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

Y. Haralambous (Ed.), *Graphonlinguistics in the 21st Century 2020. Proceedings*
Graphonlinguistics and Its Applications (ISSN: 2681-8566, e-ISSN: 2534-5192), Vol. 4.
Fluxus Editions, Brest, 2021, pp. 47–82. https://doi.org/10.36824/2020-graf-oste
ISBN: 978-2-9570549-6-1, e-ISBN: 978-2-9570549-8-5

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.

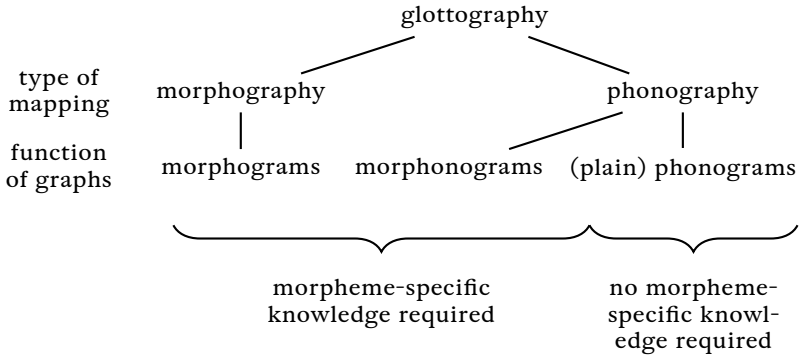


FIGURE 1. Basic subtypes of glottography and the respective functions of graphs

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 phonographic subsystem of *katakana* in Japanese. However, broadening the scope even further and using these terms as typological labels to classify 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] Therefore, 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 morphographic 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 systems 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.

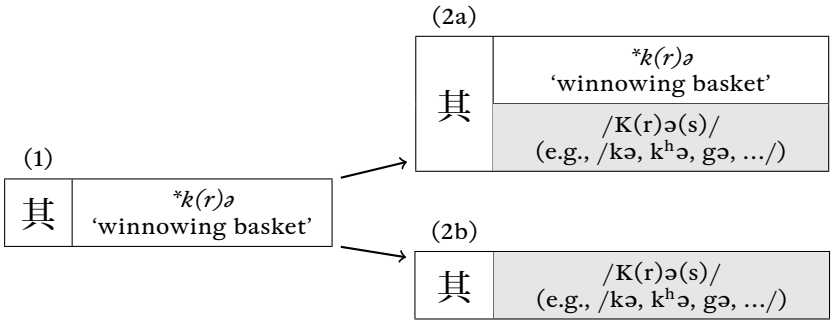


FIGURE 2. Example for a transition from morphogram to phonogram

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]ʳaj 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.'

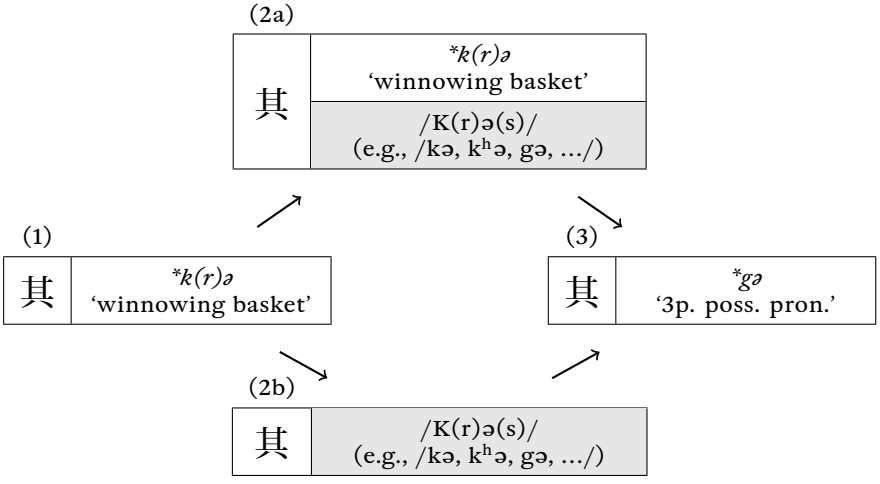


FIGURE 3. Example of a transition from morphogram to phonogram and back

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-ḥ* '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).

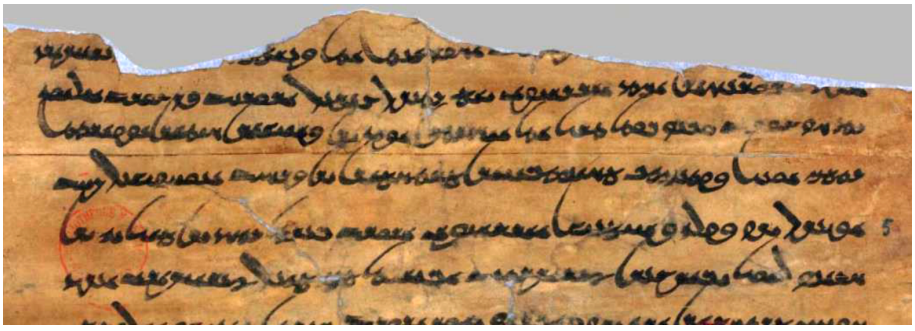


FIGURE 4. Specimen of a Sogdian text featuring heterograms[15]

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 preexisting 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.

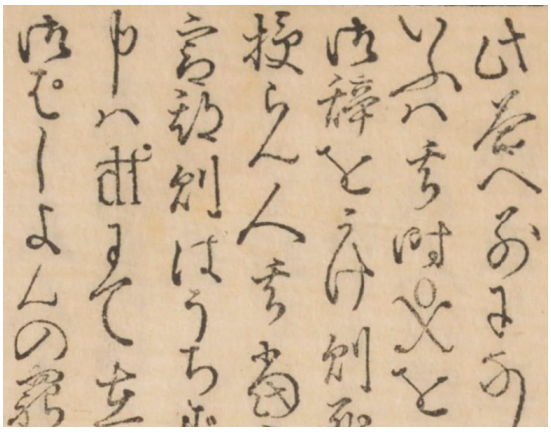


FIGURE 5. Roman-based abbreviations in the main text of *Guia do pecador*[18]

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 <dĩ> (for Japanese *deusu* < Latin *deus*), <Jš> (*Jezusu* < Portuguese *Jesus*), <Jx̊> (*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.

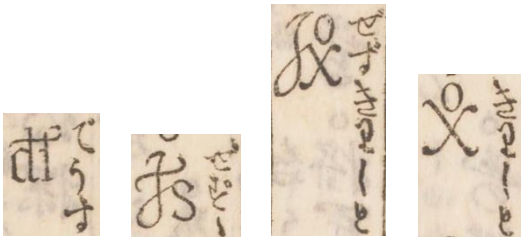


FIGURE 6. Roman-based abbreviations in *Guia do pecador*[20]

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

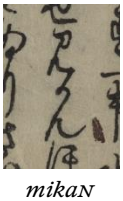
19. Some or all of these four abbreviations are also featured in other later prints produced by the Mission Press, namely *Doctrina Christam* (1600), *Doctrinæ Christianæ rudimenta* (1600), *Contemptus mundi* (1610) and *Fidesno quiŏ* (1611). Even before their first appearance in print they had already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

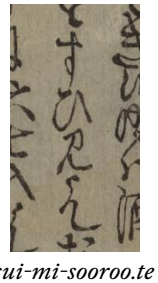
clear-cut two-way or even more fine-grained distinctions: either in *kana* vs. Chinese characters as phono- and morphograms respectively, at least by and large, or also in Romanizations, using for instance lower case for phonograms, and UPPER CASE or SMALL CAPS for morphograms.

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 𛀁, 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.

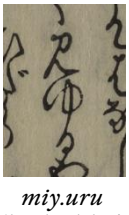
Consider the following set of examples taken from a 17th century print, more specifically a cookbook bearing the title *Ryōri monogatari* 料理物語 (1647). Cursive 𛀁 appears a number of times throughout the text, including clear-cut cases in which it serves as a phonogram and others in which its exact function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



mikaN
'mikan (citrus fruit)'
(44v, l. 3)



sui-mi-sooroo.te
'take a sip and see'
(52r, l. 8)



miy.uru
'looks like'
(38r, l. 4)

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

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

21. *Ryōri monogatari* 料理物語 (1647), copy in the possession of Kyoto University, Main Library, Tanimura Collection 谷村文庫, call no. 9-69/リ/1. Viewable online at: https://rmda.kulib.kyoto-u.ac.jp/item/rb00012373

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 𛀁 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 *mikaN*. 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, 𛀁 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 𛀁, 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) 倭尓者	*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*	YÔ^{m}B-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*	YÔ^{m}B-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.	(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.
	(Bentley, 2016, p. 105)	(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 𛀁 /ha/ (from earlier /fa/ < /pa/) and 𚥤 /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* 𛀁 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'*/*mɛː'* '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 semantics. 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 bakyaku 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.