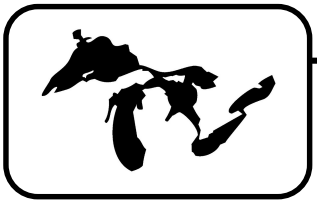

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UNIVERSALITY AND DIVERSITY IN WRITING SYSTEMS

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Abstract: Grapholinguistics is an underdeveloped and underrepresented subbranch of linguistics. While numerous writing systems have been described and various aspects of writing have been studied, comparisons have seldom been undertaken. This results in a lack of a shared understanding of grapholinguistic concepts or terminology and the nonexistence of a 'theory of writing' in which fundamental theoretical questions are dealt with, e.g. *Why are writing systems the way they are?* One reason for this is the *particularist* claim that writing systems are too diverse to be compared. By contrast, the opposite, *universalist* position is rarely adhered to with respect to writing. The present contribution presents a multimodular model of writing systems (based on Neef 2015) and discusses both universal and diverse features of writing systems. In conclusion, it is argued that universality in writing systems is based on cognitive constraints, while diversity stems mostly from cultural influence. The central claim is that comparative research is valuable in building a theoretical basis for grapholinguistics that will help systematize future research in the field.

Keywords: Grapholinguistics, writing systems, graphematics, graphetics, universals of writing systems, typology of writing systems, comparative graphematics, grapheme, orthography
Languages: German, Chinese, Thai, Japanese, Cherokee

TO THIS DAY, THE STUDY OF WRITING SYSTEMS – which, following Neef (2015), I call *grapholinguistics* – remains a heavily understudied branch within and beyond linguistics. Not only does it lack the abundance of research conducted in other areas, but there is also little agreement over even the most fundamental matters. Central questions such as *What is a grapheme?,* although they are debated time and again, have not been settled conclusively. This, of course, is not a situation uncommon to other subdisciplines of linguistics. Yet, it seems that in grapholinguistics, even the very basis is not fleshed out. Whereas many – though certainly not all – linguists agree on certain definitions of 'phoneme', it is hard to find any two scholars of writing who adhere to the same concept of 'grapheme'. A fixed and shared grapholinguistic

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terminology remains a desideratum, and in this case, without the terminology, there seems to be little theoretical agreement.

I argue that one of the reasons grapholinguistics is so underdeveloped is the tension between two implicitly underlying views: While a (fleeting) number of scholars find comparisons between different writing systems feasible, and hold that there are commonalities and – possibly – universal traits, others claim the sheer diversity of writing systems makes comparisons – while not impossible – futile affairs. Common features, they claim, could only be identified at highly abstract levels, rendering them too general and thus redundant for a 'theory of writing (systems)'. How could, for instance, writing systems as dissimilar as Chinese, German, Thai, and Arabic be compared? And what value would such a comparison even have? I call the first of these views, following Haspelmath (2010), *universalism*, while the second view is labelled *particularism*. Before attempting to provide preliminary answers to the particularist questions listed above, I want to highlight two fundamental facts: firstly, the diversity of languages has in no way stopped linguists from comparing them to arrive at abstractions, categories, explanations, etc., i.e., to arrive at a variety of theory of language. Secondly, there is no such thing as a 'theory of writing' yet, precisely because of the relative paucity of comparisons and abstractions pertaining specifically to writing systems. Consequently, we could only possibly know what the value of comparisons is if we actually carried them out and judged them by their results.

I want to stress that no one is denying that remarkable work has been done that falls under the heading of grapholinguistics. There exist excellent descriptions of writing systems in which not only the linguistics of writing, but also numerous other aspects have been treated, including the psycholinguistics of reading and writing, the history of writing, and sociolinguistic aspects of writing. However, regarding the potential 'theory of writing' alluded to above, this research has a number of serious limitations. Primarily, it focusses predominantly on a very limited number of writing systems. Above all, these are writing systems using the Roman script, e.g., English, German, French. Regarding this practice, scholars often speak of ethnocentrism (cf. Yan 2002) or, more specifically, alphabetocentrism (cf. Share 2008). The last term could be specified even further by acknowledging that not all *alphabets* are studied thoroughly, but only the ones that, as stated above, utilize the Roman script.[2] At this point in time, however, this criticism of ignoring non-alphabetic writing systems has to be rejected at least partially, as there is a large and growing body of research on Asian writing systems – predominantly Chinese and Japanese, but also Korean. While on that account it might appear as if the grapholinguistic community had a relatively broad horizon, writing systems that are truly well-studied are indeed astonishingly few compared to the number of languages that have been described in linguistics. To make matters worse, it often seems as though the valuable results that individual works on these select writing systems arrive at are rarely – if ever – integrated into a bigger picture. Thus, categories are frequently only applicable to a single system, e.g., the definition(s) of 'grapheme' that German grapholinguists has developed (cf. Kohrt 1986, Berg et al. 2016). It is in this vein that W. C. Watt, a fervent observer and scholar of the study of writing himself who has published several

[2] For comparison, the Georgian or Armenian writing systems – alphabets using the Georgian and Armenian scripts, respectively – are not studied nearly as intensively as alphabets using the Roman script.

elaborate reviews of prominent works in the field, criticized the lack of theory, yearning for 'more':

> 'More' would constitute, or at least contribute to, a semiotic theory of writing systems: a theory that would *explain*, to put it pithily, why each such writing system is the way it is, instead of some other way, and why all such systems have in common what they have in common. […] Such a theory might continue by examining the cognitive factors that determine the forms of writing systems. (Watt 1998: 118, emphasis added)

I agree with Watt in that 'more' is indeed something we should strive for in grapholinguistics. The relevant descriptive work that has been done so far should now be used to arrive at and inform *explanations*. Instead of 'only' detailing how writing systems are structured and how they developed, the focus should shift on *why* they are structured and developed this way. However, asserting that one could easily compare writing systems is also naïve and oversimplifying the matter, as the line between what is universal and what is diverse in writing systems is truly fine.

This present paper is merely a further step in the direction of a comparative grapholinguistics (for a proposal of a comparative graphematics, cf. Weingarten 2011). After outlining the theoretical bases of the structure of writing systems, it offers an overview of both the broad universal traits of writing systems that have been discussed in the literature as well as diverse features that cannot be overlooked or understated. In doing this, it is in no way exhaustive. As this contribution represents a critical think piece and not a matured and methodologically sound proposal for how to do things from now on, it will close with remarks on how universality and diversity may be explained in a future theory of writing as well as how they possibly interact.

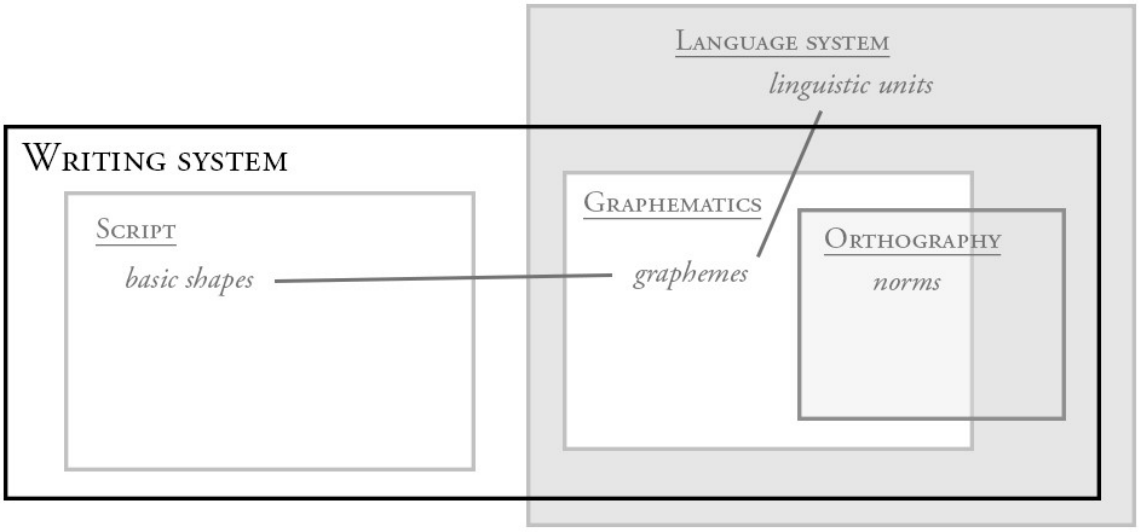

Figure 1. A multimodular model of writing systems (cf. Meletis 2018:61)

1. BASICS OF GRAPHOLINGUISTICS. My suggestion is a slightly modified version of the modular model of writing systems developed by Neef (2015). Figure 1 shows the different modules of a writing system and hints at how they interact: A **language system** represents the constitutive module. This corresponds with a narrow definition of *writing* that identifies only those forms of visual communication as writing in which visual units relate to linguistic units. In this view, visual units that correspond directly with referents of the real world are not regarded as writing (cf. Daniels 2017:83-84, Dürscheid 2016:100-101). While a language system – e.g. German or Chinese – offers linguistic units and information on various levels – phonemes, syllables, morphemes, etc., – a **script** offers the visual counterparts, the so-called basic shapes.

The basic shape is an abstract visual unit, a visual skeleton. Imagine stacking |a|-graphs[3] in different typefaces over one another in an image processing program and adjusting their opacity (cf. Frutiger 2004, Rezec 2009:64-67): this would reveal the smallest visual denominator of all of them, their skeleton, so to speak. As an abstract visual unit, the basic shape stores information on the number and the form (straight lines, curved lines, dots) of its segments as well as the relations between those segments, the most important of which is of spatial nature: topological configurations inform us about how segments are arranged in space in relation to one another, including different forms of connections between them (as visualized in |L|, |T|, |X| and |O|). It is crucial to keep in mind that scripts and their basic shapes are devoid of any linguistic information[4]; nothing about the basic shape |A| tells us that in many writing systems, it is in a graphematic relation with the phoneme /a/. In fact, in the Cherokee script, which borrowed some uppercase letters from the Roman script, this basic shape is graphematically related to the syllable /go/. The arbitrariness of scripts is the reason why they are positioned outside of the language system.[5] The module of scripts is studied by the grapholinguistic subdiscipline of *graphetics* (cf. Meletis 2015).

Linguistic units and basic shapes are related through the module of **graphematics**. The smallest of these graphematic relations are what I call *graphemes*. Graphemes, in my conception, can be seen as signs in the Peircean sense, the linguistic unit being the signatum and the basic shape being the signans (and the writer/reader being the interpretant). However, as the grapheme is an almost notoriously infamous term, there is not enough space here to discuss it in detail, which is instead done elsewhere (cf. Meletis 2019).

What greatly complicates the picture of a graphematic module is, among other aspects, the fact that due to conflicting tendencies, many writing systems are not completely biunique (cf. Dressler 2000). This means that a basic shape can sometimes lack transparency and signify more than one linguistic unit, as |v| does in the German writing system, being in graphematic relations

[3] Graphetic units such as graphs and basic shapes are enclosed in vertical strokes | | and graphematic units in angle brackets < >.

[4] There are authors who see this differently. In Primus's (2004) approach, for example, the visual features of the basic shapes in the Roman script correlate with phonological features.

[5] When a script is custom-tailored for a given language, which was the case for the first writing systems ever created – at the current time we hold those to be Chinese, Sumerian, and Mayan (cf. Daniels 2013, with other possible candidates, too) – the relationship between the visual and the linguistic proves more complex and not completely arbitrary. For example, iconicity (e.g., in the form of pictography) plays a relevant role in these systems.

with both /f/ and /v/ in different contexts (another example is the sequence |ough| in English). Vice versa, a linguistic unit can be signified by more than one basic shape (or a combination of basic shapes), exhibiting a lack of uniformity.

The imperfection of graphematic relations, namely the fact that there often exists more than one possible way of writing a given linguistic unit, is the next module's raison d'être. Even within the graphotactic limitations[6] of English, the word that is *correctly* spelled <city> could possibly also be written <*scity> or <*sity> because /s/ is not uniformly represented by one basic shape or combination of basic shapes (cf. Meletis 2018). The sum of possibilities licensed by a writing system is what Neef (2015) terms *graphematic solution space*. Why, then, is <*sity> – even though a reader of English can read it and possibly extract its intended meaning correctly, at least in context – marked with an asterisk and deemed 'incorrect'? Indeed, it is a graphematically licensed form. Its incorrectness is not descriptive, but prescriptive: it stems from the orthographic module.

The module of **orthography**[7] is optional. Historically, writing systems and communities of writers and readers could do without it, and historical records boast different spellings for one and the same word, sometimes even in consecutive lines (cf. Voeste 2008 for German). Different developments led to the growing need for standardization, even though it must be noted that some writing systems still do without the normative constraints of an orthographic module. The reason orthography serves as an example for the diversity of writing systems is that different orthographies display different focusses, conventions, and rules. Whereas in German orthography, for example, capitalization is a central topic, it does not exist in Arabic, Chinese, or Thai, as well as the majority of non-alphabetic (as well as some alphabetic, cf. Georgian) writing systems. The fact that the module of orthography is not completely positioned inside of the graphematic module in Figure 1 implies that some forms are orthographically 'correct' even though they are not graphematically licensed.

A model such as the one outlined above represents a gross abstraction. It is descriptive and not explanatory. If this model fits all writing systems, it is because it is highly general. This points exactly back to my initial question: Is there a degree of abstraction that allows comparison but leaves enough room for the diverse traits of writing systems? It all hinges on categories (or concepts, cf. Haspelmath 2010). There are, for example, phonemes and morphemes in every language, and their mere existence opens them up to comparison. However, it is we as linguists who analyzed and labelled them as 'phonemes' and 'morphemes,' which made possible the

[6] The graphotactics of a writing system tell us about "regularities, that is, statistical patterns concerning the arrangement of letters in words" (Sobaco et al. 2015:593-594), and of course this does not only concern letters, but basic units of types of writing systems other than alphabets as well. However, graphotactics are not primarily statistical. They reveal what combinations and sequences are allowed – that is, graphematically licensed – at all. If a licensed sequence occurs only once in the writing system, for example, it is not statistically significant but still part of the writing system's graphotactics.

[7] I do not treat *writing system* and *orthography* as synonyms, which is done often and obscures a crucial distinction. A *writing system* is the realization of a language in the visuo-graphic modality of writing. As such, it subsumes both the actual usage of writing (including variation, errors, etc.) as well as its standardization (its *orthography*).

unified description of languages as well as their comparison. Can the same not be accomplished for grapholinguistic categories?

2. UNIVERSALITY. One 'feature' that has sometimes been assumed as a universal of writing is that all writing refers to language. This, however, is a fairly circular argument and, in fact, merely a matter of definition. As mentioned before, the narrow and predominant definition of *writing* interprets it as visual notation that refers exclusively to language. Cave paintings, for example, are not writing. They have meaning and can be interpreted, but they cannot be decoded the same way writing can; they cannot be read, because no linguistic units are directly associated with them. This type of visual notation is sometimes called *semasiography* to distinguish it from *glottography* or writing (cf. Gelb 1969:13, Schmitt 1980:7-11). With this matter settled, however, the really interesting and important question is *how* and *which* linguistic units relate to visual units and what the nature of these relations is.

A claim by DeFrancis (1989) is that all writing is phonetic, or, to use a broader and less problematic[8] term, phonographic. Almost every typology of writing systems postulates a crucial distinction between phonography and morphography. The majority of graphemes – and, thus, the 'unmarked' grapheme – in a phonographic writing system relates basic shapes (letters, aksharas, etc.[9]) to a phonological unit – a phoneme, a syllable, etc., whereas the unmarked grapheme in a morphographic writing system relates basic shapes (characters) to morphemes. What, then, does "[n]o phonetics, no writing" (DeFrancis 1989:56) mean? The morphographic Chinese writing system offers clues of phonographic nature in the form of components within characters that hint at the pronunciation of the morpheme which, as a whole, is signified by the character. Due to the doubly articulated nature of language, morphemes also always have phonological representations. I do not completely discard the idea that there might be morphemes that only have a written, but no phonological representation[10], but *if* they exist, they are certainly not common in modern writing systems. For Chinese, the fact that the primarily morphographic morphemes can be 'pronounced', too, becomes evident when foreign names are integrated into the writing system. A Chinese teacher told me my nickname in Chinese is written <帝米>, literally translated as 'king rice': the first character signifies the morpheme *king* with the (Mandarin) phonological representation /dì/, the second character, the morpheme *rice*, pronounced /mǐ/. I am no rice king, and these graphemes are (mostly) emptied of their

[8] The use of the term 'phonetic' insinuates that writing systems give information about the lowest, etic level of spoken language, when in fact they often omit specific phonetic information and refer to phonological representations instead.

[9] I take the terms *character*, *letter*, etc., to be graphetic terms. Thus, they signify types of basic shapes – units of scripts. *Letter* thus equals 'basic shape of the Roman alphabet' (or other alphabets – which, admittedly, brings the functional level into the picture again) rather than 'grapheme of a given writing system'.

[10] One might think of determinatives or semagrams in Egyptian hieroglyphs in this context; they are mute and serve the purpose of disambiguating homophonous glyphs (cf. Loprieno 1995:13) – but do they refer to morphemes without a phonological representation?

morphological information[11], used only for their phonological content. There might be some exceptions (cf. the morphographic kanji in Japanese, which do not offer clues about their pronunciation), but writing appears to tend to phonography, indeed – including morphographic writing systems.

One common feature of linguistic units that writing relates to and Sampson (2015:32) observes is that they are all more or less members of closed classes. There is a limited number of phonemes in a language, and phonotactics regulate that there is a limited number of both moras and syllables. In phonographic writing systems, the number of graphemes is often roughly similar to the number of phonemes, moras, or syllables.[12] The sizes of phonographic grapheme inventories are, thus, quite manageable. What about morphemes and morphographic systems? Though the morphological level of language is certainly not completely closed, it is also not a level where new units are being added frequently. Whereas new words are created through word formation rather often and new sentences are being uttered by everyone of us every day, new morphemes are rarely added to a language system – loan morphemes (or words) being an exception. This means that in morphographic writing systems, even though there can be a very large number of graphemes (not all of which are commonly used), new graphemes also rarely enter the system.

A last observation that I want to present here was made by Peter T. Daniels and concerns the linguistic unit most salient for writing. He describes that both "[a]ll new writing systems […] invented by nonliterates who know that writing exists" (Daniels 2017:84) as well as the three independently created writing systems (Sumerian, Mayan, and Chinese) are or were syllabaries. He speaks of a syllabic origin of writing (Daniels 1992) and the primacy of the syllable (Daniels 2017:83) – this, for him, is evidence for the unity of writing systems. Is there actually a universal tendency towards the syllable? Syllables are indeed relevant in many other, non-morphographic and non-syllabic writing systems, as well. For example, for German and English, a graphematic syllable has been described (cf. Fuhrhop et al. 2011). Properties of syllables also play a crucial role in Thai and actually play an important role in determining the spelling. The reason for the syllable's special role in writing definitely poses a central question for future comparative research.

3. DIVERSITY. Let us start with the module of scripts which is often termed non-linguistic, and as such, quickly discarded in grapholinguistic research. It suffices to take a look – quite literally – at all the different scripts that are being used for the writing systems of the world to see the sheer diversity. The fact that the Roman script is used for so many of them should not distract from the richness of other scripts that are not utilized for as many systems. As such, there is a multitude of different basic shapes that are visually distinctive. As established before, basic shapes are devoid

[11] Even though for most syllables in Chinese, there are many homophonous (but visually and morphographically distinct) graphemes available that could be used, transliteration is not done randomly. The semantics of the graphemes play a role, and negative connotations, for example, are avoided. Semantic aspects, thus, sometimes outweigh phonetic similarity in transcribing foreign names and words (cf. Hsieh 2015).

[12] Various factors such as historical developments can lead to non-biuniqueness, of course, as is evident in the Thai writing system, where there are 44 consonant graphemes for 21 consonant phonemes.

of linguistic information. So, if we know what |d| refers to in the Roman script, it does not mean that this function is intrinsic to the basic shape, for if we do not read Thai, we will not recognize what the basic shapes |ค| or |จ| signify in the Thai writing system. What we do *see*, however, is that they – at a merely visual level – differ.

The number of basic shapes differs from script to script. Although it often does not neatly correspond to the number of graphemes in a writing system, given different degrees of biuniqueness of the graphematic module, the size of the two inventories is often very similar. In Chinese, for example, even though there are variant characters (called *yìtǐzì* 異體字) that signify the same morpheme (for example <峰> and <峯>, both referring to the morpheme *fēng* 'mountain top', cf. Galambos 2015), most characters are in graphematic relationships with distinct morphemes, meaning that the number of characters is very large, with counts ranging as high as from 85,000 to over 100,000 characters (although these numbers are to be taken with a grain of salt, as they include, for example, erroneous characters and characters attested only once, cf. Anderson 2015). A lot of different factors influence the makeup of a script and its units. For example, the need for so many characters in Chinese leads to the fact that the visual (or graphetic) differences between the characters can be minimal. Thus, the size of an inventory can influence both the individual visual complexity of the units and the visual distinctiveness of the units in relation to one another. However, a small inventory does not necessarily translate to maximal distinctiveness and low visual complexity, cf., |F| and |E| in the Roman script, differing only by one stroke, or |b| and |d|, differing only in orientation. Like writing systems and languages, scripts can be related, too. If they have an historical ancestor like the Brahmi-derived scripts do, visual similarities are common, and it is no coincidence that Korean Hangul and the Japanese kana inventories resemble Chinese characters, as the influence of the Chinese writing system was not only linguistic, but – in this case even predominantly – visual.

Even though many scripts are related, the visual richness and distinctiveness of them is undeniable. One reason that a *unified theory of writing systems* does not appear feasible is the fact that unlike our articulators of speech (our mouths, lips, tongue, teeth, lungs, etc.), our articulators of writing (our hands) are not subject to similar restrictions (cf. Günther 1993:33). Thus, the number of possible basic shapes we can produce is theoretically infinite. Watt (1999) weakens this claim by stating that there are restraints, after all, imposed upon us by our eyes and brains, our hands, and the physical properties of the writing materials available.[13] The fact that there are physical as well as cognitive constraints that influence the makeup of basic shapes produced by humans is also implied by the results of large comparative studies that have shown that there is an average number of strokes that basic shapes consist of and that there are preferred topological configurations of their constituents that resemble scenes in nature (cf. Changizi & Shimojo 2005, Changizi et al. 2006)[14]. The latter observation matches the *neuronal recycling hypothesis* that, in the context of writing, claims that brain regions that were originally dedicated

[13] This also marks a difference between writing and speech. For speech, we do not need any additional instruments or tools, whereas for writing, we always need a surface (unless we are writing in the air) and we usually need a writing tool (unless we are writing with our bare fingers in the sand, for example).

[14] Note the flaws of these studies pointed out by Daniels (2018:152).

to other functions were recycled for reading and writing processes (cf. Dehaene & Cohen 2007:386). There is some cognitive unity in visual diversity, it seems.

Diversity, of course, is not limited to scripts. It is diversity at the graphematic level that leads some in the field to conclude that comparisons of writing systems are not valuable, with some even arguing that they are downright impossible. The graphematic solution space and the various possibilities it stores of writing a single linguistic element even within a single writing system reflect that graphematic relations are complex. If we now go beyond a single system in order to compare, it is first necessary to identify the categories with which to work. This is exactly where the notion of a basic unit of writing comes in, one that has often been called *grapheme* (cf. Meletis 2019). If we leave this 'problematic' term aside and vaguely speak of a *basic unit*, then for most writing systems this unit predominantly relates to one type of linguistic unit. This fact is what makes it possible for us to group together the systems whose basic units refer to the same linguistic units and pronounce them a type. In alphabets, for example, basic units relate to phonemes, while in syllabaries, they relate to syllables. The problem that many seem to see here is that because the phoneme and the syllable are not directly comparable, the written units that relate to them should also not be comparable. This is faulty reasoning, I argue, because when we study writing, it is primarily the written units that interest us. What unites different basic units of different types of writing systems such as alphabets, abugidas, morphographic writing systems, etc., is precisely the fact that they are *basic* units, here preliminarily defined as units that cannot be broken down into smaller meaningful – or meaning-distinguishing – units. If the different linguistic levels that units of writing relate to were to keep us from comparing them, then they should also keep us from analyzing single systems, as well, for no writing system is an absolutely *pure* system, meaning every writing system incorporates features of other types, too (cf. Günther 1988:43). In German, for example, the phonological principle is predominant, but there are also other principles such as the morphological principle[15] at work. In Japanese, type-mixing is even constitutive, with one part of the writing system being syllabic (or moraic) and the other morphographic. Is the Japanese writing system in itself too diverse to allow a description?

As Weingarten (2011:12) points out in his plea for a *comparative graphematics*, the most prominent typologies of writing systems are not sufficiently fine-grained. We know, for example, how alphabets work, but just because two given writing systems – take Spanish and French – are alphabets (and additionally use the same script, albeit with small modifications), this does not mean that graphematically, they are the same. As grapholinguists, it is our duty to describe and explain what all writing has in common, but also to find out in what respects even closely related systems differ.

4. CONCLUSION: DIVERSITY IN UNIVERSALITY – THE COGNITIVE AND THE CULTURAL. Writing is the recording of language with visual means. As combinatory systems, writing systems are made

[15] According to the graphematic relationships of German, the noun <Kälte> *the cold* would regularly be spelled <*Kelte>. However, to show the morphological relation to the adjective <kalt> *cold* and to distinguish it from the (in most varieties) homophonous <Kelte> *Celt*, it is written with <ä>. The morphological principle prevails in this case.

up of basic units that combine to form larger units. These basic units can either relate directly to speech or to the morphological level of language and, thus, only secondarily to speech. The membership of a system to a given type is not clear-cut since systems are impure: phonographic systems exhibit morphographic features and vice versa. Observations such as significant visual similarities across a large sample of scripts, but also the fact that basic units of writing refer to linguistic units of closed classes, as well as the special role of the syllable in writing, all imply that writing systems are not randomly designed. Human nature – our brains, eyes, hands – imposes constraints on the makeup of writing systems, which is why at the lowest level, all writing systems must share features that aid cognition, perception and production, as well as communication (cf. Meletis 2018). But because writing records language, linguistic diversity is also reflected in it, resulting in a variety of different types of writing systems. Visual diversity is, at least partially, caused by the fact that the people who originally devised scripts had different materials and surfaces at their disposal. Orthographic diversity stems from the fact that different systems allow for different kinds of variation that calls for specific regulation and standardization. Also, orthography is a matter of linguistic policy and thus depends crucially and individually on which institutions or authorities are in charge.

In conclusion, after emphasizing again that this contribution full of fragments and open ends is only a tiny step towards an elaborated, comparative grapholinguistics, it can be preliminarily posited that at the core of all writing systems, there is a certain degree of universality. It is on top of this universal basis that diversity – a both linguistic and sociocultural phenomenon – can operate.

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