



## Introduction

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Empirical research and theoretical models of the reading process have developed largely from studies of readers of alphabetic scripts, most notably English, it being assumed that the findings would generalize to readers of other languages. Over the past two decades, this assumption has been directly put to the test in cross-linguistic comparisons of reading and writing in native and non-native reading contexts. As a result of these new investigations, it has become possible to examine under what circumstances structural aspects of a language or of language experience differentially affect reading processes.

By now a considerable body of cross-linguistic research has accumulated. Anthologies of this work have also appeared (e.g., Leong & Tamaoka, 1998). There are several comparative studies of English with readers of more regular alphabetic scripts such as Spanish, German, Italian, and Portuguese. Studies of non-Roman alphabetic scripts, most notably Serbo-Croatian and Hebrew, are also numerous. Studies of non-alphabetic scripts have also appeared in great numbers, specifically, studies of readers of Chinese. Far less research has examined syllabic scripts and hardly any research has appeared on scripts that have aspects of a syllabary and an alphabet, such as Korean Hangul or any of the Indic scripts (see Salomon, 2000; Vaid & Gupta, 2002).

The primary goal of this special issue of *Reading and Writing* was to foreground research on this hybrid class of scripts described by different scholars as alphasyllabaries, augmented consonantal scripts, or semi-syllabic scripts. These scripts are worthy of study for several reasons. One is simply that users of these scripts constitute a sizeable proportion of the world's population, thus for practical reasons alone it is important to develop a body of normative data on reading acquisition, processing and impairment in such users. Secondly, the study of users of semi-syllabic scripts is important because it allows one to compare the relative strength of influence of structural properties commonly associated with alphabetic scripts (e.g., linearity, phonemic prominence) with that of properties associated with syllabic scripts (e.g., non-linearity, syllable prominence).

What does the existing empirical research on users of semi-syllabic scripts suggest? One study reported that there is less reliance on phonolo-

gical awareness in reading acquisition in readers instructed in Kannada than that observed in readers instructed in English (Padakannaya, Rekha, Vaid & Joshi, 2002; see also Sailaja (2000) for research on phonological awareness in Telugu). Another set of studies, using a task adapted from Ben-Dror, Frost and Bentin (1995), have reported a greater tendency to segment cross-language homophones at a syllable level among biliterate adults when the sounds are presented as Hindi (Vaid, 2002) or Hangul words (Vaid, Park & Choi, 2003) than when they are presented as words in English.

Much remains to be explored for, compared to studies of users of alphabetic scripts and of logographic scripts, there is a paucity of published empirical research on normal reading and writing in users of semi-syllabic scripts. The present collection is in fact the first empirically grounded compilation of research that specifically addresses this understudied category (see also Karanth, 2003).

### Overview of contributions

A total of nine articles are brought together in this collection. In terms of the languages studied, two of the contributions focus on Hangul (Kim & Taft; Simpson & Kang), and one other compared Hangul with Hanja (Kim, Taft & Davis); four are on Indic scripts, including Hindi (Gupta), Kannada (Karanth, Mathew & Kurien), Hindi and Kannada (Chengappa, Bhat & Padakannaya), and Telugu (Vasantha). Finally, there is one contribution on Malay (Rickard Liow & Lee) and one on Arabic (Taouk & Coltheart). The studies also differ in terms of the populations studied: six are on normal, adult readers, and one is on adult aphasics (Chengappa, Bhat & Padakannaya); three others involve reading acquisition in normal children (Taouk & Coltheart; Vasanta; Rickard Liow & Lee), and two involve reading in children with reading difficulties (Gupta; Kim & Davis). A brief summary of each contribution follows.

*Susan J. Rickard Liow and Lay Choo Lee* examined Malay children's early spellings in Rumi, the morphologically transparent, shallow alphabetic-syllabic script of Malay. An analysis of spelling errors made on a test containing stem words and affixed words showed that, despite being more predictable than English at the phoneme-grapheme level, early spelling of Malay readers tends to be based on encoding at syllable and morpheme, rather than phoneme, levels.

*Miriam Taouk and Max Coltheart* describe the acquisition of Arabic reading in three groups of children and in adult readers. Despite the unique aspects of this writing system (e.g., the use of diacritics to represent short vowels and the variation in consonant shape depending on the letter's position in the word), their findings point to a common developmental progression

for Arabic as that noted for English reading acquisition, with an initial “discrimination-net” phase, where reading reflects discriminating between words known primarily by sight on the basis of partial orthographic cues, followed by a phonological-recoding phase followed by a transition to an orthographic phase, where words are recognized as wholes without requiring phonological mediation. In addition, Taouk and Coltheart note that mastery of position-specific properties of the Arabic script occurs fairly late in acquisition.

*Duggirala Vasanta* summarizes three experiments exploring the role of phonological and orthographic awareness of primary school children on reading strategies in Telugu, a Dravidian language used in southern India. The tasks involved word fragment completion, rhyme judgment and generation, and sentence completion. Based on previous studies, Vasanta wanted to test the hypothesis whether children, especially those who have had only one or two years of instruction, should make more mistakes than more experienced children in spelling the secondary forms of vowels and the secondary forms of consonants in words containing consonant clusters. The results suggest that children’s orthographic knowledge is directly related to their ability to access the phonological information of Telugu words. Further, it was suggested that knowledge about phonological and orthographic properties of words contributes to acquisition of beginning reading skills although the strategies children use to access meaning during reading might change at different developmental periods. The paper illustrates how the semi-syllabic nature of Telugu influences the phonological processing of Telugu words. More generally, the results suggest that formal instruction in reading (and thereby increased experience with orthographic properties of the writing system) facilitates access of phonological information.

The nature of reading difficulties in dyslexic readers of Hindi, a phonologically transparent semi-syllabic script, is the focus of the study by *Ashum Gupta*. The study found that in reading words and nonwords of different lengths, dyslexic children were slower and made more errors than chronologically age-matched controls and were worse than reading age matched controls on reading accuracy. Gupta further notes that an analysis of reading errors among dyslexic children revealed a preponderance of graphemic errors and errors involving vowel substitutions or deletions relative to those involving consonants. She concludes that the particular visuospatial characteristics of the Hindi script motivate certain errors and that, despite the script’s transparency, dyslexic readers of Hindi show difficulty in developing phonological representations of words. Gupta’s study is interesting because it suggests that despite the high letter-sound consistency in Hindi, dyslexic children have difficulty in developing phonological representation of words

and display poor blending skills. Secondly, it suggests that difficulty in having internal representations of vowels is not specifically related to the alphabetic nature of scripts or the irregularity of such scripts.

The relative scarcity of normative data on factors influencing reading speed in non-Roman, semi-syllabic scripts was the impetus for the study by *Prathibha Karanth, Anu Mathew and Priya Kurien* on adult proficient readers of Kannada, a Dravidian language used in southern India. Although the word frequency effect has been considered a robust finding in the reading literature, Karanth et al. report that high frequency words do *not* show a naming advantage relative to low frequency words in reading Kannada. Neither word frequency nor word type (concrete vs. abstract) was found to affect Kannada word reading latencies (Experiment 1) whereas syllable length, orthographic complexity, and phoneme/grapheme sequence irregularity did affect reading latencies (Experiment 2).

The manifestations of acquired dyslexia across different types of orthography is of interest to reading researchers. The issue becomes even more interesting in the context of biliterate or multiliterate patients. Acquired dyslexia could differentially affect reading across scripts of a multilingual acquired dyslexic just as aphasia could differentially affect speech of a multilingual aphasic. The classification of acquired dyslexia is based on the types of errors exhibited by patients. If different types of orthographies differentially favor the adoption of lexical and nonlexical strategies, dissociations between reading performance across the scripts are expected depending on the extent and severity of brain damage involved. *Shyamala Chengappa, Sapna Bhat and Prakash Padakannaya* report on reading and writing deficits in two multilingual speakers of Kannada, Hindi and English: one patient had severe alexia with agraphia in English as well as in Kannada and Hindi while the other exhibited dissociation across the languages, showing symptoms of surface dyslexia in English and mild dyslexia in Kannada. Their performance is explained in terms of orthographic differences between English and the Indian languages concerned. The paper suggests that the neurological basis for dyslexia may be the same across languages but that its manifestation, in terms of symptoms and severity, is influenced by orthographic and other linguistic features of specific language

*Greg B. Simpson and Hyewon Kang* examine the processing consequences of the visual representation of Hangul in syllable blocks, specifically, whether the latter confers a special status to the syllable in naming printed Korean, quite apart from lexical and subsyllabic levels. Four experiments are reported which converge in pointing to a syllable-level of representation in processing Hangul.

*Jeesun Kim and Chris Davis* present findings from a battery of visual, auditory and phonological processing tasks administered to good and poor readers of Korean Hangul. Like findings reported in English, poor readers of Hangul were found to be worse than good readers on a tone matching task on measures of phonological awareness; however, unlike English based findings, poor readers of Hangul were not worse off on a visual task involving perception of rapidly changing visual stimuli. The authors suggest the latter result may reflect a buffering effect of the Hangul orthography, particularly, the fact that letters are grouped into syllables, with constraints on the ordering of letters within syllables.

Finally, in a study of normal, adult readers of the two scripts used in Korean, *Jeesun Kim, Marcus Taft and Chris Davis* examine at what level (word, syllable, letter, sublexical) orthographic representation and phonology are linked in the lexicon. Using a homophone decision task, and manipulating the sublexical relationship between orthography and phonology in Hanja and Hangul, and the lexical status of the stimuli, they conclude that orthographic units are linked to phonological units at each level. They present a multilevel interaction activation model to account for their findings, suggesting that orthography–phonology links are represented in a set of distributed hidden units mediating between orthographic units and phonological units. These hidden units represent statistical regularities that occur across the language.

On the whole, the papers in the present issue highlight the importance of script characteristics as an important variable that cannot be ignored in theoretical accounts of the reading process. The papers also illustrate how research on reading semi-syllabic scripts can be fruitful, either by corroborating and extending what is already known in alphabetic scripts or by questioning certain findings or notions derived from studies of alphabetic writing systems that were thought to be universal across writing systems.

The articles in this issue point to ways in which attention to script-related attributes, in interaction with other variables known to influence reading and writing, contributes to a more nuanced understanding of the complexities of the reading process. We hope that this collection will serve as an impetus for further empirical inquiry on the acquisition and processing of semi-syllabic scripts.

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