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In recent years the topic of second language writing systems (L2WS) has been attracting more and more attention within writing systems research, as shown not only by individual articles on various journals, but also by edited volumes such as Cook and Bassetti (2005a) and Koda and Zehler (2007), journal special issues (Deacon & Cain, 2011; Geva & Verhoeven, 2000) and meta-analyses (August, 2008). The papers presented here illustrate some recent developments in this area, and suggest new directions.

Second language writing systems research investigates diverse phenomena related to the learning, use, or processing of a writing system that represents a language learnt after the first (whether second, third, and so on), and to the simultaneous learning and use of two or more writing systems. One welcome recent development in L2WS research is the move away from investigations of word recognition processes focused on L2 learners who have either alphabetic or non-alphabetic first language (L1) orthographic backgrounds (e.g., Spanish vs. Japanese learners of English). Studies of this type were prevalent during the early stages of L2WS research (for an overview, see Koda, 2005). By 2005, it had been abundantly established that characteristics of the L1 writing system affect the ease and manner of word recognition processes in L2 English. Research on second language writing systems over the past five to ten years has begun to explore other aspects of L2WSs. Among the topics that have been studied in recent years are:

- the learning of L2 writing systems in specific populations, e.g., children, adults with reading difficulties, adults who are illiterate in L1, etc.
- writing and spelling
- metalinguistic awareness (e.g. phonemic awareness, word awareness)
- linguistic effects of biliteracy (e.g., on L2 pronunciation)
- non-linguistic cognitive effects (e.g. on visual memory and mental representations of time)
- creative uses (e.g. written code-switching, use of writing systems in marketing to biliterates)
- neurolinguistics (including reading and writing disorders)
- neurocognitive aspects of second language reading and writing
- pedagogical issues

Another important development in L2WS research is an increasing interest in writing systems other than English as L2. This shift may in part reflect the growing economic prominence of countries such as China or India, in which many other languages besides English are commonly used. The surge in the number of American and European students who are learning Chinese as a second language has made it easier to study L2 users of this language. Another factor no doubt responsible for the greater attention to issues of literacy acquisition in users of different languages is the influx of immigrants in many countries in Europe and North America, which has created a pressing need to educate increasing numbers of bilingual children. Still, most research in reading/writing to date focuses on L2 English. As Share (2008) has effectively argued, the English-centered focus of most reading and writing research (whether in an L2 or an L1 context) has led to a distorted emphasis on characteristics that are not particularly relevant to many other languages, being idiosyncrasies of English. It therefore becomes very important that more research is directed at investigating a broad range of L1 and L2 writing systems. In this regard, this special issue is noteworthy because it includes an article on a less widely researched L2WS, Korean Hangul (Brown), an

alphabetic writing system other than English (French, in Sturm's article), and an article in which neither the first nor the second writing system is English (Tamaoka, Kiyama and Chu's article on L1-Chinese readers of L2 Japanese kanji).

Expanding research to L2WSs other than English does not necessarily mean working with readers whose L1 and L2 writing systems are of different types. The writing systems investigated may belong to different types (e.g., alphabetic vs. syllabic), may use different scripts (e.g. Cyrillic vs. Roman alphabet), or may use the same script but with different levels of phonological and morphological transparency (e.g. English and Spanish) or different orthography-phonology correspondences (e.g. Italian and German).

There is much to be learnt from studies of learners whose L1 and L2 writing systems belong to the same broad type of writing systems, for instance both alphabetic, but with different levels of phonological or morphological transparency. In this special issue, two papers look at L2WS learners whose two writing systems are both morphemic (Tamaoka and colleagues, and Meuter & Ehrich), and two other papers look at learners whose writing systems are both alphabetic (English-French in Sturm, various L1 and L2 Korean in Brown). Some of these studies find a beneficial effect of having similar writing systems, suggesting that L2 learners can draw on their L1 knowledge and experience. As more studies accumulate across a variety of L1 and L2 writing systems, one hopes that this will lead to a more nuanced understanding of the complexities of reading and spelling in a second language.

Another interesting consequence of looking at writing systems other than English is that new areas of investigation emerge, which might not have been considered had research only focused on users of English. For example, Sturm in this issue looks at the acquisition of accent marks, a topic that may be marginal to learners of L2 English but is crucial to learners of French. Tamaoka and colleagues investigate L2 readers' ability to distinguish homophones, an ability that probably plays a minor role in reading and spelling English but is crucial in writing systems where homophones are extremely common, such as Chinese. Brown successfully introduces mnemonics, a method associated with writing systems such as Chinese and Japanese, to western adult learners of Hangul, and finds that they actually enjoy and benefit from this approach. Looking at the wider world, including other writing systems and other teaching and research traditions, can widen researchers' horizons.

In spite of an increased interest in 'other' writing systems, there are still writing systems that are almost completely unknown, beyond short descriptions in specialised reference materials such as *The World Writing Systems* (Daniels & Bright, 1996) or the omniglot website (www.omniglot.com). We need to know more about these other WSs. In particular, research on L1 and L2 users of African writing systems is scarce. We look forward to seeing more research on under-researched writing systems, whether as L1 or L2, hopefully arising from researchers based in countries where these writing systems are used.

As the field keeps expanding to encompass less well-known writing systems, there is an even stronger need to explain the linguistic facts behind the learning, reading and writing processes. This is typically seen in papers written by linguists (e.g., Gnanadesikan, 2012). Unfortunately, linguistic descriptions in papers written by researchers in other disciplines are still often not supported by appropriate references to linguistics sources. It is therefore rewarding to read a paper such as Sturm's (this issue), whose author cites a reference work on phonology.

Contemporary work in second language writing systems is also exploring aspects beyond

phonological processing, most notably morphology. In the present special issue, Tamaoka and colleagues look at the role of grammatical and lexical knowledge in homophone selection. Sturm looks at the effects of semantics on the learning of orthographic word forms. Meuter and Ehrich look at the effects of the first language writing system on working memory and learning. It is possible that as research increasingly expands to writing systems other than English, aspects of language other than the phonological will gain prominence. If other writing systems work differently from English, this has massive repercussions not only for research but also for practice. Practical applications of research findings may become more tailored to the characteristics of the target language. For instance, Lee, Low and Mohamed (2012) argue that words used for teaching reading of Malay in remedial programmes for Malaysian readers should be polysyllabic, unlike the monosyllabic ones used in English programmes, because of differences in the frequency of poly- and monosyllabic words in the two languages.

In light of these positive developments, an important way forward for L2WS research will then be closer interdisciplinary collaborations across a range of disciplines. It is at the moment rare to see a paper with co-authors from different disciplines, say an applied linguist and a psychologist, or a theoretical linguist and a language teaching expert. Such interdisciplinary collaborations would strongly benefit L2WS research. For instance, psychologists' investigations of reading and spelling processes could be strengthened by theoretical linguists' understanding of the working of writing systems, and applied linguists working on the learning of an L2WS could benefit from discussing with a language teaching expert what actually happens in the L2 reading and writing classroom. The reader would then benefit from more grounded descriptions of the phenomena under analysis. In this collection of papers, we have included a paper on L2WS teaching (Brown) and one that draws implications for L2 testing (Lems). Also, in only five articles there are authors from four disciplines: educational psychology, English as a Second Language, psychology, and Second Language Acquisition.

Writing Systems Research will continue to foster dialogue across disciplines that investigate writing systems. Hopefully this will lead to a unified set of concepts and terminology, so that the word 'script' will have the same meaning across disciplines. Different terminologies reflect different views of writing systems, for instance in the present special issue the Chinese writing system is called 'logographic' (Meuter & Ehrich) and 'logosyllabic' (Lems). If researchers could agree on a basic set of common terms, interdisciplinary research and communication across disciplinary boundaries would be easier.

Finally, it is important to mention developments in methodology. The most evident development in the past few years has been the explosion of neuroimaging studies of reading and writing, as neurocognitive approaches are certainly prevalent and are getting more sophisticated methodologically. It remains to be seen how much this research will contribute theoretically to the field of writing systems and take it forward. Some findings have already provided food for thought, for instance, that biliteracy affects the neural structures that support reading (Perfetti & Liu, 2005) even after short periods of exposure to an L2WS (Perfetti, Liu, Fiez, Nelson, Bolger, & Tan, 2007). In this special issue, one paper indeed adopts a different but no less novel approach, one involving the use of an artificial orthography. Using a writing system created specifically for the purpose of testing a specific hypothesis has clear advantages, not least the ability to control the nature of the stimuli and to eliminate any effects of prior knowledge. We are excited to be able to open this issue with one of the very few studies to pioneer this approach in the domain of second language

reading.

Renata Meuter and John Ehrich's article is called 'The acquisition of an artificial logographic script and bilingual working memory: Evidence for L1-specific orthographic processing skills transfer in Chinese-English bilinguals'. The researchers looked at differences in working memory between monoliterate users of an alphabetic writing system (English), biliterate alphabetic writing system users (English-French), and biliterates with a morphemic native writing system (Chinese-English). Participants had to learn a set of 'logographs' created from Cuneiform symbols and their meaning with either articulatory or visuospatial suppression, which disrupted verbal and visual memory respectively by requiring participants to repeat words or to tap patterns with their fingers. Articulatory interference had weaker effects on morphemic-alphabetic biliterates than in both monoliterate and biliterate users of alphabets, which the authors explain as a consequence of superior visual memory in users of a morphemic writing system. Visuospatial interference had weaker effects in biliterates than monoliterates, which the authors claim can corroborate the hypothesis that bilinguals have stronger executive control than monolinguals (an explanation in terms of superior phonological skills is ruled out by the results of a second experiment).

Meuter and Ehrich also report a specific advantage for morphemic native readers, which they claim may be perceptual in nature, and they confirm previous findings of a bilingualism/biliteracy advantage. This study is important theoretically as it helps locate the nature of the bilingual advantage and L1 transfer advantage found in previous studies. It is also interesting because it found an advantage of a congruent L1WS in the learning of a congruent L2WS (i.e., an L2WS that belongs to the same type of WSs as the L1WS), where the target L2WS is not English. While much research has shown an advantage of an alphabetic L1WS in learning an alphabetic L2WS (English), this paper shows an advantage of a non-alphabetic writing system in learning an L2WS of the same type. The paper then shows a generic advantage of bilingualism/biliteracy, as well as a specific advantage related to characteristics of the L1WS and L2WS involved. The paper also nicely showcases the potential for using artificial orthographies for studying L2WS learning.

'How do native Chinese speakers learning Japanese as a second language understand Japanese kanji homophones?', by Katsuo Tamaoka, Sachiko Kiyama and Xiang-Juan Chu, also looks at potential advantages of a morphemic L1WS in learning a morphemic L2WS. While Meuter and Ehrich demonstrated a morphemic-L1WS advantage by comparing alphabetic and morphemic native readers, Tamaoka and colleagues demonstrate this advantage by investigating only one group of morphemic-L1WS learners of a morphemic L2WS. Using structural equation modelling, the article investigated variables that contribute to Chinese native readers' ability to distinguish homophones in a sentence completion task. The model revealed that grammatical knowledge but not lexical knowledge is causally related to the ability to distinguish homophones, not only in words of Chinese origin (which could simply be explained as a strategic use of the L1WS to perform the task) but also in words of Japanese origin for which knowledge of the L1WS provides little help. The paper has obvious implications for the teaching of a morphemic L2WS, an important issue at a time when many people around the world are learning Chinese, and replication for alphabetic-L1WS learners of Chinese may be needed, as the authors argue that learners with other orthographic backgrounds may show effects of lexical knowledge that do not show up with Chinese learners. Above all, the paper investigates a phenomenon that is central to the reading of writing systems such as Chinese and Japanese kanji, even if only marginally relevant to readers of English, namely, homophones. While homophonic words exist in

English, and readers need to differentiate *rite* and *right*, this is a minor issue. In Chinese and to a less extent Japanese, homophones are very common. For instance, the Chinese syllable /il/ can have as many as 20 different spelling, such as 一 ('one'), 医 ('doctor'), 衣 ('dress') and so on. The orthographic information that allows for disambiguation of homophonic morphemes is crucial for Chinese native readers, children and adults (e.g., Bassetti & Masterson, 2012; Chen, Vaid, & Wu, 2009). For L2 learners of English, the ability to differentiate homophones may be marginally useful, but for L2 learners of Chinese it is crucial. This paper is then a good example of how recent research is looking into variables that are not crucial to the reading of English.

Jessica Sturm's 'Meaning and orthography in L2 French' investigates effects of lexical knowledge on disambiguating homophones in an alphabetic writing system (French) which distinguishes homophones very differently from Japanese or Chinese. Written French has five accent marks, which are used to distinguish orthographic minimal pairs such as *sûr* and *sur* (meaning 'certain' and 'on' respectively) and present and past participles, as in *parle* ('speaks') versus *parlé* ('spoken'). Clearly, accents must play an important role in reading in French. Sturm examines the acquisition of accent marks in L2 French, looking at how English native readers, whose L1WS does not use accents, recognize target words with different accents, and at their ability to place accent marks on target words. By comparing two groups of beginning learners of French who had been taught the same words in two different ways, Sturm finds that presenting the meaning of a novel word (by matching it with an image) improves learners' ability to recognize the correctly accented word among a set of similar targets with incorrect accent placement, but not their ability to place the accent correctly. The author argues that this happens because of deeper processing involved in learning a word's meaning rather than just its form and because receptive skills precede productive skills. While this single experiment provides useful evidence for teaching, the author argues that a longer and more ecologically valid study may shed more light on the effects of learning word meanings on the recognition and production of correct orthographic forms. Like the paper by Tamaoka and colleagues, Sturm's paper shows that learning and using a written language is not just a matter of moving one's eyes or hands, but is a complex phenomenon that engages the language system at various levels, including knowledge of semantics and syntax. This complexity in the relationship between language and written language is even more evident in the next article, which investigates the effects of orthography on spoken language production in oral reading, a commonly used measure of reading comprehension.

Kristin Lems's study is entitled 'The effect of L1 orthography on the oral reading of adult English language learners'. The paper compared learners of L2 English with different L1WS backgrounds performing a timed oral reading task that measured how many words they could read correctly from a piece of continuous text in a set amount of time. Results show that a transparent L1WS is linked to faster oral reading speed in L2 English, including transparent non-alphabetic L1 writing systems. Oral and silent reading correlate in native readers of transparent but not of opaque writing systems. The paper has important implications for L2 assessment and for research on L2 reading by showing that oral reading is not a suitable measure of reading in L2 readers. This is something that should be borne in mind both when designing language tests and when designing research projects that involve measuring L2 reading. Oral reading may be a good measure of reading comprehension for native reading children, but it is not suitable for L2 readers.

The final paper in this special issue is Lucien Brown's 'The use of visual/verbal and physical

mnemonics in the teaching of Korean Hangul in an authentic L2 classroom context'. The paper reports an empirical study, and its explicit purpose is to see whether results obtained in laboratory conditions can be replicated in a classroom context. Adult beginner learners of Hangul were taught sixteen hangul symbols, one group using mnemonics and one without. The mnemonics technique associated hangul consonant symbols with the first phoneme of L1 English words for objects that had a shape similar to the consonant, for instance associating the angle-shaped symbol that represents /k/ with an image of the angle of a bent leg kicking a ball and the sound /k/ as in 'kicking'. For vowels, students had to perform body movements resulting in shapes that resemble the shape of vowel symbols in response to vowel sounds. The mnemonics group outperformed the control group in both recognition and production of the symbols, in both immediate and delayed post-tests. These adult learners also reported enjoying the mnemonics technique and considered it useful. This is the only strongly pedagogically oriented paper in the present collection. It shows that a writing system seen through the eyes of a beginner learner looks very different from the way it is presented in a book about writing systems. While hangul is often presented as a highly transparent writing system whose symbols clearly depict articulation of the sounds they represent, what appears as 'easy' and 'transparent' in linguistic descriptions may still be hard for a beginner learner. This is another way that L2WS research can contribute to research on reading development in L1 learners. Adult L2WS learners often go through similar difficulties as child learners, but they can more easily talk metacognitively about their learning experience, as they did in this study by means of evaluation questionnaires and interviews, and thereby provide useful information for the reading development researcher and teacher.

In conclusion, it appears that the field of second language writing systems research is moving forward, both theoretically and methodologically. Much of this research can inform practice in the classroom and in the research lab. For instance, Meuter and Ehrich's study of the learning of an artificial logography by native readers of different types of writing systems provides evidence that different writing systems are read differently, and contributes to the debate about whether morphemic writing system readers have better visual memory. Hopefully, through studies such as these, findings of L2WS researchers will move beyond their current niche and become more widely recognised in mainstream reading and writing research.

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