7

Typologies of Writing Systems

Terry Joyce

7.1 Introduction

Writing is arguably the most consequential technology of human history, as testified by both its widespread dissemination around the world and its immense significance within our contemporary societies (Coulmas 1989: 3, 2003: 1, 2013: xi, Robinson 1995: 7, 2009: 1, Rogers 2005: 1, Gnanadesikan 2009: 2, Powell 2009: 1, Sproat 2010: 8, Joyce 2016: 288). And, yet, intriguingly, all writing systems, whether long extinct or still extant, can ultimately be traced back to just a couple of truly independent inventions: Sumerian cuneiform and Chinese characters.[1] The historical diffusion of writing systems has unfolded through myriads of transmissions between neighboring peoples. In some cases, the transition process was plenary adoption, albeit with some form changes over time; in many cases, it was adaptation, where divergences between neighboring languages necessitated modifications of sign inventories; in other cases, simple misunderstandings yielded deeper structural alterations (Haarmann 2006: 2405, Daniels 2018: 139–41). These dissemination mechanisms largely account for the sheer diversity within the world's writing systems.

However, faced with the immense profusion of both historical and modern writing systems, a major challenge for scholars is to appropriately differentiate between the more significant properties, such as mapping principles, and the more marginal ones, such as sign-form variations (Joyce and Meletis 2021). In that context, the enterprise of developing typologies of writing

[1] There is general consensus that writing emerged separately in Sumer, China and Mesoamerica, but less certainty about whether the emergence in Egypt was also independent (Coulmas 2013: 192, Daniels 2018: 136, Gnanadesikan 2009: 2, Rogers 2005: 4, Sproat and Gutkin 2021: 478). Moreover, no modern writing systems are descendent from Mesoamerica.

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systems is striving to realize, as its ultimate goal, a coherent framework, or tool, for categorizing the diversity of writing systems; a touchstone for comprehending the multifarious ways of materializing written language. As sampled in Subsection 7.3.2, a number of typologies have been proposed, but, as they incorporate different theoretical assumptions about the deeply interconnected entities involved (i.e. language, speech, writing, writing systems, scripts, orthography, alphabet, grapheme), it is expedient to simultaneously analyze the enmeshed conceptual and terminology contrasts employed within typologies, in order to hone their transparency and validity.[2]

Very much in that spirit, this chapter seeks to highlight the dialectic interaction between such theoretical assumptions and the terminology employed, to potentially contribute to the emergence of more perspicuous typologies of writing systems, which, in turn, can further illuminate our understandings of written language, both diachronically and synchronically. Accordingly, Section 7.3 outlines how the majority of typology proposals have approached the classification of writing systems primarily in terms of a core set of representational principles, while Section 7.4 briefly considers the potential merits of exploring complementary or alternative approaches.

7.2 Writing Systems Research

In light of the initial claims about the significance of writing, it might strike many as rather surprising that, as also argued in Chapter 6, this volume, writing systems have not been a focus of formal linguistic research until comparatively recently. Echoing Weingarten's (2011) observation, there remains a distinct ring of truth to Gnanadesikan's (2017: 14) recent claim that the study of writing systems "is still in its infancy."[3] Naturally, there are a few closely interconnected consequences. These include the relative scarcity of fully developed proposals of writing system typologies and a marked lack of consistency in the application of their basic terminology, such that misconceptions and inappropriate terms continue to muddle matters, with writing systems remaining, in general, poorly understood (Powell 2009: 1–9, Joyce 2016: 288).

Although it is something of a moot point whether the situation primarily reflects the relative neglect of writing as an area of linguistics or is just a quirky

[2] As Coulmas (1996b: 1387) astutely observes, since "writing represents language, typologies of writing systems that are based on the units and processes by means of which this is accomplished can deepen our understanding of language, while a sharpening of the notions for analyzing the units of language can help to improve such typologies."

[3] Although Gelb's (1963) seminal work, *A Study of Writing*, undoubtedly provided the initial groundwork, arguably, the discipline's foundations were not established in earnest until after the mid-1980s, with Sampson (1985), Coulmas (1989), DeFrancis (1989) and Daniels (1990). Moreover, Daniels (2001) was the first chapter on writing systems to feature in a handbook of linguistics, with the journals of *Written Language and Literacy* and *Writing Systems Research* first appearing in 1998 and 2009, respectively.

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example of historical inconvenience, it warrants mention that alternative designations for the discipline of writing systems research continue to vie for general acceptance. Without question, the ideal term would be *graphology*, for, in being completely analogous with *phonology* and *morphology*, it could clearly signify the relations between visual form, sound, and meaning that are core to linguistics (Joyce 2002: 269, McIntosh 1961: 107; see again Chapter 6, this volume). The term, however, was earlier misappropriated to refer to the "pseudoscience of divining someone's personality from their handwriting" (Daniels 2018: 5), which has effectively forced scholars of writing and writing systems to propose alternative designations.

Gelb (1952: v) coined one of the first: *grammatology*. Despite Gelb's immense significance for the discipline and the fact that Daniels (1996a, 2000, 2009) has used it in the past, as Coulmas (1996a: 173) points out, the term has not gained wide currency. Indeed, Daniels's (2018: 4–5) preference is now for Hockett's (1951) proposal of *graphonomy*, where the relationship between graphology and graphonomy is taken to be analogous to that between astrology and astronomy. Another, more recent designation is *grapholinguistics*, which Neef (2015: 711) uses to refer to the linguistic subdiscipline concerned "with the scientific study of all aspects of written language." In addition to noting that this is a translation equivalent of the German *Schriftlinguistik*, Meletis (2018: 61), who also adopts the term, suggests, as discussed in Chapter 6, this volume, that this designation has parallels with other subdisciplines of linguistics, such as sociolinguistics and psycholinguistics. While there is some merit in that observation, in contrast to the more interdisciplinary natures of both sociolinguistics and psycholinguistics, debatably, the term grapholinguistics fails to fully accord the study of writing with the central status that it deserves alongside the study of speech. Moreover, while it is difficult to discern all the ramifications that may have arisen from this nomenclature issue and the lack of more suitable designations, there have plausibly been direct consequences in the diverse range of senses that have become associated with the term *orthography*. As Subsection 7.3.1 comments, these senses range from the literal meaning of the prescriptive rules for correct writing, to denoting written representations within research on visual word recognition, and, most inclusively, to the full set of written conventions of a language.

7.3 Writing System Typologies

Constituting this chapter's core, this section consists of three related subsections: the first discusses the three close-related terms of *writing system*, *script* and *orthography*; the second presents a selection of typology proposals; and the third focuses on their conceptual distinctions and terminology.

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7.3.1 The Elusive Trinity of Terms

No serious student of writing systems research can deny the truth of Gnanadesikan's (2017: 15) observation that there "is, in general, significant variation in the basic terminology used in the study of writing systems." In fact, given that differences of interpretation are associated with many of the discipline's terms, not just the basic ones, Gnanadesikan's comment is, possibly, at some risk of erring toward understatement. However, setting aside concerns for the ubiquity of interpretive variations, Gnanadesikan laudably highlights the thorny problems concerning the elusive trinity of terms at the heart of writing systems research, namely *writing system*, *script* and *orthography* (Joyce and Masuda 2019).[4] Treatments run the basic gamut of possibilities, with some scholars regarding all three terms as essentially synonymous, while others only treat two as synonymous and, thus, either ignore or seek to differentiate the third. Falling firmly within the first camp is Sampson (2015: 8), who uses all three terms "to refer to *a given set of written marks together with a particular set of conventions for their use*." In contrast, in treating *script* as "a general term for a writing system without regard for its structural nature," Rogers (2005: 261) effectively ignores *orthography*. In also commenting on the terminology issue, Meletis (2018: 73) remarks that *writing systems* and *orthography* "are often shockingly misused as synonyms, or *writing system* is not used at all and *orthography* is employed instead." Certainly, there are considerable degrees of overlap in the historical and conventional usages of these terms, as evidenced, for example, by the following definitions recently provided by Daniels (2018: 155). Starting with *orthography* as the "conventional spellings of texts, and the principles therefore," Daniels defines *script* as "a particular collection of characters (or signs), used to avoid specifying abjad, alphabet, etc." and *writing system* as "a script together with an associated orthography." However, resonating deeply with the concerns expressed by both Gnanadesikan (2017: 14–16) and Meletis (2018: 73–74), Joyce and Masuda (2019: 248–51) recently examine this trinity of terms with specific reference to the contemporary Japanese writing system. As pertinent to this chapter's focus on the conceptualizations and terminology of writing systems typologies, Subsection 7.3.1 briefly recapitulates the most relevant aspects of their discussions.

[4] Most of the examples of terminological variation that Gnanadesikan (2017: 14–15) singles out involve these core terms, but it bears immediate acknowledgment that Gnanadesikan's Figure 1 (2017: 15), entitled "Terminology of writing systems," consists of five terms; *writing system*, *script*, *orthography*, *signary* and *typology*. It also bears stressing that there are significant differences between Gnanadesikan's interpretations of these terms and the approach to writing systems typology presented here. Within Gnanadesikan's Figure 1, the five terms are organized at three levels: "Writing Systems (e.g. Italian writing system)" appears at the top, which is divided into "Script (e.g. Roman Alphabet)" and "Orthography (e.g. <gn> → /ɲ/ …)" at the middle level, with script further divided into "Signary (e.g. A B C D …)" and "Typology (e.g. Alphabet")" at the lowest level. Thus, while writing system clearly refers to a specific instance (in the secondary sense described below), typology denotes a specific aspect or property of a writing system. More specifically, Gnanadesikan (2017: 15) appears to be using typology to indicate a "type of correspondence to linguistic structures," which, despite her claim that it is not "usually given a name," essentially matches to what is referred to here as a representational mapping relationship.

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In contrast to Daniels's (2018) ordering of these core terms, Joyce and Masuda (2019) start by appropriately acknowledging that the term *writing system* has two distinctive meanings within the literature (Coulmas 2013: 17–18, Joyce 2016: 288). While more technical in nature, its primary meaning refers to the narrow range of abstract representational mapping relationships that exist between linguistic units and the graphemes of a language. As highlighted in both Subsections 7.3.2 and 7.3.3, the dominant approach to classifying writing systems has been to focus on the linguistic level – whether it is *morphographic* (*morpheme* + *writing*), *syllabographic* (*syllable* + *writing*) or *phonemic* (segmental) – that is predominately represented by a writing system's unitary symbols (Joyce 2011, 2016: 288–89, Joyce and Borgwaldt 2011). However, as alluded to in Daniels's (2018) definitions, a secondary, yet nonetheless frequently employed, sense of writing system is to refer to the "specific rules according to which the units of the system are interpreted in a given language" (Coulmas 2013: 17–18). Turning to the second term, *script*, as Weingarten (2011) observes, it is often confused with writing system. Yet, its meaning and both sense distinctions of writing system can be clearly differentiated, if script is suitably restricted to refer only to the set of material signs (the signary) of a specific language (Weingarten 2011, Coulmas 2013, Joyce 2016, Joyce and Meletis 2021).[5] These sense distinctions can be illustrated with reference to the notoriously complex Japanese writing system (Joyce 2011, Joyce and Masuda 2018: 182–89, 2019: 251–55). According to the second sense of writing systems, the Japanese writing system refers to all the graphemes that are used to represent the written Japanese language. Moreover, according to the primary sense, it employs all three levels of representational mapping, which are graphematically realized by its four component scripts, namely morphographic *kanji*, the two sets of syllabographic *hiragana* and *katakana*, and the phonemic segmentary of *rōmaji*, which are supplemented with the set of Arabic numerals.

As already touched on at the close of Section 7.2, *orthography* is potentially the most problematic of these terms to pin down because it has acquired a wide range of connotations. From the perspective of writing systems research, however, there are two factors that are particularly germane. The first is that an orthography is always language-specific in nature.[6] The second key

[5] It is worth noting that, consistent with his definition of script as "a set of graphic signs with prototypical forms and prototypical linguistic functions," Weingarten (2011: 16) conceives of writing systems as referring to the pairing of a particular script with a particular language. Thus, for Weingarten, Amharic-Latin and Amharic-Ethiopic are two different writing systems, where the Amharic language is being graphematically represented by a variant of the Latin script and by the Ethiopic script, respectively.

[6] Sebba (2007: 170) stresses this factor within his glossary entry for orthography: "a writing system, as adapted and designed in order to write a particular language. An orthography makes use of a particular script to write a specific language – for example, Russian orthography makes use of the Cyrillic script (alphabet)." An anonymous reviewer has perceptively pointed out that Sebba's reference to "a particular script" is not consistent with the Japanese writing system's complementary employment of multiple scripts. However, Sebba's somewhat lax use of

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aspect is that, as substantiated in the term's Greek etymology (ὀρθός /orthos/ 'straight; correct' + γράφειν /graphein/ 'to write'), orthography explicitly pertains to the prescriptive rules for 'correctly writing' a particular language (Coulmas 1996a: 379, Desbordes 1997: 117–18, Sebba 2007: 10, Weingarten 2011: 13, Neef 2012: 217–19, 2015: 709–16). Indeed, as Sebba (2007: 10) aptly observes, "'writing correctly' is exactly what is implied by the term used for spelling in many languages, – for example, German (*Rechtschreibung*, 'correct writing'), Greek (*orthographia*, 'correct writing'), and the French, German and Spanish terms which derive from the Greek."[7]

With these two factors duly noted, it is possible to further elucidate the close interconnections among the three basic terms. Reflecting its focus on correct norms, in its core sense, orthography is concerned with the mediation between the principles of representational mapping (writing system in the abstract sense), on the one hand, and the material script, on the other. That is, for *phonographic* (*sound* + *writing*) writing systems, at least, this sense of orthography closely parallels the abstract sense of writing system in the shared focus on the mapping of graphemes to phonological units. In the contexts of phonemic (segmental) writing systems, the mapping relationships are often referred to either as phoneme to grapheme or grapheme to phoneme correspondences, depending on the direction (Henderson 1982, Katz and Frost 1992b: 67, Rogers 2005, Sebba 2007, van den Bosch et al. 1994: 178).

However, the major problem with this notion of orthography is that it largely fails to adequately account for how most natural writing systems evolve. As Sampson (2018b) argues, given that both spoken languages and scripts (i.e. symbol sets) change over time, the representational consistency of mapping relationships tends gradually to erode. While some irregularities may merely reflect representational deficiencies (mapping inadequacies common to most, if not all, alphabets) that are present from the outset (Desbordes 1997: 119), most emerge due to what Sampson (2018b: 10) refers to as a tendency for orthographies to become less *phonetically based* and more *lexically distinctive* over time.[8]

"a particular script" is clearly evoking the 'conventional' allusion to an entire set of material signs (i.e. a signary); an interpretation that is consistent with Sebba's (2007: 10) earlier remark that "*Script* is usually taken to be a synonym of 'writing system,'" which stands as further testimony to the pervasive mixing of these basic terms.

[7] Consistently, although オーソグラフィー /ōsogarafī/ has also entered Japanese as a phonetic borrowing, the Greek etymology is closely paralleled in the standard Japanese translation of 正書法 /sei-sho-hō/ 'orthography' (literally, 'correct + [write + method]'). Moreover, for clarity, it should be noted that Sebba (2007: 10–11) does make a finely nuanced distinction between orthography and spelling, with orthography being "the set of conventions for writing words of the language" and spelling "the application of those conventions to write actual words."

[8] Sampson (2018b) proposes this generalization based on two separate properties. The first is orthographic constancy, which refers to assigning "a constant written shape to each lexical element – each morpheme, or at least each root (as opposed to grammatical affix morphemes) – even if that element varies its phonetic shape in different environments" (Sampson 2018b: 10), as in *divine* and *divinity*. The second property, acknowledged as potentially more controversial, is sparse orthographic neighborhoods: having fewer "other words which differ by only one letter, or by few letters in a long sequence" (Sampson 2018b: 16).

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One solution to this issue could be to simply expand the scope of the term orthography, in order to embrace all the linguistically and sociohistorically derived conventions that contribute to the complexities of determining what to regard as 'correctly written' from among alternative written representations. To the extent that many scholars generally adopt such an inclusive interpretation, that is essentially what has come to pass. However, there is undoubtedly considerable merit in seeking to distinguish assiduously between the distinct linguistic (i.e. applications of representational mapping principles) and the diverse sociohistorical factors (i.e. spelling irregulates, homophone distinctions, loanwords, identity, reform) that underlie both regular and irregular written representations.

While not underestimating the difficulties of formulating meaningful distinctions, the more recent emergence of graphematics may be helpful in this respect, at least, in providing some additional terminology demarcations. Weingarten (2011) and Neef (2012, 2015) both use the term *graphematics* to refer to the interface between abstract representational mappings and graphemes. The close parallels to both the abstract sense of writing system and the core sense of orthography are unmistakable. However, Neef (2015: 713) also defines graphematics as the module or "component of the writing system that captures the relation between letters and phonological units of the language system," where the reference to writing system is clearly on its secondary meaning of the set of material signs. More specifically, within his modular theory of writing systems (2012, 2015), Neef postulates both an obligatory graphematics module, which can potentially generate a set of multiple candidate spellings of a word, referred to as the *graphematic solution space*, and an optional module of *systematic orthography*, as a system of regulating constraints on the solution space. Undeniably, the systematic orthography module requires further elaboration, particularly in regard to Neef's (2015: 716) fleeting mention of 'conventional orthography', but the theory seems to offer a tenable framework for delineating more coherently between linguistic (i.e. representational mappings) and other sociohistorical influences (i.e. deviations and irregularities) on written representations.

Another tangible corollary derives from the notion of the graphematic solution space: the potential for multiple alternative representations to exist free from any prescriptive presumptions of 'orthographic' correctness. As already noted, Joyce and Masuda (2019) deliberate over the trinity of key terms primarily from the perspective of the contemporary Japanese writing system. More specifically, they contend that, although it is reasonable to refer to the conventions that govern its component scripts as orthography, the term's regulatory connotations of 'correct writing' are simply not reconcilable with the fungible nature of the Japanese writing system as a whole, where alternative written representations are the norm (Backhouse 1984: 219, Joyce et al.

2012: 255–60, Joyce and Masuda 2018: 182–89).[9] Although Joyce and Masuda espouse the notion of graphematic representation with specific reference to Japanese, in being unencumbered by any *a priori* concerns for orthodoxy, the concept appears to have more universal relevance, when referring to the presence of multiple alternative written representations within any writing system.[10]

7.3.2 A Sample of Typologies

This section samples some of the most influential, controversial and promising typology proposals to date (see also both Joyce and Borgwaldt 2011 and Coulmas 1996b). It is essentially descriptive in nature, with fuller discussions of the various conceptual and terminology issues deferred to Subsection 7.3.3.

However, before embarking on that in earnest, it is beneficial at this point to make a basic statement, which, on one level, seems quite straightforward and uncontroversial and, yet, on another level, remains as a truism that has still to be fully explicated within writing systems research. Simply put, writing systems represent language. Superficially, the observation might seem rather trivial, and, thus, not worth articulating, but it most definitely justifies periodic repetition. The refrain can be traced from Hill (1967: 92), who claimed that his typology placed "every system of writing in relation to that which all systems represent, language," to Sproat (2010: 9) emphasizing how "all writing systems represent elements of *language* – not ideas or something else," and to Daniels (2018: 157) more recently proclaiming simply that "writing represents language." Read (1983: 143) also frames the insight deftly, when perceptively observing that, because "writing is the representation of specific linguistic forms,"[11] it "requires a writing system, a shared way of pairing representations with linguistic forms." The direct ramification of that realization

[9] The coexistence of multiple graphematic representations is an intrinsic characteristic of the Japanese writing system (secondary sense of all signs), where the multiple material scripts can render alternative graphematic representations according to their different mapping principles (writing system in the primary sense). Thus, 山 (*kanji*), やま (*hiragana*), ヤマ (*katakana*), and YAMA (*rōmaji*) are all equally valid graphematic variants of the Japanese word /yama/ 'mountain' (Joyce and Masuda 2018, Masuda and Joyce 2018). As an approach to identifying the various motivational factors that underlie both conventional orthographic and nonconventional, or variant, written representations, Joyce and Masuda (2019) supplement the notion of conventionality with an inclusive notion of intentionality espoused on the assumption that written representations are always motivated to some degree.

[10] A potential quandary here hinges on whether *orthographic variation* might be construed as an oxymoron. Under an inclusive interpretation of *orthography*, where the term is essentially synonymous with *written representation*, the issue is largely immaterial. On the other hand, if *orthography* is about presiding over what is 'correctly written', given that only one representation can be *orthographically* acceptable, in a narrower, prescriptive sense, the issue has immense significance.

[11] As Read (1983: 143) also points out, "specific linguistic forms" means that, although photographs and paintings may communicate a message, they are not writing, as echoed in Sproat's (2010) caveat about ideas. Presumably, if they had existed at the time, Read would have also classified emoji as images that are not writing.

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is that writing systems must essentially function at one of three linguistic levels – either at the levels of *morphemes*, *syllables*[12] or *phonemes* – and the primary goal of the typology of writing systems should be to clearly communicate these core possibilities (see also Chapter 4, this volume). However, the relatively small, but expanding, collection of typologies proposed so far have generally failed to do that adequately, as the following outlines illustrate.

Even though seriously flawed on a pivotal issue, unquestionably Gelb (1952) stands as a seminal work on writing systems, as it attempted to lay the foundations for the scientific study of writing. Gelb's classification recognized five categories in total, but it should be noted that (1) pictorial representation and (2) mnemonic devices were both seen as being the forerunners of writing and so were distinguished from the main grouping of full writing, which included the final three categories of (3) word-syllabic (mixture of *logography* (word + writing) and syllabic), (4) syllabic and (5) alphabetic. Notwithstanding the insightful emphasis on the notion of full writing, Gelb's classification was fundamentally blemished by his zeal to present the evolution of writing as a teleology, which inevitably transitions via logography and syllabary to a final stage of an alphabet. A number of writing systems scholars have discussed the problems with Gelb's classification at length, including Coulmas (1996a), Daniels (1990, 2001), Rogers (2005), Sproat (2000) and Trigger (2004).

Although the 1960s were not completely fallow of proposals, such as those from Diringer (1962) and Hill (1967), the next typology that merits mention is that proposed by Haas (1976, 1983). It stands as an early attempt to move away from the historically oriented approach that Gelb (1952) represents, because it was more conceptual in nature. More specifically, Haas's (1976) classification involved a set of three binary choices or contrasts. They are *derived–original*, where *pictographs* (*picture* + *writing*) are regarded as original because they do not correspond in a regular way to speech; *empty–informed*, depending on whether or not a grapheme directly determines a meaning; and *motivated–arbitrary*, depending on whether or not the relation between a grapheme and its referent is pictorial in nature. These choices are logically independent, but not all of the combinatory possibilities are real, because, for example, an *empty* writing system cannot also be *motivated*. Accordingly, the scheme effectively only recognizes five kinds of writing systems, and although the contrasts are useful for differentiating between types of pictorial representation, only the empty–informed contrast has relevance for other writing systems. On the basis of the Greek words for empty and full, respectively, Haas (1976, 1983) also referred to that contrast as *cenemic–pleremic*, such that cenemic writing

[12] Notwithstanding the debate over the status of the mora, a phonological unit of syllable weight, for writing systems (Rogers 2005, Gnanadesikan 2011, 2012, 2017, Buckley 2018), within the scope of this chapter, it is sufficient to acknowledge Gnanadesikan's (2011: 395) claim that "looking at writing systems for evidence of syllabic structures yields strong evidence for the linguistic reality of syllables."

systems only represent sounds (i.e. phonographic writing systems) but the graphemes of pleremic writing systems are semantically informed in denoting both sounds and meanings (morphography).

The next typology to note is that by Sampson (1985, 2015), which is particularly noteworthy for a couple of reasons. Firstly, it ushered in a flurry of works from the mid-1980s onwards, which started to attract wider interest to the study of writing systems, and, secondly, it has inspired considerable, albeit often misguided, debate about its categories, as evidenced for example by DeFrancis (1989, 2002), DeFrancis and Unger (1994), Sampson (1994, 2016a, 2016b) and Unger and DeFrancis (1995). Within Sampson's typology, the first division is between *semasiographic* (*meaning, signification* + *writing*), a category that Sampson intended to be conjectural in nature, and *glottographic* (*speech* + *writing*) writing systems. At the next level, glottographic is divided into logographic and phonographic. Moreover, on the basis of what Sampson also deemed to be a logical possibility, the category of logographic is subdivided into polymorphemic units and morphemic, even though Sampson acknowledges that no systems based on polymorphemic units actually exist. The phonographic category was also further divided into three subcategories of syllabic, segmental and featural (where grapheme components correlate with phonetic features), with the latter included solely to include Korean Han'gŭl, another aspect of Sampson's classification that has prompted much debate.

Also significant for greatly contributing to the growing interest in writing systems from the late 1980s is DeFrancis's (1989) book, which presented his writing classification scheme. At the heart of DeFrancis's classification is the important dichotomy between what he refers to as 'partial' and 'full' writing systems, and, directly linked to that, DeFrancis's conviction in the phonetic basis of all full writing systems. In line with his belief that writing is simply the visual representation of speech, DeFrancis's (1989) scheme distinguishes between six types of writing systems. Although all six types fall under the umbrella of syllabic systems, two types, (1) 'pure' syllabic systems (including Linear B, *kana* and Cherokee) and (2) morpho-syllabic systems (including Sumerian, Chinese and Mayan), are distinguished from the other four types that are referred to as consonantal systems. In turn, these consonantal systems are further differentiated into (3) morpho-consonantal systems (including Egyptian) and (4) 'pure' consonantal systems (including Phoenician, Hebrew and Arabic), with the final two types, (5) 'pure' phonemic systems (including Greek, Latin and Finnish) and (6) morpho-phonemic systems (including English, French and Korean), being classified as alphabetic systems.

Despite the hugely significant contributions that the typological proposals by Gelb (1952), Sampson (1985, 2015) and DeFrancis (1989) have made to the discipline of writing systems research, the classification proposed and developed by Daniels (1990, 2001, 2009, 2018) has undoubtedly been one of the most

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influential of the last three decades. One of Daniels's primary motivations has been to address the inadequacies that he perceived in the traditional tripartite classification, such as in Gelb's (1952) typology, of writing systems as either word-syllabic, syllabaries or alphabets. More specifically, Daniels has argued for the recognition of two other script types, namely, *abjads*, where each character stands for a consonant, and *abugidas*, where each character stands for a consonant accompanied by a particular vowel, with other vowels indicated by additions to the character (see especially Chapter 2, this volume). Daniels (1990) coined both terms, which have also been the focus of much discussion. Modeled on the exemplar term *alphabet*, as the combination of alpha and beta, abjad is formed from the first letters of the Arabic script, the most widespread example of the kind, while abugida is an Ethiopic word formed from the initial letters according to their traditional ordering. For much of its history, the classification has consisted of six categories: (1) logosyllabary (morphosyllabary), (2) syllabary, (3) abjad (Semitic-type script), (4) alphabet (Greek-type script), (5) abugida (Sanskrit-type script) and (6) featural. However, Daniels's (2018) version no longer recognizes the featural category, for Korean Han'gŭl, which is classified as an alphabet. Deeply connected to the limitations of Gelb's tripartite classification, Daniels challenges Gelb's teleology, for, as Daniels (2001: 68) comments, "once abugidas are distinguished from syllabaries, a different historical sequence can be identified, which no longer privileges the alphabet teleologically."

In addition to the considerable influence of Daniels's (1990, 2001, 2009, 2018) classification, three other typology proposals also merit explicit mention within the present selective sampling. Of those, Sproat (2000) and, subsequently, Rogers (2005) are closely related. In their more radical departures from the traditional inverted-tree typology, both adopt a similar strategy of locating writing systems within a theoretical space defined by two dimensions: the type of phonography (five categories arranged horizontally) and the amount of logography/morphography (represented vertically) involved within a writing system. Although Rogers's (2005) version essentially follows Sproat's (2000) basic tactic, their typologies differ in two key respects. The first is with regard to the category terms used to refer to types of phonography. Sproat distinguishes five categories as consonantal, polyconsonantal, alphabetic, core syllabic and syllabic, whereas Rogers elects to label them as abjad, alphabetic, abugida, moraic and syllabic, respectively.[13] The second key difference relates to the label assigned to the vertical axis. Sproat's original proposal was for *amount of logography*, adopting a rather inclusive interpretation of logography as "any component of a writing system as having a logographic function if it formally encodes a portion of nonphonological linguistic

[13] It should be noted that even though a number of the writing systems common to both typologies are accorded similar treatments, not all of the examples noted are the same.

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structure, whether it be a whole morpheme or merely some semantic portion of that morpheme" (Sproat 2000: 134). In contrast, Rogers (2005: 275) refers to this dimension as *amount of morphography*.

Last but not least, Gnanadesikan (2017) tenders another typological proposal. While it is incomplete, in that it currently falls short of explicitly addressing the issues of morphographic writing systems, it is a promising approach to more finely delineating the differences between phonemic writing systems, even though it incorporates a somewhat different notion of writing systems typology. Still, there can be no dispute that, no matter how best conceived of, "writing systems have many components," from their graphemes, their spatial arrangements, their representational mappings, and their orthographic, or graphematic representational, principles, such that "typologies may (and probably should) be constructed which consider any of these components" (Gnanadesikan 2017: 14). Central to Gnanadesikan's (2017: 21) typology proposal is the term *segmentary*, which she defines as "a script all or most of whose signs are used in such a way as to encode individual phonological segments, or phonemes (which may include archiphonemes and morphophonemes)." Moreover, it is worth stressing that Gnanadesikan's typology eschews the inverted-tree structure common to a number of earlier typologies. Indeed, the tabular presentation (Gnanadesikan 2017: 28) of the typology and its terminology rather resembles a decision-tree diagram in key aspects. Arranged under three columns of category, values and term, the highest category distinction depends on whether characters basically represent segments (yes/no), while the lowest divisions are according to the degree to which vowels are included (ranging from all, most, some and none). Illustrative of the detailed classification descriptions that Gnanadesikan's typology yields (2017: 29), for example, Han'gŭl is classified as being "fully vowelled syllabically arranged featural segmentary," Devanāgarī as a "mostly vowelled āksharik segmentary," Greek as a "fully vowelled linear segmentary" and unvocalized Arabic as a "partial vowelled linear segmentary."

7.3.3 Conceptual and Terminology Distinctions

Having outlined a selection of important typologies, this section seeks to highlight some of the key conceptual and terminology contrasts that have shaped the various proposals and underlie the diverse range of category labels. Extending on Joyce's (2016) similar deliberations, the endeavor draws inspiration from both Coulmas's (1996b) observation (see note 2) and Powell's (2009: xv) assertion that writing "can be defined and understood, but only with the help of a careful organization of categories and terms." As even scholarly typologies embody different notions about the inventions and historical diffusion of writing systems (see Henderson 1982, Joyce 2011, 2016, Powell 2009), as well as divergent beliefs about language, it is pertinent to briefly note

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the problematic tendency, still frequency encountered, to perceive of language primarily in terms of speech. Largely influenced by Bloomfield (1933) and his much-cited comments about writing being merely a means of transcribing speech, many scholars still ascribe to the *language is speech* position (Joyce 2002, 2011), or what Rastle (2019) refers to as the concept of *primacy* (see also Chapter 5, this volume). Essentially, the position confuses *language* with *speech* within the standard refrains that speech, but not writing, exists in all human communities and speech is naturally acquired, whereas writing requires instruction. Yet, only a passing familiarity with sign languages is sufficient to realize that sound is not a defining characteristic of language. In contrast, the *abstract entity* position (Joyce 2002, 2011) merely regards speech, writing and signing as alternative media of expressing language, which are interconnected through conventions that allow for the approximate transformations of linguistic content. Although the *language is speech* view undoubtedly gained wider circulation due to DeFrancis (1989), as Harris (2009: 46) notes, the naïve assumption can be traced back to Graeco-Roman Antiquity. Even though they sometimes function in a complementary manner, speech and writing are "completely independent, having quite different semiological foundations." The specter of the *language is speech* position is discernible in some definitions of writing. For example, Daniels (1996a: 3, 2009: 36, 2018: 156) continues to define writing as "a system of more or less permanent marks used to represent an utterance in such a way that it can be recovered more or less exactly without the intervention of the utterer."

As expressed in the introduction, the ongoing linguistic enterprise of developing typologies is endeavoring to realize a coherent framework, or conceptual tool, that can be utilized to enrich our understanding of writing systems. However, given the elusive, closely interconnected nature of the three core terms and the wider range of terminology labels that the undertaking is generating, it must also be appreciated that, in reflecting certain opinions about what to emphasize, such classifications are, to some degree, always arbitrary in nature. Still, for writing systems typologies to fully contribute to our understandings of written language both diachronically and synchronically, typology proposals should strive to meaningfully reflect the dominant principles of representational mapping that writing systems incorporate and to employ consistent and transparent terminology in signaling those mapping principles (Joyce 2011, 2016: 288–89). Although some typology proposals have explored alternative formats, as noted earlier, many prominent classifications are visually depicted as inverted-tree diagrams. Such diagrams start from the most inclusive categories at the top, with lower category distinctions typically represented as diverging branches, usually terminating with writing systems at the very bottom. In broadly keeping with that directional metaphor, the present discussion progresses from the upper, broader classification categories down toward the lower, more specific ones.

The first concept and term that warrants comment is *semasiography*, a term coined by Gelb (1952) to serve as an inclusive term for various symbolic devices for conveying general meanings. The category has featured within a number of classifications over the years, from Gelb (1952), Diringer (1962), Haas (1983) and Sampson (1985, 2015) to Rogers (2005) and Powell (2009).[14] Arguably, the category has some merit within a broader classification of symbols or pictorial representations, but, as DeFrancis (1989) forcefully argues, it is vital to recognize that forms of semasiography are always extremely limited in what they can express. Consistent with DeFrancis's (1989) classification, a natural outcome of treating forms of semasiography as *nonwriting*, or, at best, as only *partial writing*, is the realization that the semasiography category falls just outside the scope of a typology of writing systems.[15] This key insight seems to bear periodic reiterating, given that, within the more generalist literature on writing, there seems to be something of a re-emergence of the myths that semasiography, ideography and pictography all have the potential to function as full writing systems, particularly in reference to the expressive potentials of emoji (Danesi 2017, Joyce 2019). Although indicative of the tenacity of some misconceptions, that is most assuredly not the case and, in that context, the distinction between partial and full writing also warrants renewed emphasis (DeFrancis 1989, Joyce 2019). Typologies that include semasiography essentially need to generate a new category; this is labeled as *glottography* by Sampson (1985, 2015) and as *lexigraphy* (*word* + *writing*) by Powell (2009). Although Powell (2009: 37) appears, at one point, to endorse the literal interpretation of lexigraphy in glossing it as "writing with words," from his subsequent definition, "writing in which the signs are attached to necessary forms of speech" (2009: 51), it would seem that the superficial difference from glottography is immaterial.

Before turning to the three linguistic levels at which writing systems generally function, it is appropriate to comment on the other terms that have historically overlapped to considerable degrees with semasiography; namely, *pictography* and *ideography* (*idea* + *writing*). As already suggested, the term pictography is regaining wider circulation since the emergence of 絵文字 /emoji/ 'emoji' (literally, 'picture' + 'character'), a regrettable trend that potentially perpetuates certain oversimplifications concerning the origins

[14] Sampson (1994: 119–20) has subsequently stressed that, rather than arguing for the existence of such systems, his intention was conjectural in nature (as the dotted line in his figures sought to indicate, see Sampson 1985, 2015) and he was merely speculating on "whether there might ever be a semasiographic system comparable in expressive power to a spoken language." Within a glossary entry, Rogers (2005: 297) defines "semasiographic writing" as an "alternative name for semantic writing system," the term he uses. Although Rogers (2005) argues for the existence of one semantic writing system in Bliss symbols (Bliss 1965), Sproat (2010) astutely stresses the limitations of Bliss symbolics as a writing system.

[15] In this respect, it is worth recalling Read's (1983) remarks about writing requiring consensus about the mapping relationships between linguistic forms and symbols.

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of writing systems. Of course, there is a grain of truth in claiming that the core signs in all three independent inventions of writing in Sumer, China and Mesoamerica originally involved some degree of pictographic resemblance to the objects that they signified (such as 口 /kuchi/ 'mouth', 火 /hi/ 'fire' and 魚 /sakana/ 'fish'). However, the serious limitations on pictorial representation, from both the production and perception perspectives, underscore the fact that pictographs alone simply cannot function as a full writing system. In many ways, the issues associated with semasiography, pictography and ideography relate to what has been the most evasive typological distinction to conceptualize, namely that between nonphonographic and phonographic writing systems, which remains one of the major sources of confusions about writing (Joyce and Borgwaldt 2011: 2, Joyce 2016: 293, Sampson 2016a: 561, 2018b: 4).[16] At times, the division has been cast as being between ideography, the most problematic of these terms, and phonography. However, now that the myth of ideography (i.e. that it is possible to have a full system of writing based solely on *graphs* which directly express *ideas* independently from language) has largely been dispelled, the contrast is usually framed as being between phonography and logography. The deeper significance of this typological division becomes clearer once one realizes that it is essentially the same as the *pleremic* and *cenemic* contrast within the writing system typology proposed by Haas (1976, 1983). As noted in Subsection 7.3.2, the graphemes of cenemic writing systems only represent sounds (i.e. phonography), but the graphemes of pleremic writing systems denote both sounds and meanings – the modern exemplar being Chinese characters. As Joyce (2011: 67) points out, the enduring dilemma for advocators of the *language is speech* perspective is to provide an adequate account of the existence and function of the nonphonological, or semantic elements, of Chinese characters, if writing is merely representing speech.

As already noted, it turns out that there are basically three levels of linguistic structure at which writing can function in (generally) systematic ways of representing language – the morpheme, syllable and phoneme levels. Moreover, the implications for a typology of writing systems should be immediately obvious: it should consist of three basic typological categories that correspond to these levels, and these should be clearly distinguished with terminology that is both informative and consistent. Unfortunately, misconceptions and confusions are present at these levels too. Taking the morpheme level first, the main problem appears to be that of conservatism. As Joyce (2011: 70) argues, given the consensus among scholars of writing systems

[16] As Sampson (2016a: 561) insightfully comments, although researchers generally differentiate between alphabetic and syllabic scripts, that "is a relatively minor distinction, set against the contrast between logographic scripts, which assign distinct marks to meaningful units of a language, i.e. words or morphemes, and phonographic scripts which represent phonological units of one size or another."

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(Hill 1967: 93, Sampson 1985: 32, Taylor 1988: 203, Daniels 1996: 4, 2001: 43, Fischer 2001: 170, Rogers 2005: 14, Gnanadesikan 2009: 8) that morphography is a more precise typological label than logography, typologies should cease to perpetuate this particular confusion. Indeed, as Daniels (2018: 156) explicitly acknowledges, "'morphography' would actually be preferable to 'logography.'"[17] The sheer number of symbols necessary for a purely word-based writing system means that the only level above the syllable level that a writing system can function at is the morpheme level, taken to be inclusive of both free (i.e. words) and bound morphemes. As Hill (1967) astutely pointed out some time ago, in contrast to the phonological analysis of words within cenemic writing systems, the analysis of word meaning for pleremic writing systems naturally settles on the morpheme, the smallest element of linguistic meaning.

Turning next to the syllable level, or the syllabography category, although failures to consistently apply coherent criteria are highly endemic among typologies, the ramifications are especially conspicuous at this level. The primary criteria for typologies should be the linguistic level that is predominately represented by the unitary symbols of a writing system. If it is the syllable, then it should be classified as being syllabographic, irrespective of whether or not the symbols only provide approximate indications of a target syllable and regardless of whether or not they possess internal structure or share visual similarities. As testimony to Daniels's (2001: 68) observation that the "key to the history of writing is the primacy of the syllable," it is hardly surprising that syllabographic writing has actually been realized in different ways. However, for a principled typology, it is vital to preserve the integrity of the linguistic level and to locate further method demarcations at a new level within a typology. Notwithstanding his keen insight about the significance of the syllable, Daniels's (1990, 1996a, 2001, 2009, 2018) classification is perhaps the most influential example of a typology that is greatly undermined by this basic confounding problem. As outlined earlier, his classification now distinguishes five categories, but from a typological perspective, it is clearly mixing heterogeneous typological criteria in its confusion of linguistic levels (categories 1 and 2) with exemplar names (categories 3, 4 and 5).

[17] Although the following comments from Daniels (2018: 99) are being noted here primarily in relation to the problems with the term *logographic*, they are also of relevance to the evasive division, noted earlier, between cenemic and pleremic writing systems in terms of full writing systems. "The solutions ultimately hit upon around the world were surprisingly similar: develop characters for their sounds, but also use characters for their meanings. In the latter use, the characters are called 'word-signs,' or logograms. The term *heterogram* appears sometimes in Iranian studies. […] Since it's noncommittal as to the level of grammatical analysis involved – it doesn't specify 'word' or 'morpheme,' just 'otherness' – it might be convenient to adopt it for general use." However, as Joyce (2019) remarks, it is quite difficult to see how being noncommittal in nature on a key issue for writing systems research can be considered an appropriate justification for proposing a new term, when, rather than elucidating, it would merely serve to obscure matters further.

The serious consequence is that these typological categories essentially obscure the key point that syllabography is the common underlining principle for *syllabaries* (basically separate symbols), *abjads* (underspecification of the target syllable's vowel), *abugidas* (extensions to graphemes for core syllables) and *featural* (elements combined as a block; a grapheme gestalt). A similar underappreciation for the importance of maintaining coherent typological conventions also appears to underlie a number of muddled compound labels, such as *consonantal alphabet* for abjad (Gnanadesikan 2009: 10) and *alphasyllabic* for abugida (Bright 1999: 45). These are defective as informative typological labels on two counts: they fail to specify the more salient linguistic level and convey little about grapheme structures.

The firm hand of conservatism is also the major source of distortion at the final linguistic level of phonemic writing. Despite Diringer's (1962: 24) claim that "alphabetic writing has within the past three thousand years assumed such importance as to deserve a category of its own," the practice of labeling the category after its sole exemplar is absolutely antithetical to the objectives of a typology to be informative and consistent (Hill 1967: 92, Coulmas 1996b: 1381). From the perspective of illustrating the possible relationships between language and writing, it is vital to appreciate two related points about phonemic writing systems that consist of symbols for both consonants and vowels. The first is that all extant alphabets trace back to the Greek alphabet, "a single invention that took place at a single time" (Powell 2009: 231). The second point, which also underscores its uniqueness, is the unnaturalness of phoneme segmentation, which Faber (1992: 112) argues to be a consequence of alphabetic writing rather than being a necessary precursor (for related experimental findings, see also Read et al. 1986). One of the crucial challenges for typologies of writing systems is to discern the core set of principles of representational mapping that operate within the apparent diversity of the world's writing systems (Joyce and Borgwaldt 2011: 5, Joyce 2016: 291). As Coulmas (1996b: 1380) rightly notes, the typology of writing systems must find the right balance between too many categories that overlook key commonalities and too few categories that obscure important distinctions. Accordingly, the present discussions have been shaped largely by two typological tenets. The first is that the primary categories of the typology should match to the relevant linguistic units – either the morpheme, syllable or phoneme. The second is that, because further demarcations (whether attempting to capture different methods of realization or principle mixtures, see Subsection 7.4.1) are typologically different in nature, they require additional levels of categories. While it remains to be seen whether Gnanadesikan's (2017) typology of phonemic writing systems can be extended to encompass all writing systems, it certainly has considerable merit in highlighting the limitations of single-term classification labels, such as abjads and abugidas.

7.4 Complexities of Writing Systems

This section consists of two related subsections, which seek to highlight the limitations of representational principles as a typology criterion and briefly consider the possibilities of exploring some complementary or alternative criteria, respectively.

7.4.1 Representational Mapping Principles as Idealizations

As Subsection 7.3.2 sought to exemplify, on the whole, existing proposals of writing system typologies have invariably attempted to classify writing systems based on the dominant principle of representational mapping, or graphematic representation, that underlies different systems (i.e. at either the morpheme, syllable or phoneme levels). However, as those levels and their mapping principles combine in complex ways, in reality, most writing systems are, to varying degrees, mixed in nature (Gelb 1952: 199, DeFrancis and Unger 1994, Trigger 2004: 46, Joyce and Meletis 2021: 2). Thus, it is vital to keep in mind that the principles of graphematic representation are to, a considerable extent, essentially idealizations. To underscore that point, this subsection discusses a relevant commentary and two related typological proposals, where the issues of typological purity are particularly salient.

Reflecting its somewhat complicated theoretical motivations, on the one hand, and that it falls short of constituting a systematic typology proposal, on the other hand, DeFrancis and Unger (1994, see also Unger and DeFrancis 1995) can be viewed more as a commentary on the evasive cenemic–pleremic contrast (and, hence, not covered in Subsection 7.3.2). Envisaging *pure* phonography and *pure* logography as representing opposing extremes of a theoretical continuum, DeFrancis and Unger (1994) advocate for what they consider to be a *realistic* view of writing system typology. Juxtaposing their realistic view with what they take to be *naïve* typologies in assuming two distinctive groupings of writing systems falling toward the two opposing extremes with an empty middle space, DeFrancis and Unger (1994) claim that the actual range of writing systems occupies only the middle area of the continuum. More specifically, DeFrancis and Unger (1994) posit six writing systems within the middle section, with three on the phonographic side of the continuum and three on the logographic side. Thus, Finnish is positioned closest toward the extreme of pure phonography, with French and then English placed progressively closer to the center, while Chinese is set closest toward the extreme of pure logography, with Japanese more central than Chinese and Korean situated more centrally still. Clearly, the typology proposals of most relevance in this context are those proposed by Sproat (2000) and by Rogers (2005). As already outlined, they are highly similar in terms of applying the same basic strategy of locating writing systems within a theoretical

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space. In contrast, however, to the one-dimensional phonography–logography continuum hypothesized by DeFrancis and Unger (1994), the theoretical spaces in both Sproat's (2000) and Rogers's (2005) typology proposals are two-dimensional in nature. Within both, five categories of phonography are organized along the respective horizontal axes, but the vertical axes represent the amount of logography within Sproat's (2000) typology and the amount of morphography within Rogers's (2005) typology.

However, regardless of the number of dimensions actually theorized, there are a couple of fundamental issues that are common to DeFrancis and Unger (1994), Sproat (2000) and Rogers (2005). The first is that, in all cases, the locating of writing systems is highly arbitrary in nature, whether along the single continuum in DeFrancis and Unger (1994), or at various degrees, or depths, of logography or morphology in Sproat (2000) and Rogers (2005), respectively (although Sproat and Gutkin (2021) subsequently propose a measurement approach). The second issue, albeit less conspicuously highlighted in DeFrancis and Unger (1994), is how the phonographic dimension entails different categories that are assumed to be mutually exclusive. However, advocating mutually exclusive categories would appear to entirely miss the deeper insight that any representational inconsistencies that exist are the direct consequences of a particular writing system simultaneously employing a mixture of graphematic principles, of which morphography is one, rather than constituting a separate dimension completely. This is particularly telling, because Rogers (2005: 275) explicitly sought to differentiate the amount of morphography from what he claimed to be a related, but separate, notion of orthographic depth (see Katz and Frost 1992b). In reality, although the concept of orthographic depth was formulated primarily to account for varying degrees of consistency in grapheme–phoneme correspondences within the context of investigating the psychological processes of reading, it is, of course, intimately related to the insight that representational mapping principles are idealizations and, thus, all writing systems are to some extent mixed in nature.

Moreover, although the basic dichotomy has been around for some time, the distinction between partial versus full writing is of immense significance for writing systems typologies (Joyce 2019). The contrast was certainly acknowledged in Gelb (1952: 194), but, arguably, it is first accorded its appropriate prominence in DeFrancis (1989: 3), even though his formulation is not entirely without flaws. For DeFrancis, partial writing is "a system of graphic symbols that can be used to convey only some thought," while full writing "can be used to convey any and all thought." Two crucial caveats to note immediately, however, are that the contrast is actually about the potential to represent language, as the medium of thought, and that the dichotomy is also an idealization. The significance of this dichotomy for writing systems typologies hinges on the simple, yet key, observation that only cenemic writing systems can become full writing, but partial pleremic writing systems still warrant

special attention within writing systems research. More specifically, the discipline still needs to develop coherent accounts of just how the graphemes of a pleremic writing system represent the morphemes of the specific language. Such expositions are critical not only to account for historical examples but to also adequately elucidate the contemporary examples of the Chinese and Japanese writing systems, as well as comprehensively expounding the full complexities of mixed writing systems, such as the notoriously complicated English writing system. In developing such accounts, it is also vital to stress a couple of key points. Firstly, pleremic writing systems are always partial writing systems, because it is simply not possible to represent all the words of a language by the morphographic principle alone, as there are simply too many words in all languages (and, thus, other graphematic principles must also be employed simultaneously). Secondly, morphography is the only feasible level for pleremic writing systems, as it is essential to have consensus-based associations between graphemes and linguistic units for a writing system to be fully functional. The point about the importance of consensus regarding sign–language associations also underscores why emoji are unlikely to ever become a partial pleremic writing system, despite rising popular misunderstandings to the contrary. In seeking to establish more realistic accounts of how the semantic elements of Japanese *kanji* function, for instance, one might do well to consider Robertson's (2004: 19) insightful observation on the possibility of writing emerging from the intersection between "highly developed avenues of human perception – visual (iconic) and auditory (symbolic) perception."

7.4.2 Exploring Alternative Criteria

Undoubtedly, there is considerable merit in classifying writing systems based on their dominant principles of representational mapping, as it endows typologies with sound linguistic foundations. It is, however, also worth exploring a far wider range of the characteristics and properties associated with writing systems, in terms of their potentials to serve as either complementary or alternative criteria for investigating and differentiating writing systems.

That noted, however, given the complexities of writing systems and their various component elements (Gnanadesikan 2017: 14), it is also extremely important to assess the many candidate characteristics and properties that have already been singled out for consideration, in order to determine which of the three core notions is of most relevance. That is especially so in light of the considerable confusions that continue to surround them, as Subsection 7.3.1 outlined. For example, Altmann (2008: 150) enumerates ten properties of scripts that can be beneficially investigated. However, although a number of them do indeed relate specifically to the material shapes of signs (graphemes) and their shared attributes as a set, some of the proposed properties are clearly more germane to the principles of graphematic representation.

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Thus, although (1) *inventory size*, (2) *complexity*, (3) *frequency*, (4) *ornamentality*, (5) *distinctivity* and (6) *variability* are unquestionably characteristics of the material script, the rest are not, including (7) *phonemic load*, (8) *grapheme size*, (9) *graphemic load* and (10) *graphemic utility* or letter usefulness. Moreover, even if the properties or dimensions under investigation are sufficiently restricted to just one of the basic terms, such as script, that does not necessarily make them suitable for valid comparisons across multiple writing systems. For example, a recent study by Chang et al. (2018) focuses on four dimensions that undeniably relate primarily to script forms, namely, (1) perimetric complexity (ratio of form to white space), (2) number of disconnected components, (3) number of connected points and (4) number of simple features (strokes). Chang et al.'s (2018: 427) claim that the graphic complexity across the world's writing systems "is associated with variable mappings that graphic units can have to linguistic units (abjad, alphabetic, syllabary, alphasyllabary, and morphosyllabary)" is reasonable *prima facie*. However, the striking dissociation within their data plots between the morphosyllabary writing system example of Chinese and all the other writing systems examined blatantly indicates that these dimensions are reflecting more than a simple notion of graphic complexity; once again the evasive contrast between the variable mappings of pleremic and cenemic writing systems has been entirely confounded.

Similar to Altmann's (2008) script properties, the problems of not sufficiently specifying the aspect of most relevance are also highly apparent in the related studies by Share and Daniels (2016) and Daniels and Share (2018), even though their intention to highlight a wider range of ten dimensions that potentially underlie writing system variation is certainly laudable.[18] Clearly, Daniels and Share's (2018) dimensions of *inventory size* and *visual uniformity and complexity* are concerned primarily with properties of the material script, which could also be potentially extended to *ligaturing*. However, the other dimensions, including *linguistic distance*, *spatial arrangement and nonlinearity*, *historical change*, *spelling constancy despite morphophonemic alternation*, *omission of phonological elements* and *allography*, as well as *dual purpose letters*, quickly merge into the overlapping domains of representational mapping (writing system in its primary sense) and an inclusive interpretation of orthography. As consistently alluded to, writing systems research needs to accord greater attention to carefully and consistently differentiating between writing system, script and orthography and to tracing out their complicated interactions. Adopting a different approach to thinking about the potential

[18] To provide some brief context to their dimension proposals, Daniels and Share (2018) specifically claim that the two dominant approaches to studying cross-script diversity, namely, orthographic depth (Katz and Frost 1992b) and psycholinguistic grain size theory (Ziegler and Goswami 2005) are both "deeply entrenched in Anglophone and Eurocentric/alphabetist perspectives."

merits of evaluating alternative criteria, Meletis (2018, 2019b) suggests that candidate criteria can be beneficially organized under three categories that embody the notion of fit. The categories are (1) *linguistic fit* (the match between a language and its writing system), (2) *processing fit* (encompassing both physiological and cognitive aspects) and (3) *sociocultural fit* (embracing a range of communicative and social functions). Naturally, with such diverse factors, there are bound to be dynamic interactions between them, even to the extent of often being in conflict, which also necessitates meticulous consideration. Crucially, however, they are also likely to afford further valuable insights into the complexities of writing systems and how they both evolve diachronically and function synchronically (Joyce and Meletis 2021).

7.5 Conclusion

As noted at the outset, as a technology of immense significance, understandably, the widespread dissemination of writing around the world has generated a plethora of diverse writing systems, both historical and contemporary. Thus, for research that targets many aspects of written language, a major challenge is to identify the key properties of writing systems – such as their mapping principles, rather than more superficial aspects, such as variations in sign shapes – that can serve as an effective classification criteria for coherent writing system typologies.

However, as also acknowledged from the start, to the extent that different theoretical assumptions yield divergent typology proposals, it is also valuable to continually assess the conceptual contrasts that shape typology proposals and the terminology employed in communicating them. In that vein, by outlining a selective sample of the most significant typology proposals to date, this chapter has sought to underscore the dialectic interaction between the conceptualizations and the diverse, and often inconsistent, terminology embodied within typologies. Moreover, although the basic typological strategy of classifying writing systems according to their dominant principle of representational mapping is unquestionably well motivated, this chapter has also argued that, because such principles are essentially idealizations, that strategy alone fails to fully capture the complexities of natural writing systems that are often mixed in nature. Accordingly, while also not without inherent challenges, future contributions to the ongoing enterprise of developing typologies might benefit from exploring alternative, or complementary criteria in seeking to further elucidate the materialization of written language both diachronically and synchronically.

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