

Rapid Naming, Orthographic Processing Abilities and Phonological Skill in Reading Performance of Indonesian Dyslexic Children

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Abstract: Ho, Chan, Le, Tsang, Luan (2003) found that orthographic and rapid naming deficit might pose an interrelated and the most dominant deficits in Chinese developmental dyslexia, but the phonological skill only had small deficit proportion. Burt (2006) also revealed that the reading experience associated with orthographic processing skill did not always closely track the level of phonological coding skill. Therefore, this study investigated the rapid naming, orthographic choice accuracy and phonological skill of Indonesian dyslexic children. 5 dyslexics from Pantara Inclusive Primary School, Jakarta (age 7-9; DA, DB, DC, DD, DE) and 25 children from Kwitang 8 Primary School, Depok (chronological age-matched control) participated. This study used quantitative and qualitative method (case-control study design). Two experimental measures were adapted from prior research, among them: words reading test by Anjarningsih (2015) and Rapid Automatic Naming test by Pennington et al. (2001). The t-test results showed that child with dyslexia B, C and E were significantly slower than control group, child with dyslexia A could not read all words, child with dyslexia E had severe reading disabilities, child with dyslexia C had difficulties reading words with digraph, diphthong and consonant cluster, child with dyslexia D had difficulties reading words with consonant cluster. Two dyslexics also showed some classification of errors like phoneme deletion, phoneme addition, vowel and consonant substitution, real words to pseudo words alteration, which indicated that Indonesian dyslexic children have similar deficit in naming speed and orthographic processing skill as found by Ho, Chan, Le, Tsang, Luan (2003).

1 INTRODUCTION

The definition of dyslexia is still a debate for many researches. However, many studies reveal that reading difficulty is the most problem faced by people with dyslexia (Lyon, Shaywitz, Shaywitz, 2003; Reid, 2011; and Mercer (1997, see Ivanti 2003). People who are diagnosed with dyslexia generally show disabilities to recognize sounds. They tend to substitute phoneme like [b] to [d], [b] to [p] or [d] to [p] and [p] to [b] (Solek and Dewi, 2015). They also tend to alter word to pseudo word like: *lainnya* [lainna] 'others' to *laya* [laja]. As for the reading errors, it is indicated that the reading difficulties are caused by phonological skill deficit.

Apart from phonological difficulties as the core deficit in developmental dyslexia, many researchers found that reading difficulties were caused by the deficit in rapid naming and orthographic processing skill (OPS). Rapid Automatic Naming is to measure the speed to name objects. If children with dyslexia

are slower than normal children in naming objects, the dyslexic children might have a deficit in naming speed. As for the Orthographic Processing skill, OPS is the ability of forming, storing and accessing orthographic representation relation with reading (Burt, 2006). Deficit in OPS may result from a habitual shallow and non-analytic processing style in readers when encountering words (Barker et al. 1992, see Burt, 2006).

In connection to the reading ability of children with dyslexia, Ho et al (2003) found that orthographic and rapid naming deficits in Chinese dyslexic children posed an interrelated problem in developing orthographic knowledge and representation. One hundred and forty-seven Hong Kong Chinese developmental dyslexia were tested. The study found 57% of the subjects had rapid naming deficit and those who had orthographic deficit reached 42 %.

The aforesaid facts show that rapid naming and orthographic deficit become the unique contributions to literacy performance, but phonological skills do

not. Therefore, orthographic-related difficulties are the crux of the problem in Chinese dyslexics. In addition, it differs with the skill of Chinese normal children (grade 2) found by Liao (2006). The study suggested that rapid naming correlated stronger with phonological skill. Only children in grade 4 showed that orthographic processing skill was more important as they advanced in grades.

Therefore, in order to characterize the reading ability of Indonesian dyslexics, this study aims to investigate the naming speed ability, orthography processing skill, and phonological skill of Indonesian dyslexic children. This study also aims to investigate the reading performance of dyslexics, to see whether this study result is consistent with the finding of Ho et al. (2003) and the last, to evaluate the hypothesis of Orthographic Processing Skill of Indonesian Children with dyslexia (Burt, 2006). In addition, Ho et al. (2003) did not measure the IQ score of the control group when they compared the skill between control group and dyslexics. Therefore, the present study will include intelligence test for the control group to improve its matching with dyslexics.

2 METHODS

The research method were quantitative and qualitative with a case control study approach. The dyslexics' data were taken from two experimental tests. Firstly, the researcher observed and interviewed participants, teachers and also psychologist, then the dyslexics were tested. Afterwards, the data was analyzed by means of t-test independent analysis.

As for the participants, a total of 30 children age 7, 8, and 9 years participated in this study, amongst them: 5 developmental dyslexics (3 males, 2 females) and 25 age-matched children who served as controls. We refer to dyslexics as DA (IQ=92), DB (IQ=92), DC (IQ=92), DC (IQ=92), DE (IQ=92), and as for the control group, CA, CB, CC, CD and CE. The intelligence test for control group was also conducted. All participants shared same sociocultural background, and their native language is Bahasa Indonesia. The developmental dyslexics were recruited from Pantara Inclusive Primary School in Tebet, Jakarta, whereas, The controlled children were selected from Kwitang 8 Primary School in Pancoran Mas, Depok, matched by sex and age one by one to the dyslexic children. Before performing the tests, informed consent from parents from both dyslexics and controls were received.

2.1 Word Reading

The ability of reading was assessed using word reading test derived from Anjarningsih (2015). The words consisted of 104 words (24 words with simple words (*bagi* [bagi] 'divide'), 24 words with digraph (i.e. *bunga* [buŋa] 'flower', 24 words with diphthong (i.e. *hijau* [hiʝau] 'green', and 24 words with consonant cluster (i.e. *planet* [planet] planet)). The words were taken from the 10.000 highest frequent words based on the linguistic corpus of Bahasa Indonesia.

2.2 Rapid Automatic Naming

Rapid naming was assessed through the administration of Pennington et al. (2001) [Rapid Automatized Naming Test for objects, colors, numbers, and letters (RAN-Objects, RAN-Colors, RAN-Numbers, and RAN-letters)]. These four tasks consisted of 5 items arrayed on cards. Each was repeated in random order 10 times. Participants were asked to name objects as quickly as possible, amongst them: number (2), symbol-object (3) and color (4) to assess their familiarities with the presented stimuli. A voice recorder was used to record all activities.

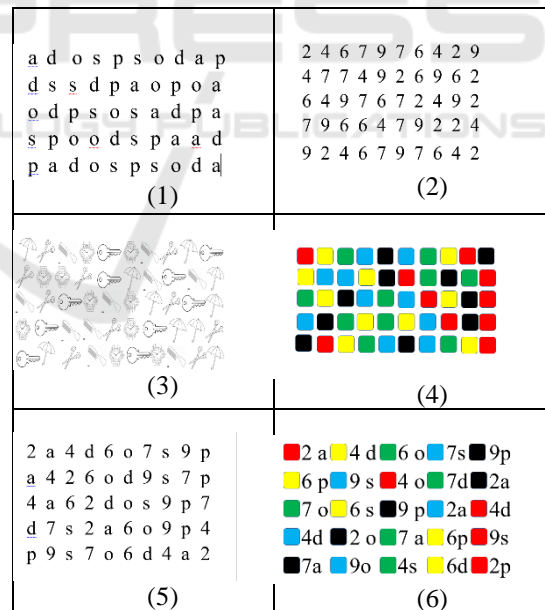


Figure 1: Alphabet (1), number (2), symbol-object (3), color (4), mixed of alphabet and number (5), mixed of alphabet, number, and color (6).

2.3 Procedure

The children were tested individually in a silent room. Two tasks were administered, including word reading

test and RAN test. Children were individually asked to read the word list and RAN test aloud. A recorder was used to record the spoken answers. The accuracy of word reading and RAN test were counted. As for the naming speed, the children's data were then transferred to PRAAT program to get the reaction time during the word reading and RAN test. Time was measured from the start signal. Afterwards the data of reading skill and naming-speed were analyzed by means of t-test independent analysis.

2.4 T-Test Independent Analysis

Based on the result appeal of paired sample in t-test independent, there were four dyslexic children who showed significantly lower than the controls in reading. Amongst them: child with dyslexia A (digraph: $p=0.000$; diphthong $p=0.000$; consonant cluster: $p=0.000$), child with dyslexia C (digraph: $p=0.000$), child with dyslexia D (consonant cluster: $p=0.001$), and child with dyslexia E (simple word: $p=0.000$, consonant cluster: $p=0.000$).

As for the RAN test, there were four children who showed significantly lower than the control group, amongst them: child with dyslexia A (letter: $p=0.000$; picture= 0.000 ; color $p=0.000$; letter and number $p=0.000$, letter, number, and color $p=0.000$), child with dyslexia B (color: $p=0.021$), child with dyslexia D (picture: $p=0.007$; number and letter: $p=0.005$); letter, number and color $p=0.000$).

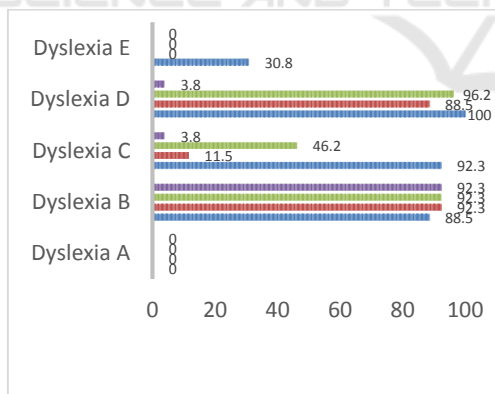


Figure 2: Word reading percentage ability of dyslexic children.

Based on the diagram (figure 2 and 3), it is observed that child with dyslexia C (92.3%), D (100%) and E (30,8%) is easier to read simple words than the words with diphthong, child with dyslexia C is easier to read words with diphthong (46.2%) than to read consonant cluster, and words with consonant cluster (3.8%) is easier to be read than the words with digraph, child with dyslexia D find easier to read

diphthong (96.2%), then digraph (88.5%) and consonant cluster (3.8%) are the most difficult at all. Child with dyslexia A cannot read any single words, and child with dyslexia E can read words with simple words only.

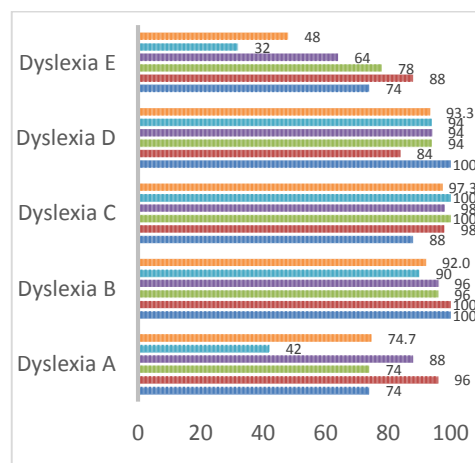


Figure 3: RAN percentage ability of Indonesian dyslexic children.

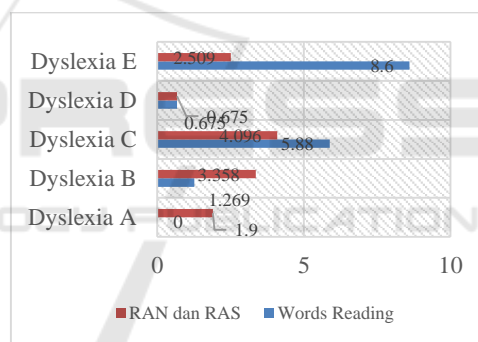


Figure 4: Naming Rapid Ability of Dyslexic Children.

Based on the ability of naming speed of Indonesian dyslexic children, it is observed that three out of five dyslexic children have deficit in naming speed, amongst them: child with dyslexia B (RAN, $p=0.001$), child with dyslexia C (reading, $p=0.000$; RAN, $p=0.002$), child with dyslexia E (reading, $p=0.000$; RAN, $p=0.000$). As for the reaction time, the lowest duration of dyslexic's skill is 0.675s, and the highest is 8.6s. As for the controls, the lowest is 0.456s, and the highest is 0.786s. For the RAN, the lowest of dyslexic's reaction time is 0.675s, and the highest is 4.096s. For the controls, the lowest reaction time is 0.737s, and the highest is 1,38s.

2.5 Qualitative Results

It is observed that 3 out of 5 Indonesian dyslexic children make some classification of errors. Child

with dyslexia C makes errors on phoneme substitution (5 times, i.e. *juga* [juga] ‘also’, to *jaga* [jaga] ‘keep’); phoneme deletion (16 times (digraph): for i.e. *hijau* [hijau] ‘green’ to *hiju* [hiju]); phoneme transposition (*hilang* [hilaŋ] ‘lost’ to *haling* [haliŋ]); word alteration (41 times, i.e. *toilet* [toilet] *toilet* -- *dia* [dia] ‘she/he’). For child with dyslexia E, she makes errors like phoneme substitution (19 times), for example: [d] to [p], for word *dari* [dari] ‘from’ to *pari* [pari]; [d] to [b], for word *tadi* [tadi] to ‘tabi’; [g] to [p] like *lagu* [lagu] ‘song’ to *lapu* [lapu].

In connection with the phoneme substitution, child with dyslexia E tends to alter voice consonant sound to voiceless consonant sound. She also alters words like *taurat* [taurat] ‘law’ to become *naya* [naja], *danau* [danau] lake to be *papa* [papa] ‘father’, child with dyslexia E also alters words to nonwords like: *spirit* [spirit] *spirit* to *tate* [tate], *senyum* [səjum] ‘smile’ to become ‘lepa’. As for the tasks to name letters in RAN test, child with dyslexia A alters [d] to [b] for 10 times, [p] to [b] for 3 times; child with dyslexia C also alters [d] to [b] once, and [p] to [d] for one time], child with dyslexia E alters [p] to [b] for 5 times and [d] to [p] for 7 times. As for other errors, child with dyslexia A, C and E made phoneme substitution, phoneme deletion, phoneme addition, words to pseudo words alteration which indicated that the dyslexic children have severe phonological deficit.

3 CONCLUSIONS

Dyslexic children generally show different abilities in reading. This study result suggests that 4 out of 5 dyslexic children show reading deficit. The reading difficulties caused by naming speed and orthographic processing skill deficit are faced by two Indonesian dyslexics, amongst them: child with dyslexia C and child with dyslexia E. As for the error classification like phoneme substitution, phoneme addition, and word alteration, it is indicated that phonological deficit also gives big effect to the reading ability. As for the child with dyslexia D who cannot read words containing consonant cluster, it might happen due to the children development, like the finding of Anjarningsih (2015) that the normal children age 7-8 have difficulties in reading words with consonant cluster. Furthermore, based on the study result, the child with dyslexia B is able to read all words, it is estimated that he receives more intensive reading therapy than other dyslexics. To summarize, the Indonesian children with dyslexia have rapid naming deficit, phonological deficit and similar proportion of orthographic deficits. Therefore, this result is broadly

consistent with Ho et al. (2003) and supports that Orthographic Processing Skill and Phonological coding skills are as predictors of word identification (Burt, 2006).

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