

Read, Miscue, and Progress

A Preliminary Study in Characterizing Reading Development in Shallow Indonesian Orthography

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Abstract: Understanding what happens when children learn to read Indonesian is very important, in terms of both advancing psycholinguistics and improving practices that are done in educational institutions throughout the country. The current study aimed to characterize the normal development of reading in the under-researched, shallow Indonesian orthography. A total of eighty-two children aged 7-9 years old participated by reading aloud 100 words that are of high frequency, monomorphemic, disyllabic, and controlled for syllable structure (simple, diphthongs, digraphs, and consonant clusters). Reading miscues that were committed by the children showed that simple disyllabic words were mastered at the end of grade one, and diphthongs, digraphs, and consonant clusters were mastered later. Results are interpreted based on the predictability of the mapping between graphemes and phonemes in the Indonesian orthography.

1 INTRODUCTION

Orthographic depth, syllabic complexity, word length, and use of sub-lexical clusters (e.g., the *st* in the word *stop* and) and digraphs (e.g., the *oe* in the word *bloem*) are explored in the current investigation with the general aim to assess how syllabic complexity influences normal reading development (see Seymour, Aro, and Erskine, 2003; Zoccolotti, De Luca, Di Pace, Gasperini, Judica, and Spinelli, 2005; Marinus and de Jong, 2008). Syllabically, the Indonesian orthography is very transparent, predominantly CV with the C being simple consonants such as that found in the disyllabic word <guru> ('teacher'). There are just few exceptions in the mapping between graphemes (i.e., letters) and phonemes. What can be considered as exceptions are diphthongs and digraphs, two letters that are pronounced as one sound. Diphthongs are <ai>, <oi>, and <au>. Some examples of digraphs are <ng> /ŋ/, <ny> /ɲ/, and <sy> /ʃ/. Interestingly, although the words have the same syllabic structure (e.g., CV-CV), when the consonants are digraphs or the vowels are diphthongs, readers see more letters written and thus words containing digraphs and diphthongs are longer in length than words that contain simple graphemes. Not only length, mapping two letters into one sound

may also be challenging for the novice readers. Therefore, there is possibility that words containing diphthongs and digraphs present some difficulty for beginning readers.

From phonetics literature, we know that what diphthongs and digraphs are. Diphthongs are vowel sounds that contain a glide from one vowel sound to another (Roach, 2009). The position of the tongue moves from one position when producing the first sound to another position when producing the second sound. For instance, in the diphthong /ai/ which is represented by <ai>, the diphthong starts with an open vowel which is between front and back, and glides to a closed high vowel. Furthermore, digraphs are two letters that represent one sound (Robbins, Kenny, and Robbins 2007). For example, in Indonesian, the letter <n> maps to an alveolar nasal consonant, and the letter <g> maps to a velar plosive consonant. However, when <n> and <g> are in a digraph, they map to /ŋ/ which is a velar nasal consonant. Another example, the alveolar nasal consonant which is represented by the letter <n> and the palatal approximant represented by the letter <y> are combined in the digraph <ny> which maps to the palatal nasal consonant /ɲ/. In practice, when beginning readers are not reading letter per letter and are instead mapping diphthongs and digraphs to their corresponding sound, they will be more successful in

reading the diphthongs and digraphs. When children think that the digraph <ng> are individual letters, for instance, they may read the word bunga as bun-ga, still preserving the number of syllables but changing their structure. When children realize that bun-ga does not map into any word in their lexicon, they start to grasp that in order to link the concept of FLOWER in Indonesian to its written rendering, they need to pronounce the <ng> as /ŋ/. That is, using the lexical strategy to read.

Syllable onsets in Indonesian can also be consonant clusters. In the current investigation, only clusters comprised of two consonants were included in the materials, such as the <dr> in the word drama. This phonotactic pattern is only one of the eight syllabic patterns of consonant clusters in Indonesian (Hasibuan, 1996).

The research builds on previous investigations of miscues made by children (e.g., Goodman, 1969; Goodman and Burke, 1973) that seek to compare what the young readers say (observed responses) and what they read (expected response). By doing miscue analysis, processes that happen during reading can be mapped and used to determine factors that influence reading development in Indonesian. More specifically, the current work builds on and expands an earlier work (Anjarningsih 2016) that studied 17 preschoolers and first graders. The most relevant findings for the present investigation were that at the grade one level, children's miscues were predominantly visual and that the consonant clusters were the most challenging words to read. Therefore, this study aims to find out what kind of miscues happen when children read highly-frequent disyllabic words containing diphthongs, digraphs and consonant clusters; to seek what the reading miscues can inform us about the effects of the spelling of diphthongs, digraphs, and consonant clusters on children's reading development; to propose a possible underlying reason for the miscues that are committed; and to propose how sub-lexical factors influence reading development of highly frequent disyllabic words.

2 METHOD

This study was a qualitative study involving eighty-two normally developing children living in Depok, West Java, Indonesia, of which 46 are boys, and 36 are girls. Miscued words produced by the children were tabulated and subjected to a qualitative analysis.

3 RESULTS

Based on the miscues that were committed by the children, three kinds of miscues were identified, including 1) visual: miscues showing change, substitution, deletion, and transposition of sounds in the words. The resulting words still share 50% of its graphemes (letters) with the tested words; 2) regularisation: miscues which results in the division of digraphs and diphthongs into one or two simple graphemes or sounds; and 3) substitution : miscues resulting in totally different words or pseudo- or non-words.

Figures 1, 2 and 3 show the total number of each kind or miscues and its proportion relative to the total number of words read per grade.



Figure 1: The total number of each kind or miscues and its proportion relative to the total number of words read by grade 1 students (n=19 children).

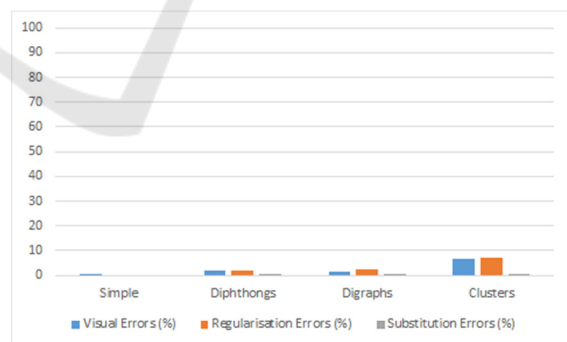


Figure 2: The total number of each kind or miscues and its proportion relative to the total number of words read by grade 2 students (n=43 children).

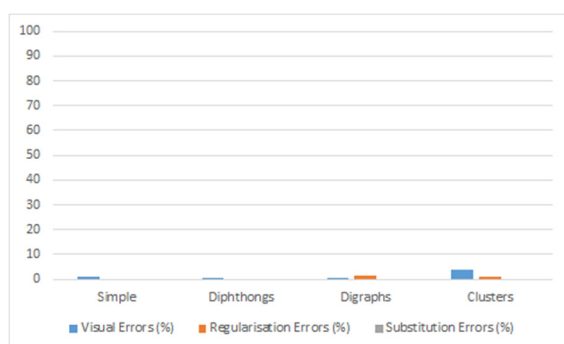


Figure 3: The total number of each kind of miscues and its proportion relative to the total number of words read by grade 3 students (n=20 children).

Within each grade and each kind of miscues, a paired t-test was run, comparing the number of miscues committed to the shorter words and that committed to the longer words. In total, nine paired t-tests were run, and none of the ps was 0.05 or lower. This means that there was no statistically significant difference between the reading performance of the children when they read the shorter words in all word groups and the reading performance of the children when they read the longer words in all word groups. Comparing the three grades, the youngest readers made proportionately more miscues than the older ones who had practiced reading longer. This was true for all kinds of miscues.

Simple words that simulated the transparency of the Indonesian orthography were read very successfully early on. Nobody substituted the simple words with other words that do not share at least 50% similarity in spelling. Diphthongs were also quite successfully read from first grade on, as reflected by the less than 5% miscue rate per kind of miscue. In first grade, children made more substitution miscues (e.g., reading *tunai* as *bumi*), but in second grade, the most committed miscue was regularization (e.g., reading *da-mai* as *da-ma*), followed very closely by visual miscues (e.g., reading *wahai* as *wati*). In the third grade, accuracy in reading words with diphthongs reached ceiling.

Comparing diphthongs and digraphs, in first and second grade, overall rate of miscues of diphthongs and digraphs are comparable. However, in third grade, diphthongs were read with virtually almost no miscues (i.e., 0.20%), whereas digraphs were miscued 1.80%. It may very well be that digraphs were mastered later than diphthongs and that the second grade is a kind of cut-off grade: after learning to read for two years, children understand that the double letter of diphthongs map to single vowel phonemes, but at the same time, it is still more

challenging to map the two letters of digraphs to single consonant phonemes.

Of the four groups of words, the consonant clusters group proved to present the most challenge for the young beginning readers. Although the percentage of miscues of this group of words declined as the grades advanced, in third grade children made comparably more miscues to words in this group than to words in the other three groups. In general, children made at least twice as many miscued consonant clusters as miscued digraphs.

On closer inspection, in grades one and two, for digraphs and consonant clusters, the kind of miscue that was produced the most frequently was regularization. Recall that this is when readers separated the letters in the digraphs and when the two letters in the consonant clusters are read as if they were single letters (e.g., reading *krisis* as *kirisis*). In grade three, digraphs were still predominantly regularized, but consonant clusters were predominantly read as other words that differ from the intended words in as much as at least 50% of their letters.

4 DISCUSSION

The study's main goal was to characterize the reading development of normal Indonesian children. In doing so, the materials were designed to capture both the regularity of the transparent Indonesian orthography and some irregularities that exist in the orthography in order to see how such irregularities influence reading development. To answer the first research question, from the sample of young readers, miscues were identified when they read disyllabic words containing diphthongs, digraphs and consonant clusters and three kinds of miscues were found: visual, regularization, and substitution. Up to the second grade, diphthongs and digraphs are mostly regularized and in the third grade, only digraphs are regularized. A higher proportion of miscues still happen to consonant clusters, compared to those to digraphs, even in the third grade. Therefore, in the children's reading development, it seemed that they went through a process, begun by successfully mastering words with simple spelling, followed by mastering words with diphthongs, digraphs and consonant clusters consecutively.

As for the answer to the second research question, the manipulation to the syllabic structure showed that children went through a process in mastering common words. They were not at the same time able to read all disyllabic words that were given. The same number of letters that constitute diphthongs and

digraphs did not seem to have the same effect on the order when they are mastered. Diphthongs seemed to be mastered at the end of the second grade, while digraphs were still a little difficult at the end of the third grade. Therefore, having the same number of letter does not seem to be the only factor at play. Another factor seems to be the ease at which children grasp the mapping between the diphthongs and digraphs on the one hand, and the phonemes on the other hand. It is proposed that the earlier mastery of diphthongs is because the glide in diphthongs may have been easier to understand by children due to the transparent mapping between the two glided sounds and the two letters in the diphthongs.

The digraphs, in turn, may have been more difficult because the sounds that the digraphs map to are not directly evident. There are two possible routes to memorizing this mapping: analysis and memorization. The children may have analyzed, in the case of the digraph <ng>, the letter <n> maps to an alveolar nasal consonant, the letter <g> maps to a velar plosive consonant, and <ng> map to /ŋ/ which is a velar nasal consonant, a consonant with the same manner of articulation as /n/ and the same place of articulation as /g/. There are features that are shared by /n/ and /g/ on the one hand, and /ŋ/ on the other hand. Once children have done the analysis and arrived at the correct conclusion based on a good match with an entry in their lexicon, they may have started to remember, for instance, the pairing between the written word <bunga> with the lexical entry *bunga* in their lexicon. This memorization may then lead to them reading not the single letters of the diphthongs, but the phoneme that each of the diphthongs maps to.

Consonant clusters seemed to present the ultimate difficulty as shown by the findings that at the end of third grade, children still made considerable proportion of miscues to words containing consonant clusters. A possible explanation is because there are many more consonant clusters than there are diphthongs and digraphs, children took longer to establish the mapping between consonant clusters and the phonemes that they represent. In other words, the greater number of kinds of consonant clusters adds more challenge, in addition to the clusters having two graphemes which render the clusters having more sounds than diphthongs and digraphs.

The above findings go along the lines of those of Marinus and de Jong (2008). Although using a different method, it was demonstrated that digraphs are utilized by beginning readers when they read and they do influence the details of the syllable structures that are mastered by children as they progress from

grade one to grade three of primary school. Furthermore, findings about word length effect that has been observed previously was also observed in the current investigation. In line with Zoccolotti et al. (2005) end of grade three seemed to be the point at which children are not very much influenced by the longer diphthongs and digraphs. In addition, the current results expand the work of Anjarningsih (2016) in that the consonant clusters continue to present challenges even up to the end of grade three.

However, the findings about consonant clusters may raise some questions before they can be confidently interpreted. There is of course a difference between digraphs and diphthongs on the one hand, and consonant clusters on the other hand: while diphthongs and digraphs map to one phoneme, consonant clusters map to two or more phonemes, one for each of the graphemes or letters in the clusters. While this mapping, intuitively, may seem to predict that consonant clusters should be easier to master than digraphs because once children can map single consonant graphemes to their corresponding phonemes, they should get the pronunciation of clusters correctly, our current findings go against this prediction. Whether the visual and regularization miscues were caused by children expecting to find simple consonants followed by simple vowels in syllables remains to be tested further.

With the above findings at hand, it interesting to see that children did not master all the tested disyllabic words at about the same time. They needed to practice reading for about three years before their reading performance became accurate. The sub-lexical details or in this case, the syllabic make-up of the words did influence how accurate children read the words. Therefore, in a transparent orthography such as the Indonesian orthography investigated here, the mapping between graphemes and phonemes in “irregular” diphthongs, digraphs, and consonant clusters influences how early children can read highly-frequent disyllabic words. Syllabic complexity and orthographic depth, just like the findings of Seymour et al. (2003), also influence the rate of reading development in Indonesian.

It should be noted that the syllabic structures tested in the current investigation do not comprise all syllabic structures in Indonesian. In addition to CV or CVC, Indonesian also has VC which can be written by vowel and consonant graphemes or just vowel graphemes (e.g., in the word <dua> meaning “two,” the grapheme <a> maps to /wa/). Furthermore, trisyllabic and words with more syllables also exist in Indonesian, both monomorphemic (e.g., *udara* “air”) and polymorphemic (e.g., *penggorengan* “frying

pan”). Future research should incorporate other syllabic structures and longer words in order to map the reading development of Indonesian children more thoroughly.

5 CONCLUSIONS

In this research that aims to characterize the development of reading in normally-developing Indonesian children, three kinds of reading miscues were committed by the participants: visual, regularization, and substitution. These miscues helped to highlight that digraphs were mastered some time after the children could read diphthongs accurately (end of grade 3 vs. end of grade 2), and consonant clusters were also mastered later than digraphs. The different paths of acquisition between diphthongs and digraphs were explained by how predictable the mapping was between the diphthongs and digraphs and their sounds. For consonant clusters, the more time it took the children to master them was attributed to the existence of much more consonant clusters than digraphs that could have extended the time children needed to map the clusters and their sounds accurately. It is shown by the current results that sub-syllabic complexity influenced the paths of reading acquisition of frequent disyllabic Indonesian words.

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