Cognitive and Linguistic Underpinnings of Literacy Development in Alphasyllabaries[1]

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For many decades reading science has focused its inquiries on three major writing systems – alphabet, syllabary, and logography (Gelb, 1952). These classifications are based on the way in which spoken language is encoded into its script, namely at a phonemic, syllabic, or a morpho-syllabic level. However, the alphasyllabic writing systems of South and Southeast Asia and parts of Africa and North America have characteristics of both alphabetic and syllabic systems, as well as those that do not fit neatly into any of these three categories (Bright, 1996; 2000; Nag, Caravolas, & Snowling, 2011), and thus it is important to understand the cognitive and linguistic demands of processing an alphasyllabary and its implications for reading acquisition.

Alphasyllabic scripts encode phonological information at *both* syllabic and sub-syllabic levels. The script is usually organized by space-separated syllable clusters, which consist of independent, identifiable graphemes that represent phonemes. This dual representation of phonological information requires sensitivity to both syllabic and phonemic level for word reading across several alphasyllabaries, including Hindi (Vaid & Gupta, 2002), Kannada (Nag, 2007), Korean (Cho & McBride-Chang, 2005; Simpson & Kang, 2004), Telugu (Vasanta, 2004), and Thai (Winskel & Iemwanthong, 2009). Although both units are encoded, syllabic information occupies a more prominent visual role, rendering syllable level awareness more important in alphasyllabic reading (Kim & Petscher, 2011). In the same vein, however, because the syllabic units are made up of decomposable phonemic units, phonemic awareness does emerge in alphasyllabary and even syllabary readers (Nag, 2007; Fletcher-Flinn, Thompson, Yamada, & Naka, 2011). Given its less salient position, however, phonemic awareness does not emerge until grade 3 or 4 (Nag, 2007; Cho & McBridge-Chang, 2005), compared with around grade 1 or 2 in alphabetic readers (Liberman, Shakweiler, Fischer, & Carter, 1974).

Visual orthographic complexity and spatial non-linearity are also central characteristics of alphasyllabic scripts. The sequence in which letters are represented in print do not map exactly with the sequence in which the spoken language is represented. While the consonant assumes the primary spatial position, vowels are placed above, below, and even before the consonants they come after in speech. Studies have shown that this misalignment between the visual sequence and the phonological sequence leads to challenges in phonological segmentation (Kandhadai & Sproat, 2010; Kim & Davis, 2004) and slower processing speed in word reading (Kim & Davis, 2004; Vaid & Gupta, 2002). The visual complexity of the diacritic ligaturing rules have also been shown to have a significant impact on Kannada spelling (Nag, Treiman, & Snowling, 2010) and overall reading performance (Nag & Snowling, 2011). In one of the few studies of the neural bases of alphasyllabary processing, Kumar et al. (2009) provided evidence

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for more activation of visual processing cortical areas in Hindi than in English underscoring the centrality of visual processing in the orthographically more complex alphasyllabic Hindi.

Although alphasyllabic scripts have visually complex orthographic layouts, they are usually transparent with regular grapheme-phoneme correspondences, and this also influences the cognitive processes at play when reading alphasyllabaries. For example, Karanth, Mathew, and Kurien (2004) found that orthographic complexity and grapheme-phoneme sequencing regularity, as opposed to grapheme-phoneme correspondence regularity as in alphabetic scripts, is important for word reading in Kannada. Similarly, Rao, Vaid, Srinivasan, and Chen (2011), found that due to the more consistent GPC rules readers of alphasyllabaries are likely to rely on the phonological processing route more than on semantic factors as in more opaque alphabetic scripts.

A final factor that distinguishes alphasyllabic from alphabetic scripts is the fact that they are deemed extensive orthographies, which are writing systems with a large inventory of symbols, including the complex diacritic ligaturing rules that need to be acquired (Nag, 2007). The additional demands required to acquire this large set of symbols leads to a slower pace of reading acquisition in alphasyllabic readers when compared to alphabetic readers (Nag, 2007; Nag & Snowling, 2011).

In conclusion, four clear attributes of alphasyllabary writing systems differentiate them from other scripts: dual syllabic and sub-syllabic phonological representation, spatially complex, non-linear orthographies, a relatively transparent script, and extensive symbol sets. Each of these factors has significant implications for the cognitive processes that are necessitated, the pace of acquisition, and the specific challenges faced by readers of alphasyllabaries.

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