Braille as Writing

Evidence and Lessons for Grapholinguistic Theory

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Abstract. The inventory of embossed symbols known as Braille is widely used by Blind and Visually Impaired (BVI) users for touch-reading and information exchange. In permitting communication through the tactile-graphical mode, Braille acts as an alternative to the visual-graphical mode employed by sighted persons for the same purpose. Since its creation two centuries ago, this tactile symbol inventory has enabled BVI users around the world to access information that might otherwise have been inaccessible or unavailable to them. Braille has been widely admired for its simplicity and emancipatory potential. Yet, most sighted users know little about the symbol inventory or its underlying workings as a graphical form of spoken language. The lack of awareness extends to scholarly circles, with Braille remaining an outlier in grapholinguistic and related research endeavors. Consequently, the insights that Braille potentially offers for refining our understanding of writing remain largely unknown. Of late, Blind and sighted advocates have been calling for greater attention to be given to Braille in grapholinguistic contexts, and for it to be considered a valid form of writing. This article addresses the fundamental question of whether Braille text can be considered 'writing' that is analogous and equivalent to print text. To this end, the article investigates whether linguistic content in Braille meets the definitions of key grapholinguistic concepts, and identifies outliers and edge cases. The article concludes that Braille text not only fulfils the definition of 'writing' under contemporary grapholinguistic theory, it also helps clarify hitherto ambiguous or debated concepts.

1. Introduction

1.1. Background and Motivation

For most sighted people across the world, Braille exists largely on the peripheries of their imaginations. Among this cohort, knowledge about Braille, its functioning and its applications has generally been minimal.

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There exists a minority of sighted Braille users, many of whom are engaged as pedagogues, advocates and allies with the Blind and Visually Impaired (BVI) community. Regardless, it appears uncontroversial to state that most of the world's sighted population—comprising the vast majority of humanity—know little about how Braille actually 'works'.

Regrettably, the epistemological marginalization of Braille also holds true within academic circles, including in grapholinguistics. Despite being hailed as "a lighthouse to pierce the darkness of the blind" (Keller in Mackenzie, 1954, p. 5), "a vital tool of literacy" (Dixon in Perkins et al., 2013, p. viii) and "the first effective digitization of writing" (Daniels and Bright, 1996, p. 886), Braille continues to be sidelined in scholarly research and remains chronically understudied (Englebretson, Holbrook, and Fischer-Baum, 2023, p. 402). Consequently, it remains largely unknown what lessons Braille may hold for refining our understanding of 'writing' in graphematic and sociolinguistic contexts.

The resultant misconceptions about Braille have prompted otherwise well-meaning sighted authors to unwittingly characterize it as an embossed notation or code for the visual or INKPRINT writing system of a language, to enable Blind users to read by touch.[1] Such characterizations have been critiqued as visuocentric, since they depict Braille as "a code for print, as derived from print [and] dependent on print" (ibid., p. 407). Along similar lines, Braille is sometimes considered a secondary or auxiliary notation system, implying that it acts as a subordinate alternative for a corresponding 'primary' writing system. Such portrayals belie the reality of Blind users for whom a Braille-based system is very much their primary mode of reading and writing, and may be the only one they are literate in Daniels (1996b, p. 818). Besides, there exists little to no methodical analysis or reliable evidence attesting to Braille's supposed secondary or subsidiary status, because of which such a characterization essentially remains an opinion. Yet, the numerical dominance of sighted scholars in the academic community has elevated the majority opinion to quasi-consensus status, in the process percolating into BVI authors' own stances on the issue (Englebretson, 2009, p. 69; Englebretson, Holbrook, and Fischer-Baum, 2023, p. 408).

Against this background, scholars, pedagogues and advocates have been increasingly calling for Braille to receive greater prominence in academic and popular spheres alike. Within grapholinguistics, Meletis (2020, p. 32, footnote 35) argues that, from a structural standpoint, Braille as used in representing spoken language qualifies as 'language writing' and should be considered as such. In the sociolinguistic realm,

1. In Braille-related contexts, the conventionalized term <inkprint> denotes any writing meant to be sight-read, even if not printed as such (e.g., electronic text). The equivalent French term is <en noir>, literally 'in black'. Such text is contrasted with material meant to be touch-read, namely in Braille.

Klein and Spitzmüller (2022) compare the relative prominence of and discourse patterns around Braille and sign language in the German-language press, with the aim of identifying the underlying ideologies in each case.[2] They conclude that:

> As opposed to sign languages, Braille is still very much *stigmatized* both in society and academic literature. While sign languages are (rightly) celebrated as languages proper and sign language users as a vivid and strong community, Braille is still perceived as an *auxiliary and pathological* form of writing/reading of *individual persons* … (ibid., 21:13; emphasis in original)

In calling for Braille's removal from "the blind spot of communication theory and practice", Klein and Spitzmüller (ibid., 21:46) highlight its status as "a proper, and extremely interesting, form of graphic communication".

A seminal argument to this end is that of Englebretson, Holbrook, and Fischer-Baum (2023), who make a compelling case for researching Braille as "a writing system worthy of study in its own right and on its own terms" (p. 400). In addition to their distinct backgrounds in linguistics, education and psychology, the authors of this study represent a mix of Blind and sighted users of Braille at varying levels of proficiency. Drawing on their diverse areas of expertise and lived experiences, they eloquently argue in favor of "decentering the sighted norm" in academic research, highlighting the ramifications of not doing so for BVI and sighted communities alike. Aside from the need to ensure equity and social justice, Englebretson et al. assert that centering Braille and Blind users in pedagogical, cognitive and grapholinguistic investigations would lead to new and insightful findings in these spheres.

The arguments in Englebretson, Holbrook, and Fischer-Baum (ibid.) serve as motivation for the present article. My intention is for this article to serve as an initial step towards the ultimate aim of normalizing Braille as a subject of inquiry in grapholinguistic research. I further hope that the article's subject matter and findings act as impetus for subsequent efforts of a similar kind, to bring the discipline of grapholinguistics closer to the stated aim.

1.2. Objectives

The prediction in Englebretson, Holbrook, and Fischer-Baum (ibid.) that foregrounding Braille in research efforts would yield promising outcomes has been partly vindicated by recent work in the pedagogical and

2. In the Anglophone literature, sign languages may also be termed *signed languages*. I am not (yet) aware of any noteworthy differences in connotation between the nomenclatural variants.

cognitive domains (see, e.g., Hoskin et al., 2024; Martiniello and Wittich, 2022; Sheffield, D'Andrea, Morash, and Chatfield, 2022). Progress on the grapholinguistic front, however, has been slow. Building on the findings of Meletis (2020) and Klein and Spitzmüller (2022), there have been welcome forays of late into unpacking Braille as used in depicting languages other than English (Fetnaci, Haralambous, and Varin, 2022; Iyengar, in press). Nevertheless, such works remain few and far between, and Braille is yet to become a routine subject of grapholinguistic exploration comparable to its inkprint counterparts. In particular, there is as yet no dedicated cross-linguistic analysis of Braille that examines its grapholinguistic properties by applying state-of-the-art theory in a rigorous and consistent manner.

Against this background, I investigate in this article how Braille is deployed in transcribing or graphizing various spoken human languages worldwide (henceforth 'Braille text'). In doing so, I gauge how Braille text might fit into current graphematic and sociolinguistic frameworks and, conversely, how these frameworks account for the manifestations of Braille text across languages. To this end, the specific questions I address are:

1. To what extent does Braille text meet the requirements of glottography, script and writing system as laid out in the academic literature?
2. With reference to the Modular Theory of Writing Systems (MT) (Meletis, 2020; Neef, 2015), how neatly is Braille text compartmentalizable into the MT's envisaged modules of graphematic system and orthography? If edge cases emerge, what can they tell us about the underlying properties of Braille text, and about contemporary grapholinguistic theory?
3. Are typological labels like logographic and phonographic applicable to Braille text? If yes, how does Braille text lend itself to the application of granular typological category labels such as abugida, alphasyllabary and alphabet (Bright, 1999; Gnanadesikan, 2017; Iyengar, 2023)?
4. What lessons emerge from analyzing Braille text using contemporary sociolinguistic approaches such as biscriptality (Bunčić, Lippert, and Rabus, 2016)? How does this analysis validate, contradict and/or refine our current understanding of sociolinguistic phenomena?

By identifying areas of congruence and dissonance between existing theory and Braille-based data, I make observations and preliminary conclusions on the relation of Braille and inkprint text, especially on the appropriateness of characterizing Braille text as 'language writing' in the conventional sense.

For consistency with established anglophone grapholinguistic practice, I spell all script names with an initial uppercase letter, as in <Hiragana>,

<Devanagari> and <Bopomofo>. Since Braille will be discussed in a similar context, the word <Braille> is also spelled with initial uppercase <B>. This is also the casing convention adopted by Sir Clutha Mackenzie in his seminal reference work, *World Braille Usage* (Mackenzie, 1954).

1.3. Limitations

The story of Braille's invention (§2) highlights the value of end-user involvement when designing a solution, in light of such users' intimate familiarity and nuanced experiential knowledge with the issue at hand. It follows that touch-readers of Braille would possess subtle insights into the underlying workings of Braille text that may not be readily evident to sight-readers of Braille text like myself. That said, ideational refinement requires collective input, especially on under-researched topics like the current one. It is, therefore, imperative that Blind and sighted researchers of Braille jointly contribute to their shared topic of interest, be it on conceptual questions as in this article, or on real-world practice as in Englebretson, Holbrook, and Fischer-Baum (2023). In any event, my conclusions in this article are necessarily preliminary, remain open to ongoing scrutiny, and will inevitably be refined, modified or superseded by future research.

2. Braille: An Overview

The symbol inventory today known as Braille is named after Frenchman Louis Braille (1809–1852), who lost his eyesight in a domestic accident aged three (Australian Braille Authority, 2024a; Mellor, 2006). At ten years old, Braille enrolled at the *Institut National des Jeunes Aveugles* (INJA; 'National Institute for the Young Blind') in Paris, where he learnt to touch-read his native French transcribed in embossed Latin-script letters (Campsie, 2021). He also acquainted himself with tactile transcription systems invented by soldier-turned-philanthropist Charles Barbier, which eschewed Latin-script letters in favor of graphically simple combinations of dots and dashes (Barbier, 1809; 1815). Building on Barbier's concept of embossed dot-and-dash symbols, Braille began exploring ways to improve the symbols' tactile perceptibility. By 1825, aged sixteen, he had a prototype ready (Henri in Mackenzie, 1954, p. 18; Tomic, 2025). Soon after, he became a tutor at his alma mater, while continuing to work on his symbol inventory (American Foundation for the Blind, 2024b).

By 1829, Braille had simplified the design template of an individual tactile symbol into a matrix or CELL of six dot positions, arranged in three rows and two columns. By raising different dot combinations within a cell, one could create up to 63 distinct embossed symbols. For reference purposes, the six dots were numbered top-to-bottom and left-to-right, as shown in Figure 1.

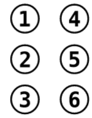

FIG. 1. Standard numbering pattern of a Braille cell. Source: Wikimedia Commons. Copyright 2010 by DePiep. Modified and used under CC BY-SA 3.0

In place of two dots, a row could comprise a continuous raised dash. Permitting dashes and dots to co-occur within a cell generated an additional 61 symbol options. Together with a blank space, Braille's inventory provided for 125 unique tactile symbols formed from just two design elements: a dot and a dash. Moreover, the 3 × 2 cell configuration ensured every single symbol would fit neatly under an adult human fingertip, facilitating efficient decipherment (Mackenzie, 1954, Chapter 2). A selection of symbols from Braille's prototype featuring various dot-and-dash combinations is shown in (1).

(1) 

By mapping individual embossed symbols onto French-in-Latin letters, digits and punctuation marks, Braille effectively created a parallel standalone transcription system tailor-made for touch-reading. Along similar lines, he harnessed his symbol inventory to devise a tactile system of musical notation. In 1829, the twenty-year-old Braille unveiled his creations in a 32-page booklet, titled *Procédé pour écrire les Paroles, la Musique et le Plain-chant au moyen de points*, 'Procedure for writing words, music and plain-song using dots' (Braille, 1829). The booklet featured embossed samples of his notation systems with accompanying explanatory text in embossed-type French-in-Latin.

Notwithstanding the design simplicity of his creations, Braille was apparently aware that the dash element was not as tactually perceptible as the individual dots. In the booklet's explanatory text, he concedes:

> Le trait qui entre dans le composition des signes … pouvant présenter quelques difficultés a plusieurs de ceux qui étudieront ce procédé ;
>
> [The dash that enters into the composition of the signs … can present some difficulty to many of those who will study this procedure;]
>
> (ibid., p. 12; translation by National Federation of the Blind, n.d.)

By the time the first book-length work typeset in his system appeared in 1837 (American Foundation for the Blind, 2024a), Braille had eliminated the raised-dash symbols from his inventory. His streamlined symbol set now featured 63 distinct cells founded upon a sole design element—a raised dot (Mackenzie, 1954). A century down the line, the INJA's Pierre Henri would note how his predecessor Louis Braille's lived experiences as a Blind person were indispensable in informing the symbols' final design:

> [O]nly a blind man [*sic*] could have arranged dots in groups which exactly correspond to the requirements of the sense of touch. Reduce the number of dots and the available signs become obviously insufficient; add to their number, and the signs can no longer be covered by the finger-tip, nor so easily read … (Henri in Mackenzie, 1953, p. 18)

Louis Braille died young at just 43 years of age, but his creation lived on. Over the following century and a half, his now-eponymous inventory of raised-dot cells became the basis of tactile representation schemes for over a hundred languages globally (Perkins, International Council on English Braille, and National Library Service, 2013; ScriptSource, 2025). The number continues to increase; in the twenty-first century, Braille representations have been proposed for languages like Inuktitut, Cherokee and even Klingon (Kearney, 2012; 2014; 2019). Louis Braille's musical notation has also endured, and has been supplemented by analogous notations in mathematics and phonetics (Englebretson, 2008; 2009; Nemeth, 1973).

With a view to examining the compatibility of Braille text and contemporary grapholinguistic frameworks, Sections 3 to 6 outline relevant terminology and theoretical concepts, and assess their applicability to Braille text. In doing so, relevant insights including noteworthy areas of incongruence are highlighted. The findings are consolidated and summarized in Section 7.

3. Script, Writing System and Glottography

The grapholinguistic term for a discrete unit of writing is a GRAPH. It serves as an all-encompassing term that is also less ambiguous than the lay alternatives *sign*, *letter*, and *character* (Iyengar, 2023; Meletis, 2020). For clarity, graphs may be shown enclosed in pipes, as in |A|. An inventory of graphs used to represent human speech in graphical form is termed a SCRIPT, with the script-language pair constituting a writing system (henceforth 'WS') (Iyengar, 2023; in press; Meletis, 2020; Neef, 2015; Weingarten, 2013). A WRITING SYSTEM, therefore, comprises two mandatory and distinct components: a *spoken* language and a *written* script. The three entities of writing system, language and script "undeniably represent an elusive trinity", according to Joyce and Masuda (2019, p. 248). Despite the ostensible elusiveness of these intertwined entities, it is imperative that they be clearly identified and conceptually distinguished, particularly in the context of this article. All three concepts fall under the umbrella of GLOTTOGRAPHY or 'language writing'—namely the use of graphical symbols to represent units of spoken language, where the spoken units might range from individual speech sounds to entire morphemes and words (Iyengar, in press; Sampson, 2015, 21ff). Glottography is distinguished from *semasiography* or 'meaning writing' (Gelb, 1963; Sampson, 2015), wherein graphical symbols denote fuzzy concepts or ideas rather than specific sounds or words. Notations that are partially or wholly semasiographic include mathematical formulae, traffic signage and emojis. In deciding if a set of graphical symbols is glottographic or semasiographic, the mode of decipherment—whether visual or tactile—does not play a part (Iyengar, in press).

Per the above, the graph inventories known as Latin (or Roman), Arabic and Canadian Syllabics (or simply 'Syllabics') are scripts, whereas Swahili-in-Latin, Mandarin-in-Arabic and Inuktitut-in-Syllabics are WSs. It follows that a particular script may be used to graphize multiple languages, as in Swahili-in-Latin and Indonesian-in-Latin. Likewise, a particular language may be graphized in multiple scripts, as in Mandarin-in-Arabic and Mandarin-in-Bopomofo. Each of these language-script pairs constitutes a unique WS. For compactness in writing, a WS's components may be denoted by standardized codes or *tags* (Raymond, 2020) approved and overseen by the Internet Engineering Task Force (IETF) (Iyengar, 2023; Phillips and Baker, 2009). Thus, Inuktitut-in-Syllabics and Mandarin-in-Arabic may be represented by the tags `iu-Cans` and `cmn-Arab`, respectively. Such a double-barreled nomenclature transparently reveals the underlying language and script components for every WS, with the presence of the language component attesting to the WS's glottographic status. Furthermore, the nomenclature reinforces the conceptual distinction between *script* and *writing system*, and the possibility of pairing any language with any script. In doing so, the binominal format underscores the fact that any language could theoretically be written in any script, subtly negating notions of intrinsic or structural inseparability between a particular language and script. The IETF's format permits optional components to be suffixed as *subtags* to further delimit the WS based on fine-grained properties, such as geographical region or orthographic variant (Iyengar, 2023; Phillips and Baker, 2009).

The concepts of script, WS and glottography are all applicable to Braille text. As already mentioned, Louis Braille's eponymous symbol set of 63 raised-dot cells is used to transcribe a hundred-plus human languages. In tacit recognition of this fact, the IETF and related standards bodies have assigned the Braille inventory the subtag Brai, consistent with the four-letter format reserved for glottographic scripts (Phillips and Baker, 2009; ScriptSource, 2025). This makes Braille a script and its individual cells potential graphs. The qualifier *potential* accounts for the fact that some of the available 63 cells may go unused in graphizing a particular language, although such superfluity is happenstance. Surplus Braille cells in the context of a certain language might well constitute graphs with identifiable linguistic values when transcribing other languages. Two or three Braille cells may also be juxtaposed and utilized as digraphs and trigraphs that function as a cohesive unit with specific linguistic or paralinguistic values. The occurrence of such compound graphs in Braille text neatly mirrors the analogous phenomenon in inkprint. Take for example the English-in-Latin digraph <sh> and the English-in-Braille digraph <⠎⠓>, both of which map onto the English phoneme /ʃ/. By definition, every language graphically represented using the Braille script constitutes a unique writing system, and can be denoted with the corresponding WS tags. Thus, French-in-Braille, English-in-Braille and Zulu-in-Braille are all instances of WSs, whose tags are fr-Brai, en-Brai and zu-Brai, respectively. In each of these systems, the Braille inventory is the script component, with individual Braille cells acting as graphs. Moreover, since these WSs constitute the written representation of a spoken language, they are indisputably glottographic in nature.

The fact that Braille satisfies the accepted grapholinguistic definitions of script, WS and glottography is also consistent with historic—if isolated—observations of the phenomenon. In *Writing Systems of the World*, Daniels (1996b, p. 818) asserts that English-in-Braille as used in the United States (en-Brai-US) is not simply "a variety of English[in-Latin] orthography, but rather an independent writing system". In her textbook on writing systems, Gnanadesikan (2009) alludes to Braille text to demonstrate that the mode of decoding is inconsequential to a WS's glottographic status:

> [B]eing visible is not crucial to [the] definition [of writing]. Braille, for example, is a writing system [≈ script] for the blind designed to be felt with the fingers. It represents letters as a series of raised bumps that can be read by touch. (ibid., p. 3)

More recently, Honda (2021, p. 631, footnote 13) notes that "Japanese braille (点字 *tenji*) constitutes a separate tactile writing system which has different formal and functional properties from its multi-script visual writing system". Fetnaci, Haralambous, and Varin (2022) demonstrate the systematic similarities and differences between the Arabic language transcribed in Braille (ar-Brai) and in the homonymous inkprint script (ar-Arab), and in doing so explicitly describe Arabic-in-Braille as a writing system. These recent conclusions are especially valuable as they attest to and affirm Braille's ongoing usage as a glottographic script for a variety of mutually unrelated languages across the world.

4. Graphematic System and Orthography

Within a writing system, the correlation of written units from the script component to spoken units from the language component is termed the GRAPHEMATIC SYSTEM, or simply GRAPHEMATICS (Iyengar, in press; Meletis, 2020; Neef, 2015). The representational possibilities offered by the graphematic system may be constrained and occasionally overridden by the optional layer of ORTHOGRAPHY (Honda, 2021; Iyengar, 2023; 2024). For instance, the 'bare' `en-Latn` graphematic system may permit or *license* multiple ways of graphizing a particular word, as in <color> and <colour>. A superimposed orthographic layer often limits the range of written forms available to users by prescribing one and proscribing the others. The choice of orthography depends on the text's intended users and use. Thus, an English-in-Latin text written by or for American users would typically feature the written form <color>. Put differently, a bare graphematic system may have different orthographic 'veneers' applied by different user groups. A particular graphematic system subject to distinct orthographic layers—as in `en-Latn-US` and `en-Latn-GB`—represent distinct sets of *spelling rules* within a given WS (Iyengar, in press, Chapter 2).

4.1. Orthographic Variants

The concepts of orthography and spelling apply neatly to Braille-based writing systems. Until the turn of the twenty-first century, countries around the world used `en-Brai` with distinct but mutually intelligible conventions. In other words, countries utilized `en-Brai` under distinct but mutually intelligible *orthographies*, not unlike the contemporary usage of `en-Latn` globally. As with `en-Latn`, the most prominent English-in-Braille orthographies were those followed in the United States and United Kingdom—`en-Brai-US` and `en-Brai-GB`, respectively (Bogart and Koenig, 2005; Cranmer and Nemeth, 1991; International Council on English Braille, 2012). Following sustained effort and collaboration over several years, a revised and consolidated set of written conventions was released and steadily adopted around the world over the first two decades of the twenty-first century (Australian Braille Authority, 2024b). The revised set of conventions is known as *Unified English Braille* (UEB) and essentially constitutes a new English-in-Braille orthography (en-Brai-x-ueb) that supersedes the erstwhile standard orthographies of en-Brai-US and en-Brai-GB.[3]

4.2. Graph Inventories

Along similar lines, Braille-based WSs for other languages have also been subject to differing orthographic standards based on region or jurisdiction. As with en-Brai, the existence of variant orthographies within the same Braille-based WS are often traceable to a sustained and complex interplay of historical, cultural and political factors. Unlike en-Brai, however, other Braille-based WSs may feature mutually unintelligible orthographies that require targeted learning. For instance, Urdu-in-Braille (ur-Brai) is subject to conspicuously distinct spelling conventions in Pakistan and India (Iyengar, in press, Chapter 11; Perkins et al., 2013, p. xvi, 68, 104). An illustrative example is shown in (2). Consequently, BVI readers conversant in either ur-Brai-PK or ur-Brai-IN—but not both—might find themselves effectively cut off from a significant body of Urdu-language literature in Braille. This is an unfortunate scenario considering the paucity of material in Braille and the accessibility barriers that BVI users already face. That being said, the situation is also speculative; there is as yet no rigorous analysis available on the impact of cross-border orthographic differences on ur-Brai readers.

(2)

ur-Arab	تَمام اِنسان اَزاد اَور بَرابَرپَیدا ہُوے ہَیں۔
ur-Brai-PK	⠞⠂⠍⠁⠍⠀⠁⠑⠝⠁⠝⠀⠜⠵⠁⠙⠀⠁⠂⠺⠗⠀⠃⠂⠗⠁⠃⠂⠗⠀⠏⠂⠽⠙⠁⠀ ⠓⠥⠺⠊⠀⠓⠂⠊⠰⠲
ur-Brai-IN	⠞⠍⠜⠍⠀⠊⠝⠎⠜⠝⠀⠜⠵⠜⠙⠀⠪⠗⠀⠃⠗⠜⠃⠗⠀⠏⠽⠙⠜⠀⠓⠥⠺⠑⠀ ⠓⠌⠰⠲
en-Latn	*All human beings are born free and equal.*

On the mutual differences between Pakistani and Indian ur-Brai, a closer analysis reveals divergences at a deeper level, including in the phonetic values of certain graphs. Consequently, one may argue that the differences between ur-Brai-PK and ur-Brai-IN are not merely orthographic. Instead, they are graphematic, since they extend down to the graph inventory. However, unambiguously categorizing dimensions of difference as

3. IETF rules specify that subtags for writing systems that are not listed in the official registry are considered 'private use' subtags, and must be prefixed with x- (Phillips and Baker, 2009, pp. 8–9). Regrettably but not surprisingly, no Braille-related subtags were listed in the registry at the time of writing this article (Internet Assigned Numbers Authority, 2025). Consequently, the code for English-in-Braille's "universal" orthography qualifies as 'private' and needs to be formulated as en-Brai-x-ueb.

orthographic or graphematic proves contentious, as no consensus exists on determining the boundary between a WS's graphematic system and orthography (Honda, 2021; Iyengar, in press, Chapter 2; Meletis, 2020). Indeed, the dilemma may well remain unresolved until theoretical advancements are made and more sophisticated analytical tools are developed.

The above finding also dovetails with the core reason for the disparity between Pakistani and Indian Urdu-in-Braille. Whereas `ur-Brai-PK` is modelled on Arabic-in-Braille, `ur-Brai-IN` is based on a common set of graphematic principles and orthographic conventions for transcribing the official languages of India into Braille. These pan-Indian Braille conventions are officially known as *Bharati Braille* (IIT Madras, 2020; Iyengar, 2023; 2024) and represent a noteworthy instance of a graphematic-system-plus-orthography being employed by multiple WSs. In principle, a person literate in *any* Bharati-Braille-based WS could be considered literate in *all* of them.[4] Identifying a comparable example among inkprint WSs proves elusive. Nor does there appear to be an equivalent among inkprint WSs for the paradox embodied by Urdu-in-Braille, wherein an Urdu speaker from India literate in `ur-Brai-IN` may struggle to comprehend same-language or HOMOGLOTTAL text transcribed in `ur-Brai-PK` conventions, but could in principle decipher other-language or HETEROGLOTTAL text transcribed in Bharati Braille WSs. The noteworthy instance of a given language-script pair manifesting in two starkly divergent variants with limited mutual intelligibility reiterates the classificatory dilemma identified earlier: Are `ur-Brai-PK` and `ur-Brai-IN` instances of the same writing system differing only in their orthographic veneers, or does the divergence go deeper? If the latter, in which layer of the writing system is the difference supposed to exist, and why? These questions may have never arisen had our focus been restricted to inkprint WSs.

Regardless of inventorial differences between `ur-Brai-PK` and `ur-Brai-IN`, individual graphs in both variants are exclusively six-dot (Iyengar, in press, Chapter 11). This contrasts with the situation of Japanese-in-Braille (`ja-Brai`), which may manifest in three different avatars—the official *tenji* variant, and the unofficial *tenkanji* and *kantenji* variants. Of these, the graph inventories of *tenji* and *tenkanji* only comprise six-dot cells (Dasgupta, 2002; Dixon, 2007), while *kantenji* employs eight-dot cells (Dixon, 2007; Nagoya Braille Network, 2006).[5] The inventorial diversity among the `ja-Brai` variants reiterates the classificatory dilemma posed by `ur-Brai`—do these inventorial distinctions exist within the orthogra-

4. In practice, there exist minor customizations within individual Bharati Braille WSs that require targeted learning. In any event, any putative pan-systemic literacy assumes practical relevance only if the person is also orate in the target language(s).

5. 'Six-dot' and 'eight-dot' refer to the underlying cell matrix, wherein the *maximum* number of raised dots is six and eight, respectively.

phy, graphematics, or some other layer? As already noted, this question may not be satisfactorily addressable at the current level of grapholinguistic theory, and likely requires developing innovative analytical approaches. It is in posing such classificatory conundrums that Braille-based WSs demonstrate their value to grapholinguistics. By exhibiting behavior unattested among inkprint WSs, Braille-based WSs challenge the status quo and invariably spur conceptual refinements.

4.3. Paralinguistic Features

In spite of their divergent inventories, `ur-Brai-PK` and `ur-Brai-IN` are both written left-to-right, top-to-bottom (LR-TB), in contrast to the right-to-left (RL-TB) directionality of their inkprint counterpart of Urdu-in-Arabic (`ur-Arab`; see (2)). Although seemingly anomalous at first glance, the differing directionalities of `ur-Brai` and `ur-Arab` is actually consistent with historical and current practice across WSs. Mandarin-in-Han characters (`cmn-Hani`) and Mandarin-in-Bopomofo (`cmn-Bopo`) can be written LR-TB or top-to-bottom, right-to-left (TB-RL), as can the related WSs of Japanese in Kanji-and-Kana (`ja-Jpan`), and Korean in Hanja-and-Hangeul (`kr-Kore`).[6] Mandarin-in-Latin variants such as Hànyǔ Pīnyīn (`cmn-Latn-pinyin`) and Wade-Giles (`cmn-Latn-wadegile`) are written LR-TB in line with Latin-script WSs worldwide. Mandarin-in-Arabic (`cmn-Arab`) or Xiǎo'érjīng is written RL-TB consistent with other Arabic-script WSs, including `ur-Arab`. In short, the directionality of a WS is more often conditioned by the directionality of homographic WSs than homoglottal ones. It is, therefore, normal and consistent for Urdu-in-Braille to follow the canonical LR-TB directionality of Braille-based WSs worldwide, independently of the directionality of Urdu-in-Arabic. The fact that Braille systems are no different from their inkprint counterparts on matters of writing directionality only underscores the systemic equivalence of the two. These underlying parallels were not lost on the BVI pioneers of Braille standardization, who noted in a 1949 UNESCO report that:

6. The subtag `Jpan` is an "alias" for the blend of Kanji (`Hani`), Hiragana (`Hira`) and Katakana (`Kana`) characters used to graphize spoken Japanese, while the subtag `Kore` is an alias for the composite of Hanja (`Hani`) and Hangeul (`Hang`) employed to write Korean. `Hira`, `Kana` and `Hang`, as well as Bopomofo (`Bopo`) for Mandarin, were or are considered subsidiary to `Hani` and unsuitable as standalone scripts for writing their respective languages. However, if one disregards the ever-evolving sociolinguistic status and adopts a purely graphematic approach, one would deem `cmn-Bopo`, `ja-Hira`, `ja-Kana`, and `kr-Hang` standalone writing systems (Iyengar, in press, Chapter 2). A similar dichotomy of 'sociolinguistically subsidiary but graphematically independent' applies to Braille-based WSs, in that they are considered subordinate to their homoglottal inkprint counterparts despite being ostensibly self-standing (§1.1).

> [t]he script of every language is both written and read in a traditional direction—Chinese from top to bottom of the page, Persian, Urdu and Hebrew from right to left, Roman, Greek and Devanagari from left to right. Braille is traditionally read from left to right, and the Brailles of Japanese, Korean, Chinese, Malay, Urdu, Persian and Hebrew conform, not to the conventions of their visual scripts, but to the Braille convention. (Advisory Committee on Braille Problems, 1949, quoted in Mackenzie, 1954, p. 34)

Despite their systemic equivalence, a conspicuous difference between inkprint and Braille-based WSs is the latter's limited inventory size, especially the six-dot variant. While the former allows the creation of arbitrary graphs as required, Braille's design simplicity and typographical constraints rule out the option of conjuring up arbitrary derivative graphs. As a result, Braille-based WSs may convey paralinguistic information through novel bespoke conventions. Where the inkprint WS is bicameral and distinguishes between uppercase and lowercase letterforms, the corresponding Braille WS may feature a standalone capital marker graph. The capital marker usually precedes a regular 'lowercase' graph, with the resultant digraph interpreted as the 'uppercase' equivalent. A string of uppercase letters, as in heading text, may be portrayed by two or more instances of the capital marker placed at the start and end of the string. While the specific Braille cell chosen as the capital marker may differ across WSs, the underlying operation remains consistent and comparable. Thus, Dot-6 ⠠ serves as the capital marker in Armenian (`hy`), Bulgarian (`bg`) and English in Braille, whereas Dots-46 ⠨ fulfils the same role in Greek (`el`), French and Ukrainian (`uk`) in Braille (Perkins, International Council on English Braille, and National Library Service, 2013). To clarify, the existence of a Braille capital marker suggests that the corresponding inkprint *writing system* is bicameral. The *script* component of the inkprint WS is inconsequential, be it Armenian (`Armn`), Cyrillic (`Cyrl`), Greek (`Grek`), Latin or any other. Similar to the capital marker, bold and italic typeface in inkprint may be denoted by standalone graphs in Braille, indicating emphasis or distinctness from the surrounding text.

Although conveying paralinguistic cues through standalone graphs may seem unusual to some readers, there exist comparable practices in inkprint WSs. For instance, inkprint text representing a verbatim quote is enclosed within standalone quotation marks. In setting off the target text in a perceptibly distinct manner, the effect of graphically standalone quotation marks is akin to that of graphically superimposed bold or italic typeforms. Similarly, standalone question marks and/or exclamation marks may be used to convey surprise or incredulity, much like uppercase typeforms are used to convey heightened emotions. In short, peripheral semantic and phonological information across Braille and inkprint WSs may be encoded as dedicated standalone graphs or as typographical variants of existing graphs. Each manifestation has advantages that influence its adoption and use. Uppercase, bold and italicized typeforms are visually conspicuous but cause inventorial bloat, as equivalent typeforms must be designed for every lowercase graph in the script. In contrast, quotation and punctuation marks may be visually understated, but prove inventorially economical. Considering the inventorial constraints on Braille-based WSs and the exigencies of touch-reading, it is unsurprising that standalone graphs are the preferred method of conveying paralinguistic information in Braille text.

5. Contractions

A corollary of indicating linguistic and paralinguistic information through standalone graphs is a concomitant increase in text length, which may potentially increase writing effort and slow down reading (Englebretson, Holbrook, and Fischer-Baum, 2023, p. 406; Fischer-Baum and Englebretson, 2016, p. 163). Previously, it also meant increased costs of publishing and disseminating hard copy, potentially impacting the affordability of Braille publications. To mitigate these issues, Braille user communities or graphospheres (Franklin, 2011; Iyengar, in press, Chapter 2) may devise shorthand methods of representing certain sound and letter sequences, along with abbreviated forms of commonly occurring words. A shorthand or abbreviated form is known as a CONTRACTION. A standardized set of permissible contractions and spelling rules is termed a GRADE. 'Full' or uncontracted spelling is customarily labelled Grade 1 and its contracted counterpart Grade 2 (ibid., Chapter 11). Both grades may be taught to school-age and adult learners as standard components of Braille literacy curricula. Certain graphospheres may employ multiple grades with increasing levels of contracted spelling (Mackenzie, 1954, Chapter 8). As evident, the higher the grade, the greater the literacy skills required to decipher it. Thus, a Braille text intended for beginner readers might feature uncontracted Grade 1 spelling, whereas material for fluent readers might be in Grade 2 (or Grade 3 where applicable) (Englebretson, Holbrook, and Fischer-Baum, 2023, pp. 406–407; Perkins et al., 2013, p. 46).

5.1. Grades as Orthographies

In Section 4.1, `en-Brai-GB`, `en-Brai-US` and `en-Brai-x-ueb` were described as having mutually differing written conventions, and were labelled orthographies of English-in-Braille. The 'written conventions' in question also encompass contraction rules, which suggests that the various grades of a Braille-based WSs constitute distinct orthographies within that system. The graphematic categorization of grades as orthographies is consistent with the portrayal of contractions in Englebretson, Holbrook, and Fischer-Baum (ibid., pp. 406–407) under the heading "Braille orthography". Deploying contractions as standard practice has normalized their presence in Braille text. While debate may exist on granular aspects of contractions, the practice of using contractions in Braille-based WSs is commonplace and, consequently, uncontroversial. The sociolinguistic legitimacy of abbreviated forms in Braille text stands in stark contrast to corresponding situations in inkprint contexts, where adhering to standardized uncontracted spellings is typically the unquestioned norm. Compared to Braille text, standardized abbreviations in inkprint text are far fewer in number and typically restricted to specific domains or contexts, such as personal or professional titles like <Mrs.> or <Dr.>. In general, sighted readers of inkprint text would be less tolerant of abbreviations in running text than BVI users of Braille text would. The former would tend to view contracting or truncating as unacceptable or shoddy practice. The sociolinguistic disdain for abbreviated writing may spill over onto the author of such text, leading to negative assumptions about the writer's skill, educational background or moral character. Indulgence in such gratuitous assumptions betrays the comparative facility of reading and writing in uncontracted spelling for sight-readers of inkprint text, compared to touch-readers of Braille text. The relative ease of reading and writing in uncontracted spelling frees sighted users from the need to devise contracted written forms for expediency, and spares them the added pedagogical burden of learning two orthographies for the same WS. Consequently, when confronted with the task of deciphering shorthand writing, a sighted reader might subconsciously resist the cognitive load it entails, and express their displeasure in the form of *ad hominem* value judgements—say, that the writer is choosing to be lazy. For Braille users, however, laziness may not be an option. Depending on the graphosphere, not being proficient in both grades, uncontracted and contracted, would effectively amount to incomplete literacy acquisition and likely pose real-world hurdles for the Braille user in question.

5.2. Typological Categorization

The above observations on 'full' and contracted writing are primarily applicable to PHONOGRAPHIC writing systems or phonographies—WSs that aim for a 'one-letter-one-sound' representation of speech (Iyengar, 2023). Gnanadesikan (2017) dubs such systems *vowelled segmentaries*. In the literature, they are often labelled *alphabetic* (Daniels, 1996b), though alphabetic systems are better understood as a specific subtype of phonographic WSs (Bright, 1999; Gnanadesikan, 2017; Iyengar, 2023). At the other end of the typological spectrum are LOGOGRAPHIC writing systems or logographies. They embody the principle of 'one-letter-one-word', where an individual written graph typically maps onto a spoken word or morpheme. The fundamental distinction between logographic and phonographic systems, therefore, lies in the smallest unit of speech they seek to represent, known as their GRAIN SIZE (Gnanadesikan, 2017). For phonographies, the grain size is the phonological segment, whereas for logographies, it is the morpheme. Depending on the spoken language in question, morpheme boundaries may coincide with word boundaries, because of which the grain size of logographies is often portrayed as the word (Iyengar, in press, Chapter 2).

Regardless of their nominal grain size, individual WSs invariably feature graphs at various levels of granularity, spanning the typological spectrum from phonographic to logographic. Thus, `en-Latn` canonically comprises phonograms like <n> that stand for a single speech sound, but also features logograms like the ampersand symbol <&>, denoting an entire spoken word or morpheme. The logographic form <&> co-exists with the phonographic form <and>, with the two constituting distinct written representations of the same spoken entity. Likewise, `en-Brai` primarily comprises phonograms like <⠝> /n/ but also features logograms like the ampersand <⠈⠯>, equivalent to `en-Latn` <&>.[7] The graph <⠈⠯> is the logographic counterpart to the phonographic form <⠁⠝⠙> corresponding to `en-Latn` <and>. In addition, the vast majority of WSs, whether tactile of visual, comprise a set of digits or numerals that serve as logograms for 'number words' in the corresponding spoken language (ibid., Chapter 2). Thus, `en-Latn` <5> and <five> are logographic and phonographic representations, respectively, of the English word pronounced /fai̯v/, as are `en-Brai` <⠼⠑> and <⠋⠊⠧⠑>.[8] Hence, `en-Latn` and `en-Brai` are both predominantly phonographic WSs with a notable subset of logograms. Needless to say, their manifestation in inkprint or tactile format is irrelevant to their typological classification, and to their status as full-fledged standalone writing systems.

Despite their systemic equivalence, `en-Brai` differs from `en-Latn` in its range and applicability of contracted forms. Besides the ampersand symbol <⠈⠯>, the Grade 2 orthography of `en-Brai` also licenses <⠯> as a contracted alternative to the sequence <⠁⠝⠙>. Whereas <⠈⠯> denotes the English word pronounced /ænd/, <⠯> is a purely graphical substitute for the written sequence <⠁⠝⠙> wherever it may occur.

7. The `en-Brai` ampersand symbol <⠈⠯> comprises two graphs, based on which its status as a logogram may be questioned. However, determining whether a graph is a 'logogram' or is simply 'logographic' in nature is a subtle and fraught task.

8. While the written forms <5> and <⠼⠑> are indubitably logographic, the forms <five> and <⠋⠊⠧⠑> feature a blend of phonographic and logographic (= morphographic) elements. In simple terms, the pronunciation of these graph sequences is not simply the 'sum' of the pronunciations of individual graphs therein (see Fischer-Baum and Englebretson, 2016). However, there is as yet no reliable or widely accepted method for measuring the relative proportion of phonography and logography within a given WS.

Thus, en-Latn <pandemic> and <Andy> may appear in en-Brai as uncontracted <⠏⠁⠝⠙⠑⠍⠊⠉> and <⠠⠁⠝⠙⠽>, or as contracted <⠏⠯⠑⠍⠊⠉> and <⠠⠯⠽> (Simpson and Horspool, 2024, p. 118). In these examples, only the sequence <⠁⠝⠙> is replaced by <⠯>; all other features remain unaffected. This includes the Dot-6 ⠠ uppercase marker in <⠠⠁⠝⠙⠽> and <⠠⠯⠽>, both corresponding to en-Latn <Andy>.

At a granular level, the en-Brai contraction <⠈⠯> has lexico-semantic significance and qualifies as a logogram, as opposed to the semantically empty contraction <⠯> that acts only as a superficial literal alternative. The semantically empty subset of Braille contractions exemplifies the Rebus principle in action, whereby a graph is used primarily for its phonological-graphematic connotations than for any semantic significance (Gnanadesikan, 2009). From a broader systemic perspective, en-Brai licenses orthographic maneuvers like Rebus-based contractions that are graphematically possible but sociolinguistically proscribed in en-Latn. A comparison of the relative prevalence of abbreviated forms in en-Brai and en-Latn text lays bare the societally conditioned nature of en-Latn's proscription on such practice. Indeed, the pragmatically-motivated permissibility and standardization of contracted forms in en-Brai offers valuable food for thought on the distinct approaches and attitudes at play among their respective user groups.

In addition to the phonograms and logograms of en-Brai, Braille-based WSs for other languages may feature written forms spanning the entire typological spectrum. Some of them may be typologically akin to their inkprint counterparts, like en-Brai and en-Latn. For instance, Mandarin-in-Braille (cmn-Brai) represents syllable onsets and rimes with distinct graphs, as does Mandarin-in-Bopomofo (cmn-Bopo). Both systems may be classified as SEMISYLLABARIES (Englebretson, Holbrook, and Fischer-Baum, 2023, p. 405). The fully vowelled or *graphovocalized* avatars of Arabic-in-Arabic (ar-Arab) and Hebrew-in-Hebrew (he-Hebr), with bound vowel symbols or diacritics explicitly written, qualify as ALPHASYLLABARIES (Bright, 1999; Gnanadesikan, 2009; Iyengar, 2023). Arabic-in-Braille (ar-Brai) and Hebrew-in-Braille (he-Brai) manifest in much the same manner.[9] The inkprint ABUGIDAS of South and South-East Asia, such as Hindi-in-Devanagari (hi-Deva) and Tamil-in-Tamil

9. The discretionary contextual omission of bound vowel graphs in ar-Arab and he-Hebr, and the concomitant omission of corresponding graphs in ar-Brai and he-Brai, is not an intrinsic feature or requirement of their underlying graphematic systems. Forsaking bound vowel graphs in these systems is a sociolinguistically motivated practice (Iyengar, in press, Chapters 6, 11) and in this regard may be compared to the repudiation of contracted writing in en-Latn. The common characterization of these systems as *abjadic* (Bauer, 1996; Fetnaci, Haralambous, and Varin, 2022; Kaye, 1996) reflects their sociolinguistically preferred 'vowelless' appearance; their graphematically licensed 'fully vowelled' avatars are demonstrably alphasyllabic.

(ta-Taml) are typological category-mates with the abugidic Hindi-in-Braille (hi-Brai) and Tamil-in-Braille (ta-Brai) (Iyengar, 2023).

Notwithstanding these examples, there exist numerous instances of Braille-based WSs diverging from their inkprint parallels. For all its congruence with cmn-Bopo, the semisyllabic cmn-Brai remains typologically distinct from its other homoglottal systems—namely the archetypally logographic Mandarin-in-Han characters and the phonographic Mandarin-in-Latin (§4.3). Whereas hi-Brai and ta-Brai share abugidic properties with hi-Deva and ta-Taml, the pairs also differ in noteworthy ways. Among these abugidic WSs, the inkprint ones also qualify as alphasyllabic thanks to their use of bound vowel graphs in specific environments. In contrast, the Braille-based abugidas employ free vowel graphs in all contexts and, therefore, count as alphabetic. For a detailed analysis, consolidation and taxonomy of abugidic, alphasyllabic and alphabetic WSs, including Braille-based systems, see Iyengar (ibid.).

The list of Braille-based WSs notable for their typological features is by no means restricted to the above examples. Indeed, a cursory overview reveals the potential they hold for advancing our awareness of graphematic possibilities. The aforementioned six-dot *tenji* variant of Japanese-in-Braille (ja-Brai-x-tenji; §4.2) appears to be a syllabary at first glance, much like its kana-based inkprint parallels. However, a closer investigation reveals that specific dots within an individual Braille cell are earmarked for vowel and consonant sounds. Dots 1, 2 and 4 in ja-Brai-x-tenji are almost exclusively used to denote vowel sounds, whereas Dots 3, 5 and 6 are typically used for consonant sounds. A comparison of consonant-vowel graphs and vowel-only graphs in ja-Brai-x-tenji is shown in (3).

(3)

[ka]	[ki]	[kɯ]	[ke]	[ko]
⠡	⠣	⠩	⠫	⠪
[a]	[i]	[ɯ]	[e]	[o]
⠁	⠃	⠉	⠋	⠊

Englebretson, Holbrook, and Fischer-Baum (2023, p. 405) categorize ja-Brai as an abugida, specifying that an individual cell typically represents a mora. While the moraic nature of an individual ja-Brai cell seems self-evident, the abugidic label is at odds with the taxonomy and characterization of abugidas of Iyengar (2023). In addition, ja-Brai's discrete representation of vowel and consonant sounds within a Braille cell, along with the ability of vowel-specific dots to occur independently of consonant-specific dots (see (3)), come across as quintessentially alphabetic properties. The *tenji* variant of Japanese-in-Braille, therefore, appears to exhibit syllabic-moraic properties at the individual graph level, while operating alphabetically at the sub-graphical level. In this regard, `ja-Brai-x-tenji` may have much in common with Korean-in-Hangeul (`ko-Hang`). While the matter requires further scrutiny and extensive examination that is beyond the scope of this paper, it is no doubt a worthwhile and promising endeavor. Yet again, the value of including Braille-based WSs in grapholinguistic explorations is plainly evident.

6. Biscriptality

The preceding sections have revealed the overwhelming evidence that exists in favour of Braille as a full-fledged script in every sense of the term. By extension, transcriptions of spoken human languages in Braille are essentially writing systems, equivalent and comparable to any inkprint WS. In addition to their role in expanding graphematic horizons, the Braille script and its associated WSs also contribute towards refining prevailing sociolinguistic concepts.

As alluded to in Section 2, Braille has been used to graphize between 100 and 130 languages globally, including nearly every major global language (Perkins et al., 2013; ScriptSource, 2025). Notably, every language graphized in Braille also has an inkprint form. There appears to be no evidence of a human language that has only ever been transcribed in Braille but never in an inkprint script. As a result, every language with a Braille-based WS emerges as BISCRIPTAL (Bunčić, 2016b). It follows that over a hundred languages worldwide, including the major ones, are biscriptal in an inkprint script and in Braille (see for example Figure 2). This reality puts paid to the stereotype that biscriptality—namely a language being contemporaneously written down in more than one script, orthography or typographic style (ibid., p. 51)—is somehow unusual or anomalous. If anything, the existence of Braille-based WSs demonstrate the ubiquity of biscriptality, and should prompt a thorough revisiting and reshaping of the prevalent narrative around this sociolinguistic phenomenon.[10]

Along similar lines, the existence of distinct regional orthographies and contraction grades within a given Braille-based WS (§4.1 & 4.2) affirms the concepts of orthographic pluricentricity and biorthographism (ibid., p. 67), wherein specific WS-internal orthographies may be adopted based on user group or context.

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10. The fact that every major world language is effectively biscriptal ironically renders the phenomenon of biscriptality rather unremarkable. In a foundational work on the phenomenon, Bunčić, Lippert, and Rabus (2016, p. 51) tacitly alludes to the 'mundanifying' effect of Braille in labelling it a "script" that is also "too universal" for a focused sociolinguistic analysis of biscriptality. Consequently, Bunčić restricts his analysis to inkprint scripts, while acknowledging Braille as a "special-purpose" tactile script.

FIG. 2. Biscriptal English-language street sign in Sydney, Australia featuring `en-Latn` <Erskineville Rd> and `en-Brai` <⠑⠗⠎⠅⠊⠝⠑⠧⠊⠇⠇⠑⠀⠗⠙>. The `en-Brai` text lacks the Dot-6 capital marker <⠠>, consistent with Braille signage in the area. (*Source:* Arvind Iyengar)

7. Conclusions and Future Directions

The copious evidence attesting to Braille's status as a script and as a constituent component of writing systems should hopefully put to rest any grapholinguistic reservations in that regard. In addition to spurring further research and discussion on the topic, the acceptance and legitimization of Braille as a script within academic circles will ensure consistency with its graphematic characterization in non-academic contexts. For instance, the latest eBraille standard for marking up electronic text in Braille mandates the use of the IETF script subtag `Brai` for such text (§3), affirming the inventory's status as a script:

> The language code *MUST* include the script subtag `Brai` to indicate the text is encoded in braille.
>
> (eBraille Working Group, 2025, §5.3.3.6; emphasis in original)

The eBraille standard also cites language tags for several Braille-based WSs and their subvariants, including Italian-Braille (`it-Brai`), English-Braille as used in the USA (`en-Brai-US`), French-Braille as used in France (fr-Brai-FR) and German-Braille as used in Germany (de-Brai-DE). The coupling of the script subtag Brai with various language and country subtags further validate Braille's role as a script for a host of world languages, and affirm the existence of country-specific orthographies within Braille-based WSs. Aside from their graphematic significance, these findings prompt some pertinent sociolinguistic questions.

Based on the prevalent—if mistaken—normalization of monoscriptality, governments around the world rarely recognize multiple scripts for a particular language at the official level. Considering that nearly every major language in the world is biscriptal in an inkprint script and in Braille, is there an argument for governments worldwide to formally recognize the Braille-based WSs of their official languages, alongside inkprint WSs? Can the government of a region or nation-state legitimately withhold official recognition from the Braille manifestations of its official languages and still remain compliant with applicable laws? Are there tenable arguments against according official recognition to a language written in Braille while justifying similar recognition to the same language written in an inkprint script? Individualized and comparative evaluations on these matters would prove immensely revealing from a sociolegal perspective. But even in the absence of these insights, it is quite obvious that global legal recognition for Braille-based WSs trails that of signed languages. Whereas a handful of governments like those of New Zealand and Zimbabwe officially recognize signed languages on par with certain spoken languages in their respective territories (Constitution of Zimbabwe, Section 6; New Zealand Sign Language Act, 2006), evidence is scant for governmental recognition of a Braille-based WS on par with inkprint ones. The inconsistency in legal recognition for the signed and tactile-graphical modes of human language aligns with observations of Klein and Spitzmüller (2022) on how society perceives the two modes (§1).

The lack of legal recognition for Braille-based WSs is especially palpable in the European context. As a script created in Europe, Braille is arguably on an equal footing with the Latin, Greek and Cyrillic scripts. More importantly, while most European languages today are typically written in only one of the three aforementioned inkprint scripts, every one of these languages is biscriptally written in Braille. As the only script common to all European languages, the sociolegal inconspicuousness of Braille compared to its inkprint counterparts is striking. For instance, the absence of the Braille-script text <⠑⠥⠗⠕> from euro currency notes (Figure 2) contrasts with the planned and systematic inclusion of the Cyrillic-script text <EBPO> following the entry of Bulgaria as a European Union (EU) member in 2007 (European Central Bank, 2025a).

FIG. 3. Section of 5 euro banknote (2013 series) featuring Latn <EURO>, Grek <ΕΥΡΩ> and Cyrl <ЕВРО>. Source: Wikimedia Commons. Copyright European Central Bank (ECB). Used under decisions ECB/2003/4 and ECB/2003/5

To be clear, the question is not about tactile or related accessibility features on euro banknotes for the benefit of BVI users.[11] Rather, the question is of recognizing Braille as a script capable of representing languages in writing, on par with any inkprint script. Considering how contentious issues of language and script recognition can be for sighted users, the information void on the sociolegal status of Braille and the opinions of lay and expert BVI users on these matters is telling. This is the case not just in the EU but across the world.

The year 2025 marks the bicentennial of Louis Braille's prototype of his tactile symbol inventory (§2). As such, it is an apt occasion for Blind and sighted researchers alike to renew our focus on the remarkable script that bears Braille's name, and work together to harness its full potential within grapholinguistics and beyond.

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11. The European Central Bank's website states that it has regularly consulted with the European Blind Union on euro banknote design since the 1990s (European Central Bank, 2025b).

sights from a Braille user's perspective, all provided with her characteristic patience and goodwill.

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