et al. (2008). "Reviews—Hydrothermal Vents and the Origin of Life." In: *Nature Reviews* 6, pp. 805–814.

Matloff, Gregory L. (2005). *Deep Space Probes: To the Outer Solar System and Beyond*. 2nd ed. Berlin, Heidelberg, Germany / Chichester, UK: Springer / Praxis Publishing.

Mayr, Ernst (1985). "The Probability of Extraterrestrial Intelligent Life." In: *Extraterrestrials: Science and Alien Intelligence*. Ed. by Edward Regis Jr. Cambridge: Cambridge University Press, pp. 23–30.

Melka, Tomi S. (2008). "Structural Observations regarding *rongorongo* Tablet 'Keiti'." In: *Cryptologia* 32.2, pp. 155–179.

———— (2010). "The Moche Lima Beans Recording System, Revisited." In: *Electronic Journal of Folklore* 45, pp. 89–136.

————— (2013). "'Harmonic'-like Sequences in the *rongorongo* Script." In: *Glottotheory: International Journal of Linguistics (Akademie-Verlag, Berlin)* 4.2, pp. 115–139.

————— (2017). "A Developmental Continuum for the *rongorongo* Script of Easter Island (Part 1)." Manuscript in the Collection of TSM.

Melka, Tomi S. and Michal Místecký (2020). "On Stylometric Features of H. Beam Piper's Omnilingual." In: *Journal of Quantitative Linguistics* 27.3, pp. 204–243.

Melka, Tomi S. and Robert M. Schoch (2020). "Exploring a Mysterious Tablet from Easter Island: The Issues of Authenticity and Falsifiability in *rongorongo* Studies." In: *Cryptologia* 44.6, pp. 481–544.

Messerschmitt, David G. and Ian S. Morrison (2012). "Design of Interstellar Digital Communication Links: Some Insights from Communication Engineering." In: *Acta Astronautica* 78.1, pp. 80–89.

METI.org (2020). "Mission—The Primary Objectives and Purposes of METI International." URL: http://meti.org/en/mission (visited on 20 April 2020).

Michael, George (2014). "Extraterrestrial Intelligence: Friends, Foes, or Just Curious?" In: *Extraterrestrial Altruism*. Ed. by Douglas A. Vakoch. An Adaptation of Michael, George (2011). "Extraterrestrial Aliens: Friends, Foes, or Just Curious?" *Skeptic* 16(3), pp. 46–53. Berlin, Heidelberg: Springer.

Michaud, Michael A.G. (2007). *Contact with Alien Civilizations: Our Hopes and Fears about Encountering Extraterrestrials*. New York: Copernicus Books / Springer.

Musso, Paolo (2012). "The Problem of Active SETI: An Overview." In: *Acta Astronautica* 78, pp. 43–54.

National Geographic (2010). "Cobra vs. Mongoose." URL: https://www.youtube.com/watch?v=vdg9gkmWsEA (visited on 26 July 2017).

Neal, Mark (2014). "Preparing for Extraterrestrial Contact." In: *Risk Management* 16.2, pp. 63–87.

Nieman, H.W. and C. Wells Nieman (1920). "What Shall We Say to Mars?" In: *Scientific American* 122.12, pp. 298–312.

Olivier, Jean Pierre, Louis Godart, and Jean-Claude Poursat (1996). *Corpus Hieroglyphicarum Inscriptionum Cretae (CHIC)*. Vol. 31. Études Crétoises. Paris: De Boccard.

Orliac, Michel and Catherine Orliac (2008). *Trésors de l'île de Pâques / Treasures of Easter Island*. Collection de la Congrégation des Sacrés-Cœurs de Jésus et de Marie SS. CC. Genève: Frédéric Dawance / Paris: Louise Leiris.

Pajmans, J.J. (2004). "The Language Question: Corpus Linguistics for non-Human Communication." URL: http://sites.millersville.edu/bduncan/221/animals/bees/paijmans-baden.pdf (visited on 24 July 2017).

Pope, Maurice (1999). *The Story of Decipherment: From Egyptian Hieroglyphs to Maya Script*. London: Thames & Hudson.

Potts, Alex (1996). "Sign." In: *Critical Terms for Art History*. Ed. by Robert S. Nelson and Richard Shiff. London, Chicago: University of Chicago Press, pp. 20–34.

Race, Margaret et al. (2012). "Astrobiology and Society: Building an Interdisciplinary Research Community." In: *Astrobiology* 12.10, pp. 958–965.

Raup, David M. (1992). "Nonconscious Intelligence in the Universe." In: *Acta Astronautica* 26.3–4, pp. 257–261.

Raybeck, Douglas (2014). "Contact Considerations: A Cross-Cultural Perspective." In: *Archaeology, Anthropology and Interstellar Communicationby*. Ed. by Douglas A. Vakoch. Washington, DC: Office of Communications, National Aeronautics and Space Administration, pp. 143–161.

Reddy, Francis (2012). *Celestial Delights: The Best Astronomical Events through 2020*. The Patrick Moore Practical Astronomy Series. Cham: Springer Nature Switzerland AG.

Regis Jr., E., ed. (1985). *Extraterrestrials: Science and Alien Intelligence*. Cambridge: Cambridge University Press.

Rescher, N. (1985). "Extraterrestrial Science." In: *Extraterrestrials: Science and Alien Intelligence*. Ed. by E. Regis Jr. Cambridge: Cambridge University Press, pp. 83–116.

Robinson, Andrew (2002). *Lost Languages: The Enigma of the World's Undeciphered Scripts*. New York: McGraw-Hill.

————— (2017). "Cryptography: The Codes that Got Away." In: *Nature* 546, pp. 208–209.

Rosenthal, Jake (2016). "The Pioneer Plaque: Science as a Universal Language." URL: http://www.planetary.org/blogs/guest-blogs/2016/0120-the-pioneer-plaque-science-as-a-universallanguage.html (visited on 21 March 2017).

Russell, Eric Frank (1955). "Allamagoosa." In: *Astounding Science Fiction* 55.3, pp. 48–59.

Sagan, Carl (1985). *Contact*. New York: Simon and Schuster.

Sagan, Carl, Linda Salzman Sagan, and Frank D. Drake (1972). "A Message from Earth." In: *Science* 175.4024, pp. 881–884. URL: http://www.jstor.org/stable/1733664 (visited on 15 January 2020).

Saint-Gelais, Richard (2014). "Beyond Linear B: The Metasemiotic Challenge of Communication with Extraterrestrial Intelligence." In: *Archaeology, Anthropology and Interstellar Communicationby*. Ed. by Douglas A. Vakoch. Washington, DC: Office of Communications, National Aeronautics and Space Administration, pp. 78–95.

Schetsche, Michael (2005). "SETI and the Consequences: Futurological Reflections on the Confrontation of Mankind with an Extrater-

restrial Civilization." URL: http://astrosociology.com/Library/PDF/Contributions/SETIandConsequences_ENG.pdf (visited on 1 May 2017).

Schmidt, Stanley (1995). *Aliens and Alien Societies*. Ed. by Ben Bova. Science Fiction Writing Series. Cincinnati, OH: Writer's Digest Book / F&W Publications, Inc.

Schoch, Robert M. (2017). "The *Wow!* Signal Controversy: Was Evidence of Extraterrestrials Detected in 1977?" Manuscript in the collections of the RMS and TSM.

Shermer, Michael (2002). "Why ET Hasn't Called." In: *Scientific American* 287.2 (August 2002), p. 33.

Shklovskii, Iosif Samuilovich and Carl Sagan (1966). *Intelligent Life in the Universe*. San Francisco: Holden-Day.

Shostak, Seth and Alexandra Barnett (2003). *Cosmic Company: The Search for Life in the Universe*. Cambridge: Cambridge University Press.

Shuch, H. Paul, ed. (2011). *Searching for Extraterrestrial Intelligence: SETI, Past, Present and Future*. Berlin, Heidelberg, Germany / Chichester, UK: Springer / Praxis Publishing.

Simak, Clifford D. (1951). "Beachhead (originally, You'll Never Go Home Again)." In: *Fantastic Adventures, July 1951*. Ed. by Howard Browne. Interior artwork by Leo Summers. Chicago, IL: Ziff-Davis Publishing Company, pp. 72–87.

Smith, Reginald D. (2009). "Broadcasting but not receiving: Density Dependence Considerations for SETI Signals." In: *International Journal of Astrobiology* 8.2, pp. 101–105.

Sproat, Richard W. (2007). "Decipherment, Pseudodecipherment and the Phaistos disk." In: *A Workshop on Scripts, Non-scripts and (Pseudo)-decipherment. Abstracts for Talks: Braun Auditorium, Stanford University*. URL: http://serrano.ai.uiuc.edu/2007Workshop/abstracts.html (visited on 5 September 2007).

———— (2008). "The Use of Corpora in Teaching and Research: Theoretical Preliminaries." URL: http://www.linguistics.uiuc.edu/rws/ (visited on 12 September 2008).

Taleb, Nassim Nicholas (2007). *The Black Swan: The Impact of the Highly Improbable*. New York: Random House.

Tarter, Donald E. (2000). "Security Considerations in Signal Detection." In: *Acta Astronautica* 46.10–12, pp. 725–728.

Tegmark, Max (2003). "Parallel Universes." In: *Scientific American* 288.5, pp. 41–51.

Tenn, William (1952). "Betelgeuse Bridge." In: *Tomorrow, The Stars*. Ed. by Robert Heinlein. New York: Doubleday and Co., pp. 136–155.

Tipler, Frank J. (1980). "Extraterrestrial Intelligent Beings do not Exist." In: *Quarterly Journal of the Royal Astronomical Society* 21, pp. 267–281.

Tomasello, Michael and Josep Call (2018). "Thirty Years of Great Ape Gestures." In: *Animal Cognition* 20, pp. 461–469.

Tredoux, Gavan (2018). "Francis Galton on Mars: The 'Discontinuous Variation' Notebook. Appendix D. Telegraphing to Mars." URL: http://galton.org/mars/tredoux-2018-galton-on-mars.pdf (visited on 18 May 2020).

Vakoch, Douglas A. (1998). "Constructing Messages to Extraterrestrials: An Exosemiotic Perspective." In: *Acta Astronautica* 42, pp. 697–704.

———— (2000). "The Conventionality of Pictorial Representation in Interstellar Messages." In: *Acta Astronautica* 46.10–12, pp. 733–736.

———— (2011a). "A Taxonomic Approach to Communicating Maxims in Interstellar Messages." In: *Acta Astronautica* 68.3–4, pp. 500–511.

———— (2011b). "What's Past is Prologue: Future Messages of Cosmic Evolution." In: *Searching for Extraterrestrial Intelligence: SETI, Past and Present and Paul, Future*. Berlin, Heidelberg, Germany / Chichester, UK: Springer / Praxis Publishing, pp. 373–398.

———— ed. (2014a). *Archaeology, Anthropology and Interstellar Communicationby*. Washington, DC: Office of Communications, National Aeronautics and Space Administration.

———— ed. (2014b). *Extraterrestrial Altruism*. Berlin, Heidelberg: Springer.

———— (2014c). "Introduction: Reconstructing Distant Civilizations and Encountering Alien Cultures." In: *Archaeology, Anthropology and Interstellar Communicationby*. Ed. by Douglas A. Vakoch. Washington, DC: Office of Communications, National Aeronautics and Space Administration, pp. xiii–xxx.

Vakoch, Douglas A. and Matthew F. Dowd, eds. (2015). *The Drake Equation: Estimating the Prevalence of Extraterrestrial Life through the Ages*. Cambridge: Cambridge University Press.

Vakoch, Douglas A. et al. (2018). "A Mathematical and Scientific Message for Active SETI." In: *Proceedings of the 42nd COSPAR Scientific Assembly, 14–22 July 2018, Pasadena, California*, pp. 14–22. URL: https://ui.adsabs.harvard.edu/abs/2018cosp%5Ceee%7B...42%7D%7B3485%7DV/abstract (visited on 22 April 2020).

Vanderburg, Andrew et al. (2020). "A Habitable-zone Earth-sized Planet Rescued from False Positive Status." In: *The Astrophysical Journal Letters* 893.1.

Vito, Carl L. de and Richard T. Oehrle (1990). "A Language Based on the Fundamental Facts of Science." In: *Journal of the British Interplanetary Society* 43.12, pp. 561–568.

Wall, Mike (2010). "NASA Hasn't Found Alien Life, But Arsenic Microbe Still 'Phenomenal'." URL: http://www.space.com/scienceastronomy/arsenic-bacteria-extraterrestrial-life-search-101202.html (visited on 20 March 2014).

Ward, Peter D. (2005). *Life as We Do Not Know It: the NASA Search for (and Synthesis of) Alien Life*. New York: Viking / Penguin Group.

Watts, Peter (2006). *Blindsight*. New York: Thor Books.

Webb, Stephen (2002). *If the Universe Is Teaming with Aliens... Where Is Everybody? Fifty Solutions to Fermi's Paradox and the Problem of Extraterrestrial Life*. New York: Copernicus.

Westby, Tom and Christopher J. Conselice (2020). "The Astrobiological Copernican Weak and Strong Limits for Intelligent Life." In: *The Astrophysical Journal* 896.58, pp. 1–18.

Wolfram, Stephen (2018). "Showing Off to the Universe: Beacons for the Afterlife of Our Civilization." In: *Writings*. URL: https://writings.stephenwolfram.com/2018/01/showing-off-to-the-universe-beacons-for-the-afterlife-of-our-civilization/ (visited on 8 May 2020).

Wright, J. T. et al. (2014). "The Ĝ Infrared Search for Extraterrestrial Civilizations with Large Energy Supplies. I. Background and Justification." In: *The Astrophysical Journal* 792.

Zackrisson, Erik et al. (2016). "Terrestrial Planets across Space and Time." In: *The Astrophysical Journal* 833.2.

Zaitsev, Alexander L. (2008a). "Sending and Searching for Interstellar Messages." In: *Acta Astronautica* 63, pp. 614–617.

———— (2008b). "The First Musical Interstellar Radio Message." In: *Journal of Communications Technology and Electronics* 53.9, pp. 1107–1113.

Zerwick, C. and H. Brown (1968). *The Cassiopeia Affair*. New York: Doubleday.

Zörnig, Peter and Tomi S. Melka (2014). "An Ethnographic Study of the Pintaderas of Gran Canaria (Canary Islands): A Measuring Theoretic Approach for Quantifying Symmetry." In: *Glottometrics* 29, pp. 31–58.

Mute Melodies

Christine Kettaneh

Abstract. Mute Melodies is a short tour through an artist's work that investigates the boundaries of language and systems in research-based projects that are simultaneously sculptural and performative, and that articulates language as both excavated material and excavation technique. Or, alternatively, an artist's journey through everyday matter: soap on the wash basin, ants in the garden, sugar on the kitchen table, keys in locks—language in the mouth.

1. Introduction

In my practice as an artist, I have an inclination to the conceptual, yet I am unable to forget about matter. As Patricia Berry (2008) puts it, in *Echo's Subtle Body*, matter is both the most necessary and the most lacking, the tangible and the incorporeal, the form and the chaos. Maybe it is this paradox within matter that sustains my interest. My mind cannot make up words for abstract thought just out of thin air; the mind can make use of only what is already at hand: the physical, the concrete, the body, matter… It is actually out of our need to expand our range of expression, that our language flows from the concrete to the abstract through what we commonly know as metaphor. So I would like to think of art as metaphor which means "carry across" in Greek or "transfer" in Latin.

In my practice, the visual, the research and the writing inform each other. When I write and when I work with the visual I feel I am activating the same region in my brain, perhaps the same gnostic neurons that help me make connections and links between the conceptual and the physical space that I would have otherwise not been able to make. The verb 'to essay' means, "to attempt at;" I would like to consider art, as an essay that attempts at metaphor, at what takes place entirely within the fiction of the mind: Art is an attempt at understanding.

Christine Kettaneh   ⓘD 0000-0003-4099-9990
School of Architecture and Design, Lebanese American University, Byblos, Lebanon
E-mail: christinekettaneh@gmail.com, Web: www.christinekettaneh.com

2.   Soap Coins: The Economic Metaphors

Clare Whistler invited me to collaborate with her and Chris Drury in one of Clare's Gift series: *Coin—a gift for wealth*, in Seaford, UK (May '14). Aware that I had previously been trained as an economist she asked me if I could make coins that we would set to sea after a ritual. I responded with *Soap Coins*.

Economic reasoning is highly metaphorical but economists are not so conscious of it because they are accustomed to it by daily use. As I stepped back from the field, I found it easier to see the metaphors. So for that project, I considered different metaphors that were commonly used in economics and finally decided on a list of 6 that gave off tactile associations: Equilibrium, Maximizing, Elasticity, Liquidity, Volatility, and The invisible hand. For each of the 6, I designed a coin made up of soap. In each soap, I engraved the word along with simple compositions made up of curves inspired by the metaphor's economic model as well as its literal or noneconomic meaning. Most economic models can be represented by curves and their intersections, the famous equilibrium points. So at every point where the curves would meet recto verso on the soap, I made a hole.

Clare had no prior knowledge of economic theory and she requested that I give her her very first lesson—in front of an audience. Although I had hoped I would not have to teach the basics of economics again that soon and had secretly wished that my memory could somehow vaporize them, the responsibility of the years I had put in acquiring them still burdened me. So I obliged. I explained to her the assumed maximizing behavior of people… I explained how the consumer made de-

cisions in a way to maximize his utility, how the supplier made decisions in a way to maximize his profit, and assuming that everyone was behaving—rationally—in his own self-interest, how the market reached equilibrium. And then when the equilibrium was not favorable, how government could, by making decisions in a way to maximize welfare, lead equilibrium to an assumed optimal.

Not surprisingly, Clare barely managed to answer any of my economics questions 'rationally.' Instead, she gestured with her hands every time I tried to define a word like equilibrium, elasticity or liquidity. Her gestures gradually grew into more elaborate movements and as soon as the lesson was over, she continued with her dance moving outside the room, outside the house onto a path towards the sea. And the audience followed her in her trance.

When they reached the sea, Clare handed them the coins. She requested they rub them hard with water, exchange them and then repeat. As they did that, the words—the metaphors that launched the ritual— started to effervesce and the coins started to smell and melt. All that remained for Clare to keep were the holes in the coins.

3. Mute Melodies: The Dead Metaphors
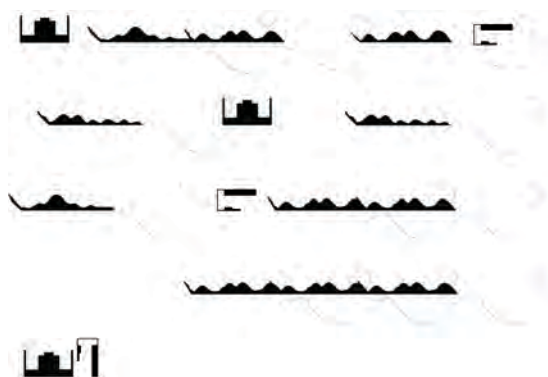
Figure 2

Metaphor is not only for the economists, poets or the fancy and sophisticated. Even when we are not conscious of it, we are using metaphor in our everyday language. Metaphors are words that help us cross the realm of the physical to the abstract. When words are used frequently enough in their metaphorical abstract sense we forget their literal physical origins and so the metaphors die. But with their deaths

they form the building blocks of our language. For example, take the most mundane word: the verb "To have". What is it really that we do when we have a hand, a leg, a house, a headache, or a cousin? As Guy Deutscher (2005) explains in *The Unfolding of Language*, 'To have' or more generally the idea of possession is an abstract notion. Actually 'to have' as well as 'to capture' are derived from the same Proto-Indo-European root *kap which means 'to seize.' In other languages, where the word 'to have' does not have an exact equivalent, the notion of possession is expressed through other words borrowed from physical situations of having something like the transitive verbs 'to take, hold, carry or get' or expressions related to images of physical proximity like something being near, on or at you...

As for me, the idea of possession lies in a key. We always obsess about losing or misplacing the key because the key embodies power; with it we control our ownership, our security. The key fosters the separation between "yours" and "mine." It represents our fears from one another or our desire for independence from each other. But I am not interested in the key. I am interested in the bits of the key that get lost when the key is cut. Those cut bits leave a space, but not an absence, because it is in that space that the essence of the key system lies. Every time a key and the right lock do their affair, that space is reactivated. The pins align in one unique mute melody. And then there is an opening, a closing, a sharing, a stealing and an on and off.

So if the cutting of the key activates the idea of possession, the idea of something close to you—at the extreme the idea of you—then that space between the key and the lock reactivates that idea whenever it is occupied. So in response to that idea, I started a ritual. I asked key cutters around London to save all their metal filings—the metallic dust that gets lost when the keys are cut—and I collected them. I also asked friends to entrust me with their sets of house keys and to describe to me the paths they would take every time they entered their homes, from the outermost layer to the innermost. I fancied the idea of retracing the missing bits of their keys and restoring their wholeness.

For some, the retraced bits looked like Arabic or some other script. For others, they looked like waves or ships. It wasn't until you read my text in the book under the installation of bits that you found clues to what they actually were: retraced missing bits of keys. You could also cut your own copy of the text/key along the perforated margins of the book, leaving me again with the bits.

But to me, today, the bits look like little unique gravestones to the dead metaphors of possession: 'To have'.

4.   Smell Me, Touch Me, Kiss Me: The Chemical Metaphors
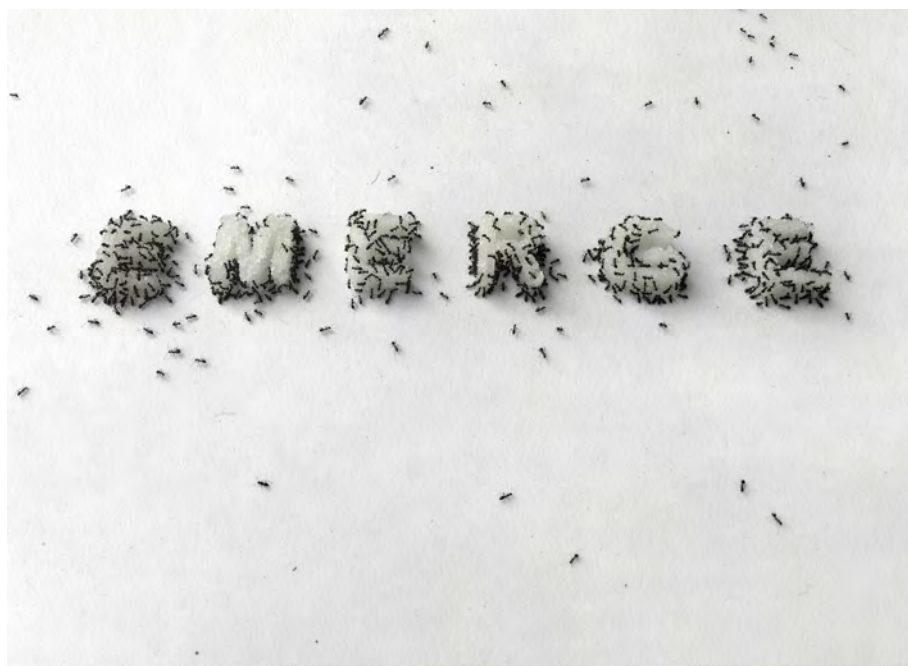
Figure 3

Synesthesia is a perceptual phenomenon in which stimulation of one sensory or cognitive pathway leads to involuntary experiences in another sensory or cognitive pathway. For example, you see colors when you hear words or sounds; you taste food when you see words or shapes; you hear sounds when you smell scents or touch objects; you feel a touch when you see someone else being touched etc.

We actually all have some synesthetic abilities: we instinctively can find, or create, synesthetic patterns. If synesthesia is the result of cross-connectivity among the brain's sensory regions, the same connectivity could explain how our metaphorical thinking can create a kind of conceptual synesthesia, in which the abstract is understood in the context of the concrete or physical. And many of the metaphors we use everyday are synesthetic.

My dad had grown a beautiful garden but passed away just before the trees bore their first fruit. With our bitter hearts and salty tears, we welcomed the remarkable sweetness of that first harvest. After his 10th memo-

rial I went into his garden in search of him. Over two months I prepared and served sweet letters to the garden. The ants responded.

Far simpler but not any less interesting than human metaphors are the metaphors exchanged between ants. Ants communicate mostly chemically through pheromones which are scented chemicals produced by glands found all over their bodies. Those chemicals are detected as the ants feel each other through the tips of their super sensitive antennae. They may relay further messages by kissing, a common practice called trophallaxis, which is an exchange of liquid food regurgitated and mixed with pheromones. Their vocabulary seems crude typically containing only ten to twenty perfumes, each representing a 'chemical metaphor' that could for instance be signaling: Run away! There is food over here! I'm on foraging duty! Attack!

According to Steven Johnson (2004), in his book *Emergence*, many of those signs operate in a relatively simple binary fashion—signaling, for instance, whether another ant is a nestmate or an enemy. But ants can also detect gradients in pheromones, revealing which way the scent is growing stronger. Gradients in the pheromone trail are the difference between saying "there's food around here somewhere" or with more confidence "there's food due north of here."

So when an ant stumbled across one of my sweet words in the garden, it marked a scented trail on the way back to the nest so that more ants might follow. When an ant encountered another ant, it felt the other ant with its antennae; they then kissed as they recited scented liquid letters to each other. If an ant found a shorter path to the words, it secreted a stronger scent indicating more confidence and hence diverting the trail. Successful trails were followed by more ants, reinforcing better routes and gradually identifying the best delivery lines for my letter. After this long sweet affair with the ants, the underground became a mine of smells, touches and kisses.

Emergence

Ants are also particularly good at measuring the frequency of certain 'metaphors', a talent that also broadens the semantic range of the ant language. Ants can sense the difference between encountering ten foraging ants in an hour and encountering a hundred. This local talent is critical to the colony's global ability to adjust task allocation according to colony size and food supply. All the individual ant needs to do is mind its immediate neighbor and the colony would magically self-organize. Pheromones play the central role in the organization of the ant colonies. The key to that intelligence is simple: the ants smell, touch and kiss—literally!

By following simple rules, ants can create a colony; heart cells can cluster into a heart; people can assemble into a neighborhood; and a

software can learn how to recommend new books. The movement from low-level rules to higher-level sophistication is what we call emergence. I am interested in emergence/complexity/science of self-organization, how a complex organism/system could assemble itself without any master planner. An emergent system experiments, learns and grows by responding to feedback. Through emergence, large patterns emerge out of uncoordinated local actions. The crossing over of metaphor from the concrete to the abstract, or more generally the evolution of language can be also considered as an emergent phenomenon. While each person tries to reach his or her own communicative or expressive goals in various social circumstances, he or she uses a word in a particular way. If enough people use it in that same way, a metaphor is born and later dies; language is changed.

5.   Hayat: The Conceptual Metaphor
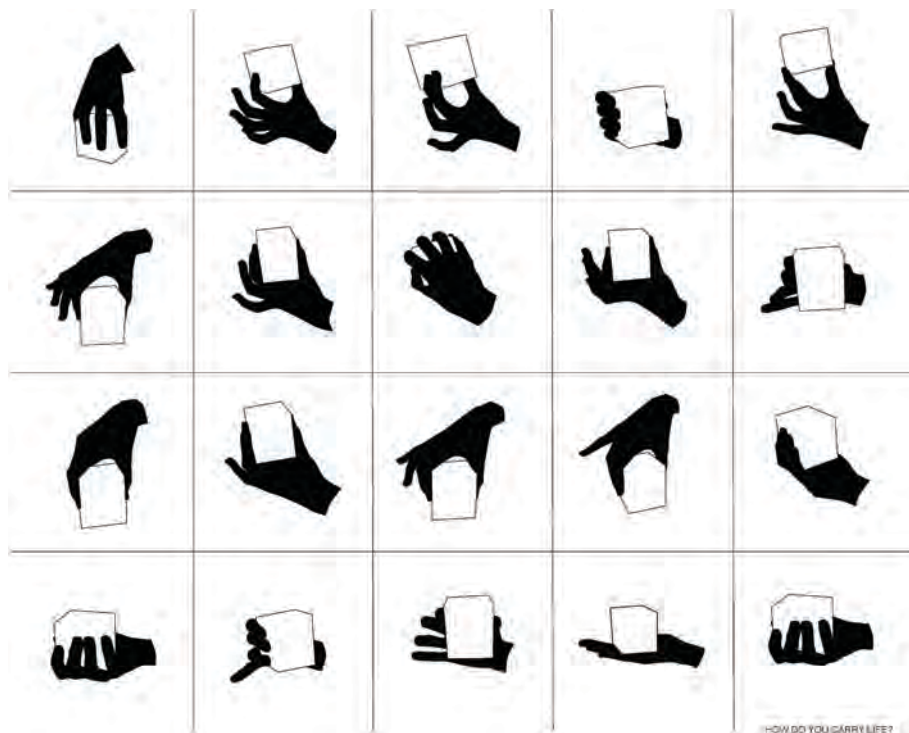
FIGURE 4

Our 'conceptual metaphors' influence our perception of the world. The images gain independent existence, and through our cultural artefacts, they even shape the world around us. The classic definition of

metaphor is giving a thing a name that belongs to something else. But when we give a thing a name that belongs to something else, we give it a whole set of analogies too. So when I fell upon an old advertisement from the 1950s of a traditional Lebanese bar of soap called *Hayat*, which means life in Arabic, I was very intrigued to investigate.

I discovered that Hayat still existed and was being made in a newer facility in Tripoli, North of Lebanon. I also discovered that Hayat was the daughter of the cook that had originally made the soap. According to some accounts, the cook named the soap Hayat after his daughter and according to other accounts, he named his daughter after the soap. Which story was more true or less true did not matter, I wanted to find Hayat. Excited, I tracked down Hayat's son and met with him. During our encounter, Hayat's son talked extensively about his life and about his dad's life. When I finally asked about Hayat, with a blank look he said: Hayat led a 'normal' life.

How can 'normal' be inspiring?! I thought with a sigh. He suggested I meet her when she was back from her travels. I then asked if perhaps he would share some old photos of her. He explained that Hayat might not approve because she was veiled later in her life. I knew I would not ask about Hayat anymore. I preferred to leave her veiled in the intimacy of her own 'normal' life. I realized I could only try to unveil the 'hayat' in my hands.I went back to the ad: there was a hand holding the soap up with the tips of its fingers. Very elegantly. very lightly, so unlike how you would carry a rough brick-like heavy traditional bar of soap. I wondered whether it had been the name Hayat, life in Arabic, that had allowed that divergence. So I explored the different possible ways of carrying hayat.

According to David McNeill (2005), an expert on the relationship between gesture and thinking, gestures can draw forms or spaces that induce imagery for abstract meanings. Through metaphor and metaphorical gestures, body and mind can be intimately entangled. The body is the most immediate thing in our physical environment, so it is no wonder that there is hardly any part of the body that has not been the origin of a metaphor for spatial and more abstract concepts. For example, words like behind, back, and front are all body-parts marching towards abstraction. The word life itself is derived from roots that refer to the abdomen, waist, or womb but most importantly roots that refer to the whole body.

I think, life is soap. It is made so it is unmade; it is worth all that consumes it; it is the dirt between your hands, the sweat of your body and the stains on your best of clothes. I also think, language is soap. It clears as much as it slips; it is decorative; it is plain; it can take on different forms. Then there must be life in language. And language in life.

According to Ghassan Tueini, Lebanese journalist, politician, and diplomat, there is life in every letter; every day the letter is born both young and old (Fondation Libanaise de la Bibliothèque Nationale, 2010, p. 11). So I think it is possible then that a hand can carry a bar of hayat, a bar of life that is simultaneously young and old, heavy and light.

6. Conclusion

In *Mourning Sex,* Peggy Phelan (1997) said the words fled because they were sick of our literal faith in them; Healers wanted the words to comfort, politicians wanted them to inspire, and artists wanted them to make magic. We believed so much in the words we made them carry our dreams and histories. Peggy Phelan realized that, like her lover, the words fled because they had been horribly misrecognized. We made the mistake of loving the words for the way they made us feel and behave and forgot to love the words for the "more in-them-than-themselves that made it possible for them to create something we could never control, the more-in-them that made it possible for them to travel to places whose topography we could never map." (1997, p. 7) So the words ran out of our ears, out of our mouths, flew right out of our bodies and rang and clanged high up in the sky and finally exploded in a big cacophony of sounds.

I like to explore the effect on language if we suspend our literalness. We may have to accept the partialness of experience and the fallibility of memory, and then allow both perception and remembering to be tools of invention rather than recording. That way, a new sense may develop not from History alone but also from Fiction—a projection of reality.

Our reality is handed to us at a macro level: at any moment it is the result of a complex historical development. Yet we can only interact or add to this reality at a micro level. Because of that mismatch in scales, between macro and micro, we feel ignorant. And it is that ignorance that makes us feel alienated. We think that by excavating history ever more thoroughly we would be able to ease that sense of alienation. But the truth is our experience, our perception of reality, will always contain more than what we know. To define an object, a person, or a system by its history would only limit it. So a more complete understanding can be achieved in trusting that very sense of alienation in our experience of reality. So that is why I am interested in our most immediate experience of reality, our 'everyday,' like the ants in our gardens, the keys in our hands, the soap on our wash basins, the sugar on our kitchen tables, and most importantly the language on our tongues.

My search involves an enquiry into language. There is a temporary forgetting of meaning as I feed the alphabet to the ants and as I suspend my search for the origin of Hayat. Only to pick up the words again and

use them as triggers for rituals in the hopes of smelling, touching and kissing matter's more metaphorical possibilities.

By bringing together what we know and what we don't know through analogy, metaphorical thinking helps us understand, learn and communicate. Most importantly it opens the door to the greatest discoveries and inventions.

7.   Art Exhibition

Soap Coins: The Economic Metaphors

FIGURE 5

FIGURE 6

Mute Melodies: The Dead Metaphors
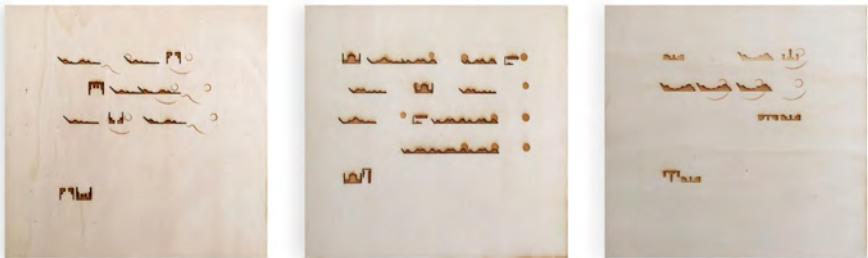
FIGURE 7

FIGURE 8
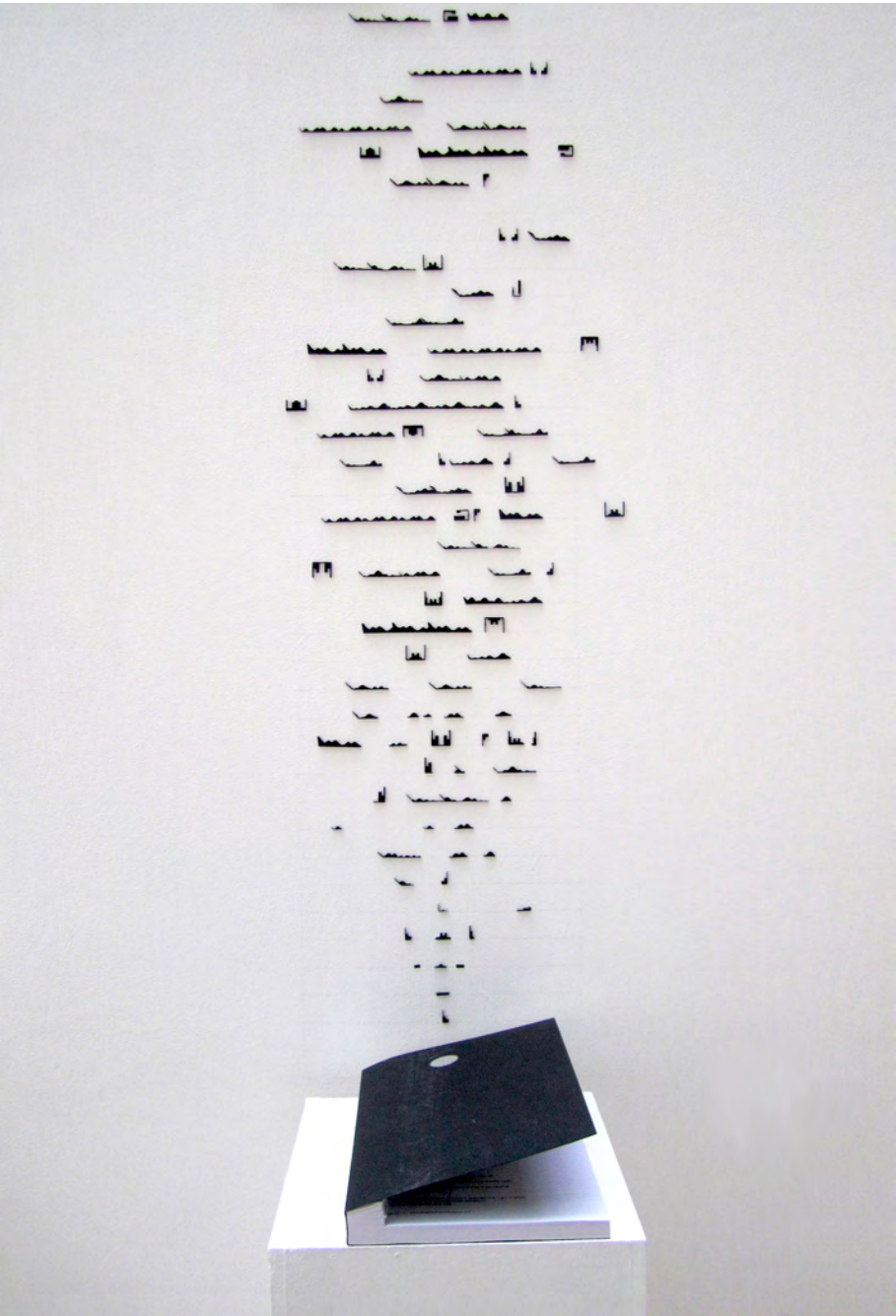
Figure 9

Smell Me, Touch Me, Kiss Me: The Chemical Metaphors
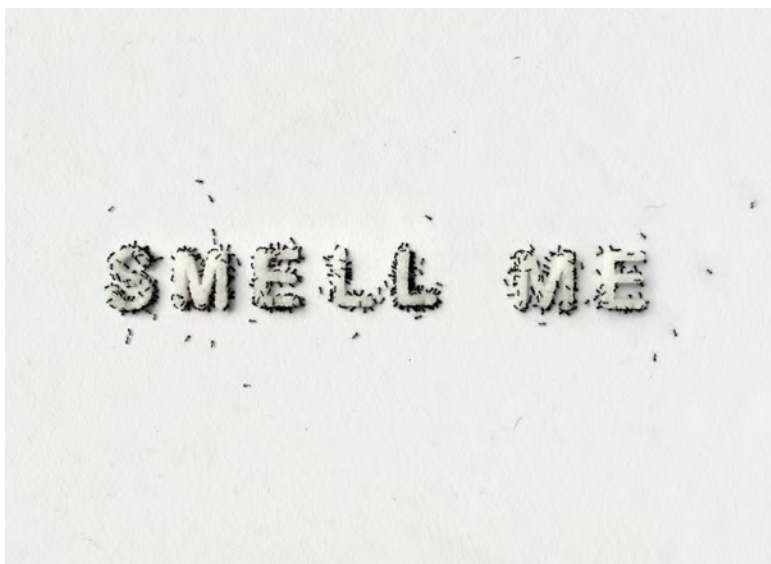
FIGURE 10

FIGURE 11

FIGURE 12

Hayat: The Conceptual Metaphor

FIGURE 13

FIGURE 14

Image Details

Figure 1 Designs of '*Soap Coins*', Christine Kettaneh, 2014.
Figure 5 *Soap Coins*, Christine Kettaneh, laser engraving on soap, 2014.
Figure 6 Washing with *Soap Coins* at *Coin—a gift for wealth*, event organized by Clare Whistler and Chris Drury, Seaford, UK, photo courtesy of Kevin Costello, 2014.

Figure 2 Designs of '*Mute Melody to P*', Christine Kettaneh, 2013.
Figure 7 *Mute Melody to C, Mute Melody to P dot, Mute Melody to G*, Christine Kettaneh, 2013, laser-engraving on plywood, 20×20 cm each, ed. 2/2.
Figure 8 *Bags of 'unobsessivenesses'*, part of Mute Melodies project, Christine Kettaneh, 2013, bags of metal filings, Exposure 2013, Beirut Art Center, image courtesy of Roland Ragi.
Figure 9 *time cutting time*, part of *Mute Melodies* project, Christine Kettaneh, 2013, acrylic pieces and artist book, Exposure 2013, Beirut Art Center.

Figure 3 *EMERGE*, Christine Kettaneh, 2016, cold press bright paper, ed. 1/4, 24×32 cm.
Figure 10 *SMELL ME*, Christine Kettaneh, 2016, cold press bright paper, ed. 1/4, 24×32 cm.
Figure 11 Art Installation (artist book, rotating sugar ball & box of sugar letters) part of *Smell me, Touch me, Kiss me* project, Christine Kettaneh, 2017.
Figure 12 *Comma, Semi colon1, & Semi colon2*, Christine Kettaneh, 2016, cold press bright paper, ed. 1/4, 18×24 cm each.

Figure 4 Designs of '*How do you Carry Life?*,' Christine Kettaneh, 2016.
Figure 13 *Hayat old ad*, 40×14 cm, *Hayat old stamp*, 40×53 cm, *How do you carry life?*, 40×48 cm, cold press bright paper, ed. 3/4, Christine Kettaneh Solo Show 2018, Gagliardi e Domke, Turin.
Figure 14 *Proof that there is life in language and language in life*, part *of Hayat* project, paint on soap, 6.5×6.5×4.5 cm each, ed. 3/4, Christine Kettaneh Solo Show 2018, Gagliardi e Domke, Turin.

References

Berry, P. (2008). *Echo's subtle body: contributions to an archetypal psychology*. 2nd ed. Connecticut: Spring Publications.

Deutscher, G. (2005). *The Unfolding of Language: An Evolutionary Tour of Mankind's Greatest Invention*. London: Random House.

Fondation Libanaise de la Bibliothèque Nationale (2010). قرن من الصحافة في لبنان ١٨٥٨-١٩٥٨ [*Cent Ans de la Presse au Liban, 1858–1958*]. Beirut: Fondation Libanaise de la Bibliothèque Nationale.

Johnson, S. (2004). *Emergence: The Connected Lives of Ants, Brains, Cities, and Software*. New York: Scribner.

Kettaneh, C. (2014). "Mute Melodies." URL: http://www.christinekettaneh. com/ (visited on August 27, 2020).

————— (2015). "Soap Coins." URL: http://www.christinekettaneh.com/ (visited on August 27, 2020).

————— (2017a). "Hayat." URL: http://www.christinekettaneh.com/ (visited on August 27, 2020).

————— (2017b). "Smell me, Touch me, Kiss me." URL: http://www. christinekettaneh.com/ (visited on August 27, 2020).

Martinez, C. (2012). "Unexpress the expressible." In: *dOCUMENTA 13: The Book of Books*. Ed. by Katrin Sauerlander. 100 Notes - 100 Thoughts. Ostfildern, Germany: Hatje Cantz.

Martinez, Chus (2012). "How a tadpole becomes a frog. Belated aesthetics, politics, and animated matter: toward a theory of artistic research." In: *dOCUMENTA 13: The Book of Books*. Ed. by Katrin Sauerlander. 100 Notes - 100 Thoughts. Ostfildern, Germany: Hatje Cantz.

McNeill, D. (2005). *Gesture and Thought*. Chicago, London: University of Chicago Press.

Phelan, Peggy (1997). *Mourning sex: performing public memories*. London: Routledge.

Index

A

abbreviation, 14, 15, 32, 33, 60–63, 76, 77, 91, 269, 282, 378, 514, 631, 719, 819, 946, 1078

    marker, 15

abjad, 51, 53, 54, 60, 76, 134, 178, 180, 228, 625, 781, 807–811, 820, 822, 910, 1109

Abkhaz, 115

abstract, 561, 563, 565, 567

    object, 9

abugida, 54, 162, 163, 165, 177, 180, 184, 228, 625, 807–811, 818–820, 822

acrophonic, 208, 232

    principle, 168, 224, 232

acrostics, 1109, 1111–1113, 1116

Adobe, 441

Aegean, 807, 809

Aidarus, 980

Ajami, 971

Akkadian, 59, 116, 117, 216, 218, 929, 1112

al-Busiri, 980

al-Inkishafi, 977

Albanian, 166, 373, 392

aleph, 466, 1114, 1115

Algerian (typeface), 397

Algernon, 276, 278

Alice in Wonderland, 350, 351

alloglottoepy, 790

alloglottography, 790

allography, 129, 134, 136, 232, 233

alphabet, 89, 144–148, 150, 152, 154, 155, 157, 166, 168–170, 172, 177, 180, 182, 185–187, 218, 223–230, 232, 234–236, 241, 242, 244, 429, 432, 463, 473, 569, 763, 765, 807, 810, 811, 822, 825, 829, 831, 837, 841, 888, 907, 908, 910, 916, 1109, 1112

    a monument to hidebound conservatism, 114

    Arabic, 910

    Aramaic, 166

    Armenian, 166, 185, 186

    Bougainvillian, 837

    Carian, 181, 182, 232, 233

    consonantal, 208, 218, 810, 811

    Coptic, 184, 775, 776, 778, 780

    Cyrillic, 115, 154, 1068, 1070, 1080

    dual, 14

    English, 825

    Entlehnungs-, 150

    Etruscan, 170, 171, 916

    Georgian, 793

    Gothic, 166, 224

    Greek, 115, 167–171, 182, 187, 225, 226, 230–232, 234, 775–779, 781

    Hebrew, 231, 497

    history, 157

Q

R

S