The significance of the morphographic principle for the classification of writing systems

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The significance of the morphographic principle – by which the orthographic units of a writing system primarily represent morphemes – has been seriously undervalued within the study and classification of writing systems in general and in comprehending kanji within the Japanese writing system in particular. This paper argues for a re-evaluation of the importance of the morphographic principle and suggests that the shift in focus that comes with fully acknowledging that the term morphographic is *more precise* than the widely (mis)used term logographic has profound consequences for how we think about writing systems and writing, as well as for the kinds of questions that we ask about the nature and organization of the mental lexicon in literate language users.

Keywords: morphographic principle; logographic; writing system classification; Japanese writing system; kanji; psycholinguistics; mental lexicon

> If a [writing] system is not easily classified, this is either because its structural make-up and mode of operation are poorly understood or because the typology and hence the underlying theory is inadequate
> (Coulmas 1996b: 1386)

1. Introduction

This paper discusses the consequences of the common failure to fully acknowledge the importance of the morphographic principle within linguistic classifications of writing systems. While some scholars may be tempted to dismiss as merely a matter of emphasis the preference advocated here for the term *morphographic* – orthographic units that represent morphemes, the smallest linguistic elements of meaning – over the more generally encountered *logographic* – orthographic units that represent words – to refer to Chinese characters or to kanji within the Japanese

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writing system, the present author can see absolutely no merit to the practice of some scholars of writing systems to continue using the term logographic while at the same time admitting that morphographic is *more precise* (Daniels 1996a, 2001; Fischer 2001; Gnanadesikan 2009; Halliday 1985; Sampson 1985; Taylor 1988; see also entry in Coulmas 1996a). As the central motivations driving terminological distinctions should be to provide more accurate descriptions and develop more realistic theoretical accounts of the phenomenon under consideration, clearly getting the terminology right is vital. As this paper seeks to highlight, the shift in theoretical focus that the terminological revision in favour of morphography requires is of fundamental significance for our understanding of kanji in the Japanese writing system in particular and of writing systems in general, as well as of psycholinguistic research into the organization of the literate mental lexicon, and even of language itself.

After briefly describing the formation principles of kanji as background to the subsequent discussion of classification labels, Section 2 of the paper illustrates the tendency to portray the Japanese writing system as extremely complex and speculates in passing whether this image is, in some measure, a reflection of typological limitations and misunderstandings. Section 3 focuses on theoretical perspectives concerning the relationship between language and writing manifest in the long and often heated debates over classification labels, such as pictograph, ideograph, and logograph, that have been applied at various times to kanji within the Chinese and Japanese writing systems. Finally, moving to consider the wider implications that emerge with the recognition that morphographic is the more appropriate term, Section 4 briefly considers psycholinguistic research into the lexical retrieval and representation of polymorphemic words in the mental lexicon. In that context, Section 4 specifically outlines a series of constituent-morpheme priming experiments for two-kanji compound words (Joyce 1999, 2002a, 2002b, 2004; Joyce & Masuda 2005, 2008) that supports the notion of morphological relationships being reflected in the organization of the mental lexicon for literate Japanese language users.

2. The Japanese writing system

As background to subsequent discussion of the treatment of kanji within linguistic classifications of writing systems and the terminology employed, it is useful to start with a quick look at the classification of kanji according to their principles of formation, for much of the classification and terminology debate relates to how these principles have been perceived.

2.1 The formation principles of kanji

Kanji are often classified according to the principles of their formation. Traditionally, six groups have been recognized,[1] but that is rather misleading because two of the groups are actually principles of usage, as explained below, rather than principles of formation. Focusing on the four formation principles, it is possible to distinguish between two simple kanji groups and two complex kanji groups (Habein & Mathias 1991; Halpern 1990; Kaiser 1993). Examples of these formation principles are given in Table 1.

Table 1. Examples of formation principles for kanji

Formation principle	Examples and explanations			
Simplex characters				
Pictographs	木	tree	人	person
	日	sun; day	山	mountain
	象	elephant; image	鳥	bird
Ideographs	一	one	二	two
	上	up	下	down
	本	roots; origin	末	end
Complex characters				
Semantic compounds	林	woods; grove	木	tree + 木 tree
	休	rest	人	person + 木 tree
	信	trust; believe	人	person + 言 word
Phonetic compounds	侍	*ji* serve	人	person + 寺 *ji* temple
	持	*ji* have	手	hand + 寺 *ji* temple
	時	*ji* hour; time	日	sun; day + 寺 *ji* temple

The first group of 象形文字 *shōkei moji* 'pictographs' are based on simple pictures of the physical objects they represent (as already noted, fuller discussion of some of the terms introduced here is deferred to Section 3). Today, these kanji are highly stylized in form, due in part to changes in writing implements, so it is not always clear what is being depicted. Although many pictographs have relatively few strokes (e.g. 人 /hito/ 'person'), some are more complex (e.g. 鳥 /tori/ 'bird'). The second group of 指示文字 *shiji moji* 'ideographs' represent simple concepts. For example, for small numbers this is done with tally-like strokes (e.g. 一 /ichi/ 'one'); for marking directions by adding marks to a baseline (e.g. 上 /ue/ 'up'); and other simple concepts by highlighting a part of a pictograph (e.g. 末 /sue/ 'end'). Kanji formed by these two principles are sometimes referred to as simple kanji, and according to Habein and Mathias (1991) account for 152 (7.8%) of the *Jōyō kanji* officially designated for general usage.

The other two formation principles involve the combination of kanji from the first two groups. The third group of 会意文字 *kaii moji* 'semantic compounds' are based on combining characters from the first two groups to represent a meaning that is a function of the meanings of the elements (e.g. 林 /hayashi/ 'woods; grove'). These account for 483 Jōyō kanji (24.8%) (Habein & Mathias 1991). The last formation principle is that of 形声文字 *keisei moji* 'phonetic compounds'. This is by far the most important group, accounting for 1,310 Jōyō kanji (67.4%) (Habein & Mathias 1991). These characters consist of a semantic determiner, or radical, indicating the semantic field of the kanji, and a phonetic determiner indicating the reading (e.g. 時 /ji/ 'hour; time'). Kaiser (1993) points out that for 58% of phonetic compounds, the phonetic determiner gives a perfect indication of the whole kanji pronunciation and that for a further 33% the indication is partly reliable. Thus, phonetic determiners provide no clue to the pronunciation in less than 10% of these kanji.

While it is important to carefully differentiate these four formation principles from the two usage-based principles within the traditional classification, the two usage principles have unquestionably had a key role in the development of a full writing system from the rather limited set of simple kanji. As they will, therefore, also feature in subsequent discussions, the two principles are mentioned here. The first usage principle is of 仮借文字 *kasha moji* 'phonetic loans' by which a character comes to be used for another meaning on the basis of a shared sound, such as when 来 /rai/ 'wheat' was borrowed to write the word /rai/ 'come' (which is extremely difficult to represent in a simple picture). The second usage principle is of 転注文字 *tenchū moji* 'derivative characters' by which a kanji is used to represent another meaning by extension of the original meaning, such as 令 /rei/ coming to mean 'governor' from 'command' via 'commander'.

2.2 The complexity of the Japanese writing system

When one looks at descriptions of the Japanese writing system by scholars of scripts, one cannot fail to be struck by both the pervasive image of complexity and the sheer variety of superlative forms, ranging from the *most complex* (Sproat 2000; Kess 2005; Gnanadesikan 2009), the *most complicated* (Coulmas 1989; Fischer 2001; Robinson 1995), the *most elegant* (Kess 2005), the *most intricate* (Coulmas 1989; Kess 2005), the *most onerous* (Unger 2004), to being *without inferiors* (Sansom 1928), or simply describing the Japanese writing system as "one of the worst overall systems of writing ever created" (DeFrancis 1989: 138). Ever since its first contact with the West, the Japanese writing system has undeniably had a bad press: Francis Xavier (1506–1552), the early Jesuit missionary to Japan, apparently pronounced that the "complex Japanese language and its writing system

are inventions of the devil, designed to prevent the spread of Gospel" (cited in Taylor & Taylor 1995: 279). While scholars today no longer see the hand of the devil at work, clearly portrayals of the Japanese writing system as being complex are still common in works on writing systems. Commenting on the adaptation of Chinese characters to the Japanese language, Coulmas (1989: 122) writes that "under the hands of the Japanese, Chinese characters were transformed to become what is often said to be the most intricate and complicated writing system ever used by a sizeable population".

Smith (1996) discusses two aspects of the Japanese writing system that undoubtedly contribute to the sense of complexity. The first is the multi-script nature of the Japanese writing system, which consists of 漢字 *kanji* (literally 'Chinese characters'), the two native syllabaries of 平仮名 *hiragana* and 片仮名 *katakana*, and increasingly ローマ字 *rōmaji* (Roman alphabet), as well as Arabic numerals. Claiming that Japanese can be written entirely in kana, Unger (1987) believes that the system is unnecessarily complex, and accordingly describes kanji as "just a burdensome collection of visual abbreviations" (1987: 35). A similar position is taken by DeFrancis (1989: 138), who remarking on the development of kana syllabaries from Chinese characters, comments "it is an ironic fact, however, that while the Japanese developed a system of sound representation that was almost perfectly suited to their language, they ended up with one of the worst overall systems of writing ever created". More recently, Fischer (2001: 167) writes that the mixture of scripts which are "written together following arbitrary rules perhaps embody the most complicated form of writing ever devised".

The second aspect discussed by Smith (1996) is the dual system of *on-readings* (borrowed Sino-Japanese pronunciations) and *kun-readings* (native Japanese pronunciations) for kanji. For instance, 人 'person' has the on-readings of /jin/ and /nin/ and the kun-reading of /hito/. The remarks of Sansom (1928), writer of an early grammar of Japanese, have often been quoted in this respect, which refer to the common custom in his day of indicating readings for kanji in newspapers with 振り仮名 *furigana* glosses:

> "One hesitates for an epithet to describe a system of writing that is so complex that it needs the aid of another system to explain it. There is no doubt that it provides for some a fascinating field of study, but as a practical instrument it is surely without inferiors." (Sansom 1928: 44)

The dual-reading system gives rise to an interesting form of allomorphy within Japanese, where a morpheme can be associated with a different pronunciation according to its context. For example, as a word, or free morpheme, the native Japanese morpheme meaning 'water' is pronounced /mizu/ and it is usually

represented by the kanji 水. It is also pronounced as /mizu/ within native Japanese compound words, such as 水洗い /mizuarai/ 'wash with water' and 飲み水 /nomimizu/ 'drinking water', but it is pronounced as /sui/ within Sino-Japanese compound words, such as 水洗 /suisen/ 'flushing' and 防水 /bōsui/ 'waterproofing'.

Certainly, it cannot be denied that these two aspects of the Japanese writing system add to its complexity, but it should be noted that not all scholars have taken such a negative view. Backhouse (1984: 220), for example, perceptively remarks that the mixture of scripts "makes for a potential flexibility of orthography on a scale that is inconceivable in the case of more familiar writing systems". Perhaps, the sense of complexity is just a matter of perspective. Sproat (2000: 132) has written that "Japanese is surely the most complex modern writing system, and the hardest to force into any taxonomic mold". Recalling Coulmas' (1996b) observation cited at the head of this paper, possibly the problems of classifying the Japanese writing system are telling us more about misunderstandings and limitations with our typologies of writing systems. Yamada (1967: 705) has insightfully observed that,

> "[a]mong the various languages of the world, there are probably few which present so many difficulties as Japanese in the matter of characters. On the other hand, it would also be true to say that few are as fitting subjects for the development of a theory of characters."

3. Treatment of kanji within linguistic classifications of writing systems and terminology issues

Although Anderson (1992) is referring to typologies of language, still, his observations about the nature of typologies would seem to be equally relevant for classifications of writing systems.

> "We can conclude that the parameters of a typology ought to be ones from which something follows: that is, they ought to identify groups of properties that co-vary with one another, so that knowing how one things works entails knowing about others as well, as a direct consequence of whatever it is that motivates the typological labels." (Anderson 1992: 322)

While it is crucial to acknowledge that no 'pure' writing systems exist (DeFrancis & Unger 1994; Gelb 1952; Trigger 2004), there is also considerable merit in identifying the dominant principle underlying a particular writing system, such that the distinctions we utilize in differentiating systems may be as informative as possible about how different writing systems function in representing language. The purposes of this part of the paper are, first, to briefly note some of the typological labels that have been applied to kanji within various linguistic classifications of

writing systems, and, second, to discuss the assumptions about writing and scripts that underlie these typological labels.

Table 2. Terms used for kanji in various classifications of writing systems

Classification	Term
Taylor (1883)	Pictographs, ideograms and verbal phonograms
Gelb (1952)	Word-syllabic
Diringer (1962)	Ideographic (analytic transitional)
Hill (1967)	Morphemic
Halliday (1985)	Charactery (logogram)
Sampson (1985)	Logographic
DeFrancis (1989)	Morpho-syllabic
Daniels (1990, 1996b, 2001)	Logosyllabic
Faber (1992)	Logographic
Coulmas (1992)	Morphosyllabic
Sproat (2000)	Chinese = Syllabic + medium level of logography Japanese = Core syllabic + high level of logography
Cook & Bassetti (2005)	Morphemic
Rogers (2005)	Chinese = Syllabic + high level of morphography Japanese = Moraic + high level of morphography

Table 2 lists the terms applied to Chinese characters and kanji within a number of important typologies of writing systems, beginning with one of the earliest by Taylor (1883) and the seminal work of Gelb (1952). Although our discussions will draw on key insights from some of these typologies, it is regrettably beyond the scope of this paper to more fully trace out the evolution of writing system typologies (for relevant discussions, see Coulmas 1996a; Daniels 1990, 2001; Rogers 2005; Sproat 2000; Trigger 2004, and a brief outline in the introduction to this special issue). The prime focus in this part of the paper is to reflect on some of the assumptions inherent in the typological terms, particularly, the loose usages of *pictographic*, *ideographic*, and *logographic*, that have generated much heated debate (for discussion with respect to Chinese, see DeFrancis 1984, 1989, 2002; Erbaugh 2002; and Hansell 2003; and with respect to Japanese, Matsunaga 1996, 2002; Miller 1967, 1986; Unger 1987, 1990, 2004; Unger & DeFrancis 1995; Vance 2002). While Hansen (1993: 376) may see the debate over terminology as a "matter of truly mind-numbing triviality",[2] the issues at stake have rather more profound implications.

3.1 Language and mediums of expression

How we approach the problem of classifying the world's writing systems will depend not only on how we perceive the creation and historical development of

writing systems, but also on our notions about how speech and writing are related, and even on what we understand language to be (Henderson 1982). Accordingly, the paper discusses three fundamental questions integrally related to the classification of writing systems; namely, what to regard as writing, how does writing relate to language, and what level of linguistic units are represented by pleremic, or semantically-informed, writing systems (Haas 1976, 1983).

3.1.1 *What to regard as writing?*

On the first important issue of what to regard as writing, although Gelb (1952), Diringer (1962), and Haas (1983) (and speculatively Sampson (1985)) distinguish forms of semasiographic writing from full/ proper/ glottographic writing in their classifications, DeFrancis (1989) is undoubtedly correct to stress the importance of distinguishing between partial writing and full writing. As DeFrancis (1989: 3) points out, partial writing "is a system of graphic symbols that can be used to convey only some thought",[3] whereas full writing is a system "that can be used to convey any and all thought".

3.1.2 *How does writing relate to language?*

The second issue that a classification of writing system must consider is how graphic symbols can convey 'any and all thought'. Simply put, how does writing relate to language? This question is the single most important issue for understanding writing and how different types of writing systems function.

On the relation of writing to language, it is possible to discern two approaches. The first holds that language should be conceived of in terms of speech, and that writing is merely a means of transcribing speech, with the graphic unit defined primarily as representing units of speech (Bloomfield 1933; Daniels 2001; DeFrancis 1989; Hansell 2002; Miller 1967, 1986; Robertson 2004; Sproat 2000; Unger 1987, 2004). Among writing system scholars, DeFrancis (1989) is a particularly strong advocator of the 'language is speech' position. At the risk of greatly oversimplifying DeFrancis' (1989) arguments, there are two main elements to his reasoning. The first element is the often-cited arguments for the primacy of speech over writing, which are that speech exists in all human communities although writing does not, and linked to this, that while speech is naturally acquired, writing requires explicit instruction. In the 'language is speech' view, these facts are interpreted to indicate that sound is a defining attribute of language. The second element of DeFrancis' arguments is the *rebus principle*, which he refers to as the "epoch-making invention […] whereby a pictographic symbol was used not for its original meaning value but specifically to represent the sound evoked by the name of the symbol" (1989: 50).

In the second approach to language, sound is not regarded as being a defining feature of language, and while speech is undeniably the most natural medium of expression for hearing persons, other mediums of expression – writing and signing – are not secondary to speech in terms of their relation to language (Garman 1990; Halliday 1985; Lyons 1981; Morioka 1968; Olson 1994; Sandler & Lillo-Martin 2001; Steinberg, Nagata & Aline 2001). Thus, language is seen as an abstract entity, where speech and writing, as well as sign, are different mediums for expressing language, which are linked not in a hierarchical relation but rather in terms of relations of inter-translatability. These two views are represented schematically in Figure 1.

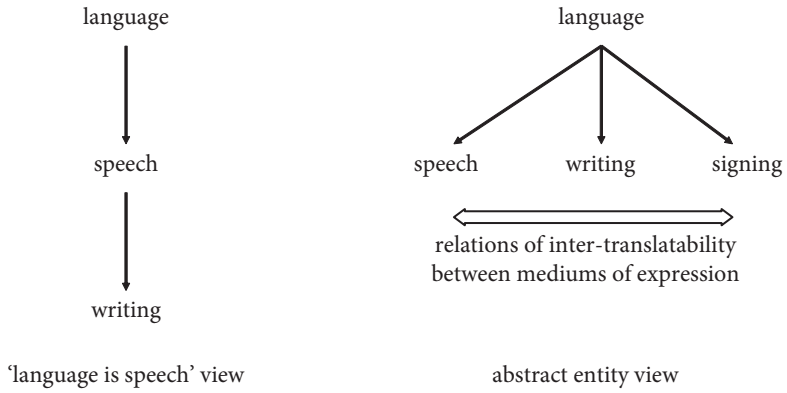

Figure 1. Schematic representation of the 'language is speech' view and the abstract entity view

To clarify the differences in these views of language a little further, it is useful to return briefly to the two elements of DeFrancis' (1989) arguments. As mentioned, the conception of language solely in terms of speech stems from the facts that speech exists in all human communities while writing does not and that writing requires explicit instruction while speech is naturally acquired. The second position, however, does not deny that speech is the primary medium of expression; it only acknowledges that speech is not the only modality in which language can be given expression, and so does not privilege speech over writing or sign as mediums of expression.

Turning to the second point, the significance of the rebus principle, DeFrancis is correct in describing this as a key device in the development of partial writing systems into full writing systems. It is, however, extremely important to appreciate how this happened in the case of Chinese characters. In contrast to the application of the rebus principle in the case of Sumerian cuneiform (Cooper 1996), which,

through subsequent transmissions, eventually led to the creation of cenemic, or semantically-empty, writing systems, the way the principle was employed in union with radicals as semantic determiners in the creation of the phonetic compound Chinese characters did not lead to a cenemic writing system. This actually presents a very real dilemma for the 'language is speech' position, for if language is speech and if writing is merely representing speech, then, what exactly is the non-phonological or semantic element of Chinese characters? Where does it come from and what is it doing? Although DeFrancis claims not to deny the existence of what he refers to as the "secondary but nonetheless important nonphonetic, that is semantic or morphemic, aspect" (1989: 58) of morphosyllabic systems (including Chinese in his classification), his response to the dilemma is to suggest that "Sampson, Haas, and others have seriously undervalued the phonetic element in Chinese writing" (1989: 52) and to apparently go to the extreme in the opposite direction in overvaluing the phonetic element when he claims that Chinese writing is a 100 percent syllabic script.[4] The notion of a pleremic writing system is not, however, a problem for the abstract-entity view of language. Because this approach regards both speech and writing as mediums of expressing language which are linked in relations of inter-translatability, it is able to offer a more flexible understanding of how both semantic and phonological elements can combine in Chinese characters.[5]

3.1.3 *What linguistic units are represented in pleremic writing systems?*

The final issue relating to the classification of writing systems is the level of linguistic unit represented by pleremic writing systems. As Hill (1967) astutely observed some time ago and as Rogers (2005) incisively reminds us more recently, simply, there are no writing systems based primarily on words. Because of the sheer number of symbols that would be required for a purely word-based writing system, we find that the only level at which a writing system can function above the syllabic level is the morphemic level. As Hill points out, in contrast to the phonological analysis of words in cenemic writing systems, a pleremic writing system entails analysis of word meaning, where it will settle on the morpheme, the smallest element of linguistic meaning.

As this insight is central to the arguments in favour of the morphological principle being advanced here, at this juncture, it is worthwhile to consider in a little more detail just how the vast majority of Chinese characters were created. Robertson (2004) has noted that users of early writing systems employed a number of measures to expand on the limited set of concrete words that could be referred to pictorially. One of these was the rebus principle – utilizing phonological similarity – where a pictograph representing a drawable object is pressed into double service to also stand for a homophonous word which defies simple

pictorial representation. Another principle was the polyphonic principle – relying on semantic similarity – such as the Chinese pictograph for 'eye' being used to write the verb 'see' (Boltz 1986). The reader has undoubtedly realized that these two principles correspond respectively to the two principles of kanji usage. However, as already noted, the most common way of creating new Chinese characters was the method that Robertson (2004: 24) describes as exploiting "the opposition of visual versus auditory perception". That is, the principle underlying *keisei moji* 'phonetic compound kanji' of using a radical or semantic determiner with a phonetic determiner in order to avoid the problematic levels of ambiguity that arise from the rebus principle alone and to specify the particular morpheme in question. It is instructive to look at an example of the phonetic compound principle provided by DeFrancis (1989). DeFrancis (1989: 98) writes that this principle "is one which combines a rebus-like symbol with another symbol giving, generally, a semantic clue to the meaning", as in the pictographs 女 for 'woman' and 馬 for 'horse' being joined to form the character 媽 for 'mother'. In this union, 女 is the semantic determiner indicating that the meaning is 'female'-related and 馬 is the phonetic determiner, where the pronunciation *mǎ* associated with 馬 is used to represent the similar syllable *mā* for 媽. Hansell (2003: 159) extends on this example pointing out that in addition to functioning as a phonetic determiner in other characters as a rough representation of *ma* (although not always matching for tone), such as 罵 'to scold' *mà*, 碼 'symbol' *má*, and 瑪 'agate' *mǎ*, 馬 also functions as a semantic determiner in 駝 'camel' *tuó*, 駐 'to station' *zhù*, and 騎 'to ride' *qí* indicating 'horse'-related senses. The crucial point to realize from these examples is that the phonetic compound principle was never an evolutionary step towards a cenemic writing system in Chinese. The phonetic compound principle involves the combination of a semantic determiner, providing a broad clue to the meaning, and a phonetic determiner, providing a rough approximation to the sound, but the two elements became fused together (and written within the roughly equidimensional space that a pictograph would occupy alone) to uniquely represent a linguistic unit; the morpheme.[6] And, once a morphograph is created, just as it would be an error to say *mǎ* when the intended morpheme is *mā*, so it would be a mistake to write 馬 when the intended morpheme is 媽.

While we should always be mindful of the axiom that there are no 'pure' writing systems and the implication, noted by Coulmas (1996a), that classifications of writing systems can never be totally objective, still, the terms that we apply in differentiating different systems should, as far as possible, seek to capture the dominant relationships between abstract linguistic elements, meanings, and the mediums of expression, namely, the orthographic and phonological units for different classes of systems. From the perspective that speech and writing are functionally equal in terms of expressing language, the issue of how to classify a

writing system becomes a matter of identifying the level of linguistic unit that the graphic units of the writing system principally represent. As a major component of the Japanese writing system, kanji primarily function as a *morphographic writing system* – a writing system where the orthographic units represent morphemes, the minimal units of meaning in the language. It is regrettable that misconceptions about writing systems and kanji, reflected in terms like pictograph, ideograph, and logograph, as discussed next, continue to hinder a general appreciation of the morphographic nature of kanji.

3.2 Pictographs and the ideographic myth

The first of the problematic typological labels that have been applied to kanji is the term pictograph. Suffice to say, while the term may be used in reference to the limited numbers of simplex kanji that are derived from simple pictures of the physical objects they represent, these alone only constitute a partial writing system.

The second problematic term is ideograph, which has certainly generated the most misunderstandings and the fiercest debate (see earlier references). While it is beyond the scope of this paper to comment on the long history of that debate, the basic argument against the term is succinctly summarized by Miller (1986) who emphasizes that it is "potentially extremely misleading" (1986: 17) because kanji are not *graphs* for writing *ideas* (1986: 19).

Although it is generally acceptable to use of the term 'ideographic' in a narrow sense to refer to the second group of simplex kanji, that represent simple concepts, it is extremely unfortunate that this term has been used in the past to refer to all kanji. Once again, the term is totally inappropriate because the ideographic principle in the narrow sense alone could, simply, never underpin a full writing system. To be a full writing system, a system must be capable of expressing the entirety of a language, and to do this the graphic units of the system must be representing linguistic units – at either the phonemic level or the syllabic level in the cases of cenemic writing systems or at the morphemic level in pleremic writing systems.

3.3 Logographic versus morphographic

In his glossary for the terminology of writing, Gelb (1952: 250) makes the following entry: "*Logography or Word Writing*. A writing in which a sign normally stands for one or more words of the language". Subsequent scholars have, however, accorded logography with a wider, more inclusive definition. For example, Taylor and Taylor (1983: 20–21) remark that "a writing system in which one grapheme represents primarily the meaning (and sometimes secondarily the sound) of one word or morpheme may be called a logography". In their list of

terminology of writing, Daniels and Bright (1996: xlii) provide the definition of logogram as "a character that denotes the meaning but not the pronunciation of a morpheme".

Given these wider definitions, a preference for the term morphographic may seem somewhat pedantic. However, recalling that the typological labels we apply should be as informative as possible about how different writing systems function in representing language, the central task for students of writing systems must be to identify the dominant principle underlying a writing system and to classify it accordingly. A recent comment about writing systems by Gnanadesikan (2009: 7) has particular resonance for the present discussion:

> "Writing systems that concentrate on representing morphemes – as complete meaning-pronunciations complexes – are called *logographic* (the name, meaning 'word-writing', is traditional, though it ignores the difference between morphemes and words."

The central argument being advocated in this paper is that the tradition of using the term logographic, while simultaneously acknowledging that morphographic is *more precise* (Daniels 1996a, 2001; Fischer 2001; Halliday 1985; Kess & Miyamoto 1999; Sampson 1985; Taylor 1988; see also entry in Coulmas 1996a), is surely one that does us no service at all, and, therefore, should be abandoned.

logo "word"	+	*graph* "writing"	=	implies only words
morpho "morpheme"	+	*graph* "writing"	=	covers both free and bound morphemes

Figure 2. Logographic versus morphographic

As Figure 2 seeks to illustrate, the term morphographic not only covers perfectly satisfactorily the fact that many single kanji represent words, such as 川 /kawa/ 'river', 緑 /midori/ 'green', and 車 /kuruma/ 'vehicle, car', because by their very definition *free morphemes* are simplex words, but it also more accurately reflects and emphasizes the principle by which kanji function within the Japanese writing system. In the vast majority of cases, kanji appear in combination with other graphic units; either with hiragana as *okurigana*, 'inflectional elements' following the stem morpheme of verbs and adjectives[7] or with other kanji as components of poly-morphemic words. Indeed, the most common poly-morphemic word in Japanese is the two-kanji compound word (Nomura 1988), accounting for up to 70 percent of all Japanese words, as estimated by Yokosawa and Umeda (1988) from type counts of dictionary entries.

It is instructive in the present context to look briefly at the word-formation principles that underlie two-kanji compound words (Joyce 2002a; see also Kageyama 1982; Nomura 1988; Ozaki, Todome, Nishioka, Yamada & Yamada 1992;

Tamamura 1985), as presented in Table 3. Although it is true that some two-kanji compound words are phonologically based, such as monomorphemic *jukujikun* (e.g. 葡萄) and *ateji* (e.g. 面倒), they are by far the exception. The vast majority of two-kanji compound words are morphologically motivated. That is, they are formed according to word-formation principles operating on the underlying morphemes, with the representation of the resultant polymorphemic word being the product of combining the orthographic representations of the component elements.

Table 3. Word-formation principles underlying two-kanji compound words (Joyce 2002a)

Principle					**Morphological**
Modifier + modified					Yes
山桜	/yamazakura/	'mountain' + 'cherry'	=	mountain cherry	
国道	/kokudō/	'country' + 'road'	=	national road	
Verb + complement					Yes
登山	/tōzan/	'climb' + 'mountain'	=	mountain climbing	
殺人	/satsujin/	'kill' + 'person'	=	murder	
Complement + verb					Yes
外食	/gaishoku/	'outside' + 'eat'	=	eat out	
毒殺	/dokusatsu/	'poison' + 'kill'	=	kill by poison	
Associative pairs					Yes
親子	/oyako/	'parent' + 'child'	=	parent(s) and child(ren)	
生死	/seishi/	'life' + 'death'	=	life and death	
Synonymous pairs					Yes
山岳	/sangaku/	'mountain' + 'mountain'	=	mountains	
変化	/henka/	'change' + 'change'	=	change	
Repetitions					Yes
段々	/dandan/	'step' + 'step'	=	gradually, by degrees	
個々	/koko/	'piece' + 'piece'	=	individual, one by one	
Derivation					Yes
不明	/fumei/	'un-' + 'clear'	=	unclear, obscure	
史的	/shiteki/	'history' + '-ic'	=	historic	
Abbreviations					Yes
農協	/nōkyō/	from 農業協同	=	agricultural cooperative	
春闘	/shuntō/	from 春季闘争	=	spring (labor) offensive	
Phonetic borrowing					No
葡萄	/budō/		=	grapes	
面倒	/mendō/		=	care	

Note. In compound words formed by repeating a kanji, the second character is usually replaced by the simpler form 々 which has a meaning something like 'same as previous' or 'ditto'.

Apparently overlooked in the heat of debate over the formation of kanji, classifications of writing systems should also be informative about how graphic units are combined in expressing language. Unlike the spelling rules concerning the level of correspondence between graphemes and phonemes in cenemic writing systems, such as the alphabet, the rules for combining kanji are not primarily orthographic in nature. Rather, the concatenation of kanji to form multi-character words is the domain of morphology, with the surface orthographic form of a word being derived from the morphographic principle where kanji represent morphemes.

4. Two-kanji compound words in the Japanese mental lexicon

Having argued for the significance of the morphographic principle for linguistic classifications of writing systems, this final part of the paper briefly discusses the profound implications for psycholinguistic research into visual word recognition and the organization of the literate mental lexicon.[8]

There has been considerable psycholinguistic interest in the extent to which morphological information influences the processing of polymorphemic words in reading (Feldman 1995; Jarema, Kehayia & Libben 1999; Sandra & Taft 1994). At one level the interest is well motivated because awareness of morphology is clearly an important part of our linguistic knowledge, as evidenced by the sheer numbers of polymorphemic words that already exist in the lexicons of all languages, and in the relative ease with which language users are able to produce and understand new polymorphemic words (Sandra 1994). At another level, clearly, the representation of morphological information also has profound implications for models of the mental lexicon. Notions about how morphology should be represented impact directly on our conceptualizations of lexical representations (for instance, either full listings or decomposed storage), on approaches to lexical retrieval (for example, whether search or activation), as well as on the extent of morphological involvement in processing (whether as separate parsing routes or as intermediate-level units).

In order to investigate the lexical representation and retrieval of two-kanji compound words within the Japanese mental lexicon from a morphological perspective, Joyce (1999, 2002a, 2002b, 2004; Joyce & Masuda 2005, 2008) has conducted a series of constituent-morpheme priming experiments that controlled for the word-formation principle underlying the two-kanji compound word targets in the lexical decision task. In two experiments with five word-formation principle conditions (modifier + modified (e.g. 夕飯 /yūhan/ 'evening meal'), verb + complement (e.g. 帰宅 /kitaku/ 'return home'), complement + verb

(e.g. 予習 /yōshu/ 'preview'), associative pairs (e.g, 父母 /fubo/ 'father and mother'), and synonymous pairs (e.g. 変化 /henka/ 'change')) and three prime-target relationship conditions (first-constituent (e.g. 帰 – 帰宅), second-constituent (e.g. 宅 – 帰宅), and unrelated (e.g. 号 – 帰宅), Joyce (1999, 2002a, 2002b) found that responses to two-kanji compound word targets were facilitated in both the first-constituent and the second-constituent prime conditions compared to the unrelated prime condition, and, in the majority of cases, the priming in the two constituent conditions was at similar levels. The only word-formation condition with significant differences between the two constituent conditions was the verb + complement condition, where responses in the first-constituent condition were faster than in the second-constituent condition. Additional evidence for verb morphology effects also comes from experiments conducted by Joyce and Masuda (2005, 2008) employing very short stimulus onset asynchronicity (SOA) conditions (60 ms, 90 ms, 120 ms, 150 ms, and 250 ms) in order to investigate the time courses of orthographic, phonological, morphological, and semantic activation for two-kanji compound words. Interestingly, reversed patterns of priming have been observed between the verb + complement and the complement + verb compound words across the SOA conditions, with priming effects for verbal constituents being larger than for the complement constituents.

In accounting for these findings, Joyce has advocated the Japanese lemma unit model as a model of the Japanese mental lexicon (1999, 2002a, 2002b, 2004), based on a multi-level interactive-activation framework model for Chinese (Taft, Liu & Zhu 1999). A special feature of this model is the incorporation of lemma unit representations, as connection or way-stations, which mediate the links between both orthographic and phonological access representations and semantic representations. In the Japanese lemma unit model, information about families of morphologically-related words is modeled in terms of the pattern and strengths of connections to and from lemma unit representations, as well as between them, which mediate the activation from access representations for constituents and the degree of overlap in the activation of semantic representations. Thus, the notion of morphology that is incorporated in the Japanese lemma unit model is highly consistent with Bertram, Baayen and Schreuder's (2000) claim that much of the interconnectivity in the human mental lexicon is based on networks of morphologically related words.[9]

5. Conclusion

In summary, this paper has argued for a re-evaluation of the significance of the morphographic principle for our understanding of classifications of writing

systems, particularly kanji within the Japanese writing system, and of writing itself. After a brief sketch of the Japanese writing system, Section 3 focused on some central questions for the classification of writing systems and argued that while cenemic writing systems function at either the phonetic or syllabic (or moraic) levels, pleremic writing systems function at the morpheme level. It is very interesting to note that the distinction between cenemic and pleremic writing systems is a key feature of the Japanese writing system with its integration of morphographic kanji and syllabic kana as functionally complementary components of an overall system. Then, noting that classifications of writing systems should also be informative about the ways in which graphic units are combined in forming larger linguistic elements, a quick look at the morphology, or word-formation principles, of two-kanji compound words highlighted the fact that the vast majority of compound words are morphologically motivated. The orthographic representation of polymorphemic words is not based on the kind of grapheme-phoneme correspondence spelling rules of cenemic writing systems, but rather on grapheme-morpheme correspondences; that is, the morphographic principle. Finally, a series of visual recognition experiments clearly indicates that morphological information influences the lexical representation and retrieval of two-kanji compound words in reading. Underscoring the wider significance of the morphographic principle, it can be no matter of mere coincidence that non-cenemic writing systems must be morphographic in nature and that morphology is so fundamental to the organization of the literate mental lexicon.

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Notes

1. The traditional classification, known as 六書 *Rikusho* 'Six Scripts,' was introduced by 許慎 *Kyoshin* in his dictionary, 説文解字 *Setsumon kaiji* compiled in China around 120 CE, and is

still widely used in Japan today (Martin 1972; Kaiho & Nomura 1983; Henshall 1988; Coulmas 1989; Halpern 1990; Habein & Mathias 1991; Kaiser 1993; Boltz 1996). Sometimes, another distinction is made for those kanji that have been created by the Japanese themselves, referred to as either 国字 *kokuji* 'national characters,' or 和製文字 *wasei moji* 'Japanese-made characters,' (Halpern 1990). However, the majority of these kanji are based on the semantic compound principle (e.g. 峠 /tōge/ 'mountain pass' is a combination of 'mountain,' 'up' and 'down,' while 躾 /shitsuke/ 'discipline, train' is a combination of 'body' and 'beautiful').

2. Not to take Hansen's (1993) remarks completely out of context, we should note that Hansen's sense of despair stems from what he sees as the limited application of a term that is used "to refer to a language-type with exactly one-and-a-half instances" (1993: 376) referring to China and Japan, respectively. Still, one cannot help but feel that the comment somewhat misses the point of the debate.

3. In his writing classification scheme, DeFrancis (1989: 58) lists cave painting, Uruk IV symbolization, Yukaghir pictographs, and Amerindian pictographs as examples of partial writing systems. The reader is referred to Sproat (2000) for a balanced stance on DeFrancis' (1989) arguments that no full writing system is semasiographic and on DeFrancis' singling out of the Yukaghir 'love letter' cited by Sampson (1985).

4. While DeFrancis (1989: 100) comments that "simple characters of pictographic origin […] comprise only about one percent of the total number of Chinese characters. The remaining 99 percent […] are compound characters whose main component is a phonetic element", the number 100% is used in the title of a figure (1989: 102–103). As Sampson (1994: 117) comments, "this claim confuses diachrony with synchrony. It may be correct that the creation of a script always involves phonetic considerations, but subsequent evolution of script and spoken language can remove the phonetic basis of a writing system. It is difficult to agree that modern Chinese writing is essentially phonetically based; and it is certain that phonetic motivation is not a necessary feature for a script". More objectively, Hansell (2003: 159) puts the figure for radical – phonetic compounds at "over 90 per cent of all Chinese characters", but also remarks that the distribution by type is not even, for while low frequency characters tend to be radical – phonetic compounds, the highest frequency characters tend not to be.

5. Although Robertson (2004) undoubtedly presents his noteworthy account of the possibility of writing from the 'language is speech' position, much of his discussion would seem to be more compatible with the abstract-entity view of language. For example, Robertson insightfully observes that the possibility of writing emerges from the intersection between the "highly developed avenues of human perception – visual (iconic) and auditory (symbolic) perception" (2004: 19); an understanding that could potentially serve as a basis for a realistic account of how semantic and phonological elements are combined in kanji.

6. Daniels (1996b) suggests that the answer to why writing only emerged for the three civilizations of Sumerian, Chinese, and Mayan lies in the syllable. In explanation of this notion, he comments that "[i]n Sumerian, Chinese, and Mayan, most morphemes and in particular independent words comprise single syllables" (1996b: 585). However, if early writers of Chinese were focused only on the syllable, then why did Chinese writing not develop into a cenemic writing system? In emphasizing the phonological unit of syllable, Daniels seems to miss the fact that the salient unit is really the morpheme. As cited by Houston (2004), Boltz (2000) would appear to be closer to the point when he points out that languages that are principally

monosyllabic, like Sumerian, Chinese, and Mayan, are likely to have a greater incidence of homophones, that is morphemes that are similar in sound but are *distinguished by virtue of the fact that they have different semantic references*, and so the early writers of these languages would be more inclined to explore the potential of the rebus principle in writing.

7. While some scholars may argue over the exact placement of the morpheme boundaries for group 1 (五段 /godan/) verbs, the basic principle of kanji-orthography stems and hiragana inflections is morphographic in nature. For instance, 書く /ka.ku/ 'to write' consists of the stem morpheme represented orthographically by the 書 kanji following by く /ku/ indicating that this is the base, or citation, form of the verb, in contrast to 書きます /ka.kimasu/ the polite present, 書かない /ka.kanai/ the plain present negative, 書こう /ka.kō/ the plain volitional, and 書ける /ka.keru/ the plain potential, where all the verb inflections are represented by hiragana. The author also acknowledges that there are a number of idiosyncrasies relating to okuragana rules, which are somewhat problematic, but such disambiguating exceptions are generally consistent with the morphographic principle.

8. While we should certainly be very wary of reading too much significance into the directions that an academic discipline proceeds in, still, one cannot help but speculate about how notions concerning the classification of writing systems have contributed in shaping psycholinguistic research into visual word recognition (Henderson 1982). In their broad survey of Japanese psycholinguistic research into the processing of kanji and kana, Kess and Miyamoto (1999) comment on the inadequacies of early dichotomies between more holistic processing of kanji and more assembly-based processing of kana. It also seems relevant to note that their review devotes considerable attention to the single kanji character, compared to the relatively sparse discussion of compound words, and to wonder to what extent is the imbalance a reflection of earlier misconceptions concerning ideography and logography.

9. It is interesting to note that the basic insight into morphology-based networks underlying much of the interconnectivity in the organization of the mental lexicon provided by Baayen and Schreuder and their colleagues (Baayen & Schreuder 1999; Bertram, Schreuder & Baayen 2000; Schreuder & Baayen 1995) comes principally from their psycholinguistic work with Dutch, German, and English; all languages using the same basic cenemic writing system of the alphabet.

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