# READING STRATEGIES OF FIRST GRADE BILINGUAL CHILDREN IN HINDI AND ENGLISH

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***ABSTRACT***

*This study examined the reading accuracy of first grade bilingual children in Hindi and English using word and nonword reading tasks. The word reading tasks in Hindi and English were matched for spoken frequency of usage, age of acquisition, imageability regularity, and word length. Nonwords in Hindi and English were also matched for word length. Results revealed that reading accuracy in case of words as well as nonwords was significantly greater in Hindi than in English. In word reading task, in Hindi, children adopted alphabetic strategy, whereas in English, they adopted a combination of logographic and alphabetic strategy. In nonword reading task, in both Hindi and English, an alphabetic strategy was used. Results are discussed in terms of orthographic transparency, sublexical and lexical reading strategies.*

## INTRODUCTION

Written language represents a true achievement of human cognition, and is apparently an achievement not easily come by: successful written languages have developed independently at only a few places and times in human history. Therefore, a better understanding of the reading process is important not only for its own sake, but also because it promises to reveal some of the basic principles of human cognitive representation, computation, and problem solving (1).

Reading acquisition is fundamentally a process of matching distinctive visual symbols (orthography) to units of sound (phonology) (2). Several cognitive developmental models have been proposed to understand the process of reading. For example, Frith (3) proposed

the standard model of reading acquisition in alphabetic systems that postulates three main stages in reading, called *logographic, alphabetic,* and *orthographic,* respectively. In the *logographic (logo means picture/symbol)* stage, the child processes words just like any other visual object or symbol. In the *alphabetic* stage, the child needs to represent ordered sequences of letters. Finally, repeated exposure to the same words leads the child to store whole-word grapheme sequences, i.e., to constitute an *orthographic (spelling) lexicon*.

Ehri (4) proposed four phases of word recognition development. The first three phases, namely, *pre-alphabetic, partial alphabetic*, and full *alphabetic* phase are similar to those suggested by Frith's model. In addition, Ehri (4) also suggested the fourth or *consolidated alphabetic* phase, when the beginning reader starts to notice multiletter sequences that are common to many words he or she has stored in memory (e.g., the *-ock* sequence in *rock*, *lock*, *block*; the *-ight* sequence in *night*, *right*, *flight*; or the *-est* sequence in *best*, *rest*, *chest*).

All these models assume that there are different reading strategies employed by the learners, an assumption that has been developed into dual-route models of reading. *Dual-route* models of reading typically specify that there exist separate *lexical* and *sublexical* mechanisms for processing words (5, 6). The *lexical processing route*, which operates at the *whole-word level*, provides a link between orthography and phonology, while the *sublexical route* relies, among other procedures, upon a set of *grapheme-to-phoneme correspondence rules* (GPC rules).

Cognitive models of reading development that mainly emerged from the study of reading in a deep orthography like English (3, 7, 8, 9) made the implicit assumption that stages of reading development are more or less uniform across different alphabetic orthographies. However, a set of recent studies pointed out that factors such as the level of orthographic transparency of the alphabetic language might affect the processes of reading (10). The idea that reading acquisition may differ according to the nature of orthography has been referred to as the 'Orthographic Depth Hypothesis' (11).

The cross-linguistic comparisons made so far have suggested that transparent orthographies (a) promote faster rates of reading acquisition (12, 13), (b) allow faster development of phonemic awareness (13, 14), and (c) encourage an alphabetic reading strategy (14, 15).

However, there is one long-standing difficulty in these cross linguistic comparisons: they compare children who have learned to read different languages but who have also been taught by different teachers, in different classrooms, in different schools, using potentially different methods of instruction, and in different cultures. It is hard to control all of these factors (16).

In this regard, with her multilingual fabric, India offers an interesting contrast of written languages with the extreme opacity of English alongside the transparent Hindi orthography within the same group of children. A beginning in this direction has already been made. In a recent study, the reading accuracy of dyslexic readers was examined in comparison to chronological age-matched normally progressing readers in Hindi and English using word reading tasks, matched for spoken frequency of usage, age of acquisition, imageability, and word length. Both groups showed significantly greater reading accuracy in Hindi than in English. In Hindi, nonword errors were predominantly produced by normally progressing as well as dyslexic readers. In English, normally progressing readers produced greater percentage of word than nonword errors, whereas dyslexic readers produced greater percentage of nonword than word errors (17). In another study by Gupta and Jamal (18), in Hindi, a far greater percentage of nonword (89%) than word (11%) errors, whereas in English, 54% of nonword and 46% of word errors was reported.

With bilingualism being such a common phenomenon, the present study endeavors to examine the Hindi and English word reading accuracy of bilingual normally progressing first grade children in order to understand the nature of reading strategies adopted by them as a consequence of different degrees of transparency of English and Hindi orthographies.

## METHOD

### Sample

Participants were 30 first grade bilingual (Hindi and English speaking) children (16 boys, 14 girls) with a mean age of 78.47 months (range: 60-85 months; SD = 4.72 months), from six Grade 1 classes of an English medium public school in West Delhi. The school followed the National Council for Educational Research and Training (NCERT, New Delhi) approved English and Hindi textbooks. Although it is referred to as Grade 1, this was the children's

third year at school. In their first year, they attended a nursery class. In their second year, they attended a Kindergarten class, in which reading instruction in both the languages started. In grade 1, in Hindi, words with vowels (*ma:tra:*) were introduced, whereas in English, along with regular words irregular words were also introduced. In case of both the languages, various activities, such as those suggested at the end of each chapter in their textbooks were used to help them develop phonological skills. Approximately 30 to 40 minutes were spent each day on reading in Hindi and English and they were also assessed on a one-to-one basis with their teachers. Their teachers indicated that the reading methods they used had a major emphasis on phonics. At the time of the present study (in November) the children had already spent about six months in grade 1. According to the parents and teachers, all the children were exposed to Hindi and English simultaneously from birth onwards at home and had to study the two languages since the beginning of their schooling. During English and Hindi sessions, teachers as well as children spoke the respective languages. Hindi and English were spoken at home and with peers in the school. All the children were exposed to similar kinds of language training activities such as story-telling, singing, dramatics, etc. both in Hindi and in English. There was similar exposure to media in Hindi and English as, comics and TV programmes (especially children' programmes such as cartoons) were available in both the languages.

The bilingual first grade children (henceforth referred as children) were included in the present study only if Hindi was their native language and they had Hindi – speaking parents and at least one English – speaking parent. Other inclusion criteria required that these children were studying at the same school since the beginning of their education; all of them had at least average recitation and reading achievement in Hindi as well as in English, based on their school records; and all belonged to same socioeconomic status (middle income group). Those who were repeating class, who were using corrective lenses for poor vision, and who showed stuttering were not taken for the present study.

## Materials

In case of word reading tasks, in Hindi as well as in English, only content words were used. Content words include nouns, verbs, adjectives, and adverbs. The words in the two tasks were also matched as much as possible in terms of spoken frequency of usage, age of

acquisition, and imageability. All the words in Hindi as well as in English were regular words and were of equal length, i.e., they had equal number of letters. There were no significant differences between Hindi and English words in terms of spoken frequency of usage, age of acquisition, and imageability.

**Hindi Word Reading Task:** For this task, 30 words were selected from the Hindi textbooks that the participating school followed. These words were rated in terms of spoken frequency of usage, age of acquisition (AoA), and imageability. The ratings were obtained from 30 Hindi language teachers teaching grades 1-5 in English medium schools. For rating the words according to spoken frequency of usage, participants were asked to rate the words using a 5 – point scale, ranging from 1 to 5 (1-2 for low, 3 for medium and 4-5 for high spoken frequency of usage). For obtaining AoA ratings, participants were given instructions adapted from Carroll and White (20), Gilhooly and Logie (21), and Monaghan and Ellis (22), which asked them to estimate the age at which they believed that they and others have first learned each word and its meaning, in either spoken or written form. Such ratings have been shown to correlate highly with objective measures of word – learning age (23). Ratings were made on a 9 – point scale, where the middle seven points ranged from 2 (1-2 years of age) to 8 (10-12 years of age), with additional points being added at each end of the scale, 1 (0-1 years of age) and 9 (12+ years of age), to encourage use of the full range. For rating the words for imageability, the instructions given to teachers followed those of Gilhooly and Logie (21) and Monaghan and Ellis (22), who asked participants to rate the imageability of a word using 7 – point scale, ranging from 1 (highly imageable) to 7 (poorly imageable), depending on the ease with which the word aroused a mental image – sensory experience.

For the present task, 10 words (one word with a high spoken frequency of usage, 4 words with a medium and 5 words with a low spoken frequency of usage) were taken that were printed vertically in the middle of an A4 sized paper in bold 20- point Devanagari font (this font was similar to the font used in the children's reading books). Reading was evaluated in terms of number of words read correctly.

**English word reading task:** For this task, 30 words were selected from the English textbooks that the participating school followed. These words were rated in terms of spoken frequency of usage, age of acquisition and imageability. The ratings were obtained from 30 English

language teachers teaching grades 1-5 in English medium schools by following the same procedure that was used to rate words in Hindi word reading task. For the present task, 10 words (one word with a high spoken frequency of usage, 4 words with a medium and 5 words with a low spoken frequency of usage) were taken that were printed vertically in the middle of an A4 sized paper in bold 20- point, Times New Roman font. Reading was evaluated in terms of number of words read correctly.

**Hindi non-word reading task:** This task was devised by selecting items from non-word reading task used by Gupta (24) in her study. This task was developed on the lines of the one used by Wimmer (25). In a study, examining the nonword reading of severely dyslexic children learning to read German, Wimmer (25) derived nonwords from the words by exchanging the initial letters of the words within the list. In the large majority of items, these initial letters stood for consonantal onsets. Therefore, the items of the nonword list were of the same length as the items of the word list, consisted of the very same letters, and were made up of the same letter clusters (mostly in the rimes) as the words. For the present study, 10 nonwords were printed vertically in the middle of A4 sized paper in bold, 20-point Devanagari font (this font was similar to the font used in the children's reading books). Reading was evaluated in terms of numbers of nonwords read correctly.

**English non-word reading task:** This task was developed on the lines of the one used by Wimmer (25). The nonwords were derived from the words by exchanging the initial letters of the words. In the present study, ten nonwords were printed vertically in the middle of A4 sized paper in bold 20- point Times New Roman font. Reading was evaluated in terms of number of nonwords read correctly.

For the present study, in case of both Hindi and English, nonwords were of equal length as the words used in the word reading tasks in the two languages. Words and Nonwords used in Hindi and English reading tasks are given in Appendix A.

### Procedure

Children were tested individually in a quiet room in their school over a period of 4 days. For both Hindi and English word and nonword reading, children had to read the list of items aloud. First, children were assessed on Hindi word reading for which they were asked to try

to read the words aloud in order to see how their reading was coming along. They were told that they would be recorded and would need to speak loudly and clearly. The next day the same procedure was followed to assess English word reading. On subsequent days reading assessment was carried out for nonwords in Hindi and in English. In case of nonwords, children were told that they would be reading some *funny* words, which do not have meaning, but nevertheless they could be read. Practice with 2 such words was given in both Hindi and English. Nonword reading in Hindi and in English was recorded by following the same procedure that was used in case of word reading. Each child's reading responses on all the 4 reading tasks were recorded for later error analysis.

## RESULTS

### Word Reading in Hindi and English

There was a significant difference between the number of words read by children in Hindi and in English. It can be seen from Table 3.1 that the Hindi word reading accuracy (M = 7.07, SD = 2.26) was significantly greater than English word reading accuracy (M = 4.20, SD = 2.87). In case of Hindi, children read approximately 71% of the real words correctly, whereas in case of English, they read only 42% of the real words correctly. Clearly, children showed significantly greater word reading accuracy in Hindi than in English, $t(29) = 4.36$, $p < .01$.

**Table 3. Comparison of word and nonword reading by first grade children (n = 30) in Hindi and in English**

| | Hindi | | English | | |
|---|---|---|---|---|---|
| Tasks | M | SD | M | SD | t(29) |
| Word Reading/10 | 7.07 | 2.26 | 4.20 | 2.87 | 4.36** |
| Nonword Reading/10 | 4.73 | 2.65 | 1.73 | 1.70 | 6.32** |

### Non-word Reading in Hindi and in English

The children showed significantly greater accuracy while reading Hindi nonwords than while reading English nonwords. It can be seen from Table 3 that Hindi nonword reading accuracy

(M = 4.73, SD = 2.65) was significantly greater than English nonword reading accuracy (M = 1.73, SD = 1.78). In case of Hindi, children read approximately 47% of the nonwords correctly, whereas in case of English, they read only approximately 17% of nonwords correctly. Clearly, the Hindi nonwords were read more accurately by the children than English nonwords, $t(29) = 6.32$, $p < .001$.

**Qualitative Analysis of Reading Errors Produced on Hindi and English Word Reading**

An analysis of error type for both Hindi and English words for the group was undertaken. Errors were classified into 3 types: (1) non-word errors (2) word errors, and (3) scaffolding errors.

From Table 4. it is evident that in Hindi, children produced a far greater percentage of nonword errors (89.89%) than word errors (10.11%). In English also, children produced more nonword errors (65.71%) as compared to word errors (34.28%). Further, in Hindi, 52% scaffolding errors were produced, whereas in English 45.14% scaffolding errors were produced.

**Table 4. Reading errors produced by first grade children on word and non-word reading tasks in Hindi and in English**

| Tasks | Types of errors (%) | Hindi | English |
|---|---|---|---|
| Word Reading | Non-words | 89.89 | 65.71 |
| | Words | 10.11 | 34.28 |
| | Scaffolding | 52.00 | 45.14 |
| Non-word Reading | Non-words | 93.67 | 85.48 |
| | Words | 06.32 | 14.51 |
| | Scaffolding | 64.55 | 34.67 |

**Qualitative Analysis of Reading Errors Produced on English and Hindi Non-word Reading**

In case of non-word reading tasks in Hindi and in English, errors were classified into 3 types: (1) non-word errors (2) word errors, and (3) scaffolding errors.

It can be seen from Table 4 that in Hindi, children produced a far greater percentage of nonword errors (93.67 %) than word errors (6.32 %). In English also, children produced a far greater percentage of non-word errors (85.48 %) than word errors (14.51 %). Further, in Hindi, 64.55% of total errors were scaffolding errors, whereas in English, 34.67% of total errors were scaffolding errors.

## DISCUSSION

The aim of the present study was to compare the word and non-word reading accuracy in a transparent orthography (Hindi) and in an opaque orthography (English) in case of first grade bilingual children and to see the reading strategies adopted by them in reading words and non-words in the two languages.

In the present study, children were significantly better at reading real words in Hindi than in English. This finding is significant as the differences in reading accuracy between Hindi and English were found within the same children, who had started learning to recite, read, and write in the two languages at the same time. Moreover, considering the Indian urban set up, where learning to recite, read, and write in English is given utmost importance, it will not be wrong to assume that in case of almost all the children a greater emphasis is put on learning to read and write in English by their parents as well as teachers. Despite this, the children in the present study showed significantly greater accuracy in Hindi than in English.

Greater accuracy in Hindi word reading could be attributed to Hindi being the first language of these children. However as the words chosen for the English and Hindi reading tasks were matched for spoken frequency, word length, age of acquisition, and regularity. Further, children's level of familiarity for both the languages was comparable as the two languages were being used simultaneously in their day–to–day interaction in their school and at home. This implies that there are differences in orthographic transparency of the two languages, Hindi and English. In 'shallow' or 'transparent' orthographies, including German, Spanish,

Dutch and Italian, graphemes generally represent only one phoneme, whereas in 'deep' or 'opaque' orthographies, including English and French, individual graphemes represent a number of different phonemes in different words, and there are many exceptions to grapheme-phoneme correspondence rules (26). Therefore, in a 'deep' orthography, children have to learn not only the grapheme-phoneme conversion rules but their exceptions as well.

In case of nonwords, children showed significantly greater reading accuracy in Hindi than in English. This finding further confirms that the differences were due to orthographic transparency and not due to factors such as familiarity. This is because nonwords are letter strings, which resemble real words, confirming to their sound and spelling structure but do not make sense. Nonwords can be used to determine how well readers can decode words they have never seen before. When nonwords are used, there is no likelihood that the items will be familiar. Nonword reading tests have been extensively used by researchers (24, 26, 27) as these can provide an important measure of change in letter-sound knowledge and have the potential to assess phonological processes in reading separate from specific reading vocabulary (28).

There is also evidence that phonological awareness skills can develop more rapidly amongst children learning to read a transparent orthography, for example, Ellis and Hooper (16) compared the rate of literacy acquisition in orthographically transparent Welsh and orthographically opaque English and showed that Welsh children were able to read aloud accurately significantly more of their language than were English children. Seymour, Aro and Erskine (29), investigated the effect of orthographic depth on the early (foundation) phase of reading acquisition in English and 12 orthographies. The authors reported that orthographic depth affects both word reading and nonword reading. The rate of development in English is more than twice as slow as in the shallow orthographies. The present study has extended the results of several previous studies (13, 14, 16, 19, 26) by demonstrating the superior performance of children, in reading real words and nonwords in transparent than in opaque orthography.

Further, error analysis revealed that in case of real words, a greater percentage of nonword than word errors was produced both in Hindi as well as in English. However, in comparison to Hindi, in English, nonword errors were accompanied by a substantial percentage of word

errors. On the contrary, in case of nonwords, a far greater percentage of nonword than word errors was produced in Hindi as well as in English.

In Hindi, in case of real words as well as nonword reading task, a majority of the nonword errors as compared to a small percentage of word errors indicates that children were reading words mainly by assembling pronunciations from grapheme-phoneme correspondences (GPC). They seemed to follow the alphabetic strategy for processing words. Reliance on alphabetic strategy lead to successful reading in Hindi as it is a transparent orthography. A very small percentage of word errors indicate that these children were not adopting logographic strategies. This finding is supported by Gupta (24) who reported that children with dyslexia as well as reading-age and chronological-age controls showed a greater percentage of nonword errors on Hindi word reading. Furthermore, in case of both words and nonword reading tasks, more than 50% error responses were scaffolding errors, which further indicates that children were reading mainly by left-to-right, letter-by-letter decoding. Scaffolding errors are the responses that preserve both the initial and final boundary phonemes of the target word, but the middle phonemes of the target words are inaccurately pronounced (30). In recent studies, Gupta and Jamal (17, 18, 19) have also reported similar findings. Thus, in Hindi, a predominant use of alphabetic strategy in the absence of logographic strategy implies that Hindi, being a transparent orthography encourages its readers to use GPC rules from the beginning of reading itself. This is in line with the previous studies by Wimmer and Hummer (31), and Wimmer and Goswami (14), who suggested that children learning to read a transparent orthography may not pass through an initial stage of logographic reading.

In English, in case of real words, a greater percentage of nonword than word errors implies that children were reading words indirectly by assembling pronunciations from grapheme-phoneme correspondences (GPC). Thus, children were reading words mainly by employing alphabetic strategy. However, a substantial percentage of word errors also indicate a deviance from a purely alphabetic strategy. It appears that children also relied on logographic strategy, which involves reading by guessing the word. Such guessing at words resulted in word errors. Moreover, less than 50% of the total error responses were scaffolding errors, which further indicates that these children were not applying only alphabetic strategies for reading words. Had the words been read only by assembling phonemes from left-to-right, it would

have resulted in a greater percentage of scaffolding errors. This finding is similar to previous research studies (16, 17, 26, 31).

According to Frith (3), phoneme awareness arises naturally in children at age 5 or 6. With this ability, the child can read by sounding out a sequence of letters and merging those sounds into a word. However, this way of reading is tedious and relatively inefficient, as it requires letter-by-letter processing, and in spelling systems like that of English, the letter-sound correspondence is not reliable enough to ensure total accuracy. A further refinement of the alphabetic stage is to associate phonemes not just to single letters, but also to graphemes. In the present study, in case of English, it is evident from the error analysis that children have not yet achieved the refined alphabetic stage and they are still using the tedious left-to-right, letter-by-letter decoding to read words.

In terms of Ehri's model (4), the children in the present study were at partial alphabetic phase. In this phase, beginners commit printed words to memory by forming connections between one or more letters in a printed word and the corresponding sound(s) detected in the word's pronunciation. In the present study, noticeable presence of scaffolding errors indicates that these children were using partial alphabetic strategy, i.e., they were able to segment the initial and the final sounds in the words and guess the rest of the word from these initial and final sounds.

Overall in English, a greater percentage of nonword errors along with a substantial percentage of word errors indicate that these children have not fully reached the alphabetic stage (3) or the partial alphabetic stage (4). Had they successfully acquired the alphabetic strategy, they would have produced only nonword responses as errors. In the present study, on the contrary, a substantial presence of word errors points towards remnants of logographic (3) or pre-alphabetic (4) strategy. Perhaps, as suggested by Frith (3), they are at a stage where both logographic and alphabetic strategies coexist for some time before the full transformation to alphabetic strategy takes place.

Furthermore, in English, in case of nonword reading task, a far greater percentage of nonword than word errors was produced which implies that children were using predominantly alphabetic strategies to read unfamiliar words. This is in line with the existing studies, such as Spencer and Hanley (26); Wimmer and Hummer (31). In a recent study, Spencer and Hanley (26)

have shown that children learning a transparent orthography were more likely than appropriately matched children learning an opaque orthography to attempt to read unfamiliar words by using alphabetic strategies.

The study by D'Anguilli, Siegel, and Serra (32) who investigated the development of reading in English and Italian in bilingual children provides a plausible explanation for these findings. They found that exposure to a language with more predictable grapheme – phoneme correspondences, such as Italian, may enhance phonological skills in English. According to them, it is possible, that Italian phonology disambiguates the choice of the segments more easily than English phonology does. An individual may be able to identify more overlapping segments in Italian than in English, and therefore the probability of mistakenly substituting a similar segment is higher in the latter than in the former. Less skilled readers who are exposed to Italian may realize this feature of Italian when they face ambiguous English words at school. As an alternative strategy of word reading, these children may overgeneralize the regularity of Italian words and transfer it to English words. In the present study, it is possible that the same process as suggested by D'Anguilli et al. (32) might underlie the children's preference to apply the reading strategy of the language with more predictable grapheme-phoneme correspondences, which in this case is Hindi.

Overall, the error analysis in the present study suggests that in case of word reading tasks, children used different strategies, i.e., mainly alphabetic strategy in Hindi and a combination of logographic and alphabetic strategies in English, whereas in case of nonword reading tasks, they used same reading strategy (mainly alphabetic strategy) in both the languages.

## CONCLUSION AND IMPLICATIONS

It can be concluded from the findings of the present study that orthographic transparency of a language affects the reading accuracy with significantly greater reading accuracy achieved in case of orthographically transparent (Hindi) than in case of opaque (English) language. Secondly, the nature of the orthography affects the reading strategies adopted by its readers. Thirdly, assumptions of cognitive developmental models, such as Frith (3) that all the children, irrespective of their language pass through the logographic stage are doubtful in case of orthographically transparent languages such as Hindi. All the findings of the present study are similar to the findings of studies conducted by Ellis and Hooper (16); Goswami et al. (33;

13); Gupta and Jamal (17, 18, 19); Seymour et al. (29); Spencer and Hanley (26); Wimmer and Goswami (14) on the comparisons of English with other transparent languages, such as Welsh, German, Spanish, Greek, and Hindi. In the present research, an attempt has been made to study reading acquisition in these two languages. It throws light on the demands made by orthographies differing in transparency on the beginning readers, the difficulties that they face, and the various strategies that they employ while acquiring the two languages. Such knowledge about the different orthographies, the errors made by those learning to read them and the strategies successfully employed by them for attaining mastery in these languages can have important implications for early and precise diagnosis of reading difficulties in Hindi and English, which can be followed by assessment based interventions.

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