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Lexical Properties and Early Literacy Acquisition of Kindergarten Children in Malay Orthography

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Abstract
Cross-linguistic studies show that complexity and regularities of orthographies will affect the decoding and spelling acquisition rate of the language. However, very little research examines the lexical properties and their relationship with literacy acquisition in Malay, a transparent alphabetic orthography. Therefore, this study aimed to explore the relationship between the lexical and sub-lexical qualities in Malay words and kindergarten children's decoding and spelling acquisition. The study involved Malay native speaker kindergarten children from an urban city in West Malaysia. The results converged with previous studies on consistent and shallow orthographies but offered an alternative perspective on the contribution of sub-lexical properties in Malay orthography in relation to kindergarten children's literacy acquisition. Pedagogical implication for the design of an early literacy intervention programme was discussed, highlighting a combination of a coarse-grained and fine-grained approach in teaching the multisyllabic language with salient syllable structure.
Keywords: Malay orthography, Early literacy development, Decoding, Spelling, Lexical Property

1. Introduction

Speaking a language is innate in human but learning to read and write is not because writing system exists much later than spoken language in human history. For any native speaker of a language, the inherent language device produces and retrieves phonological structures through automatic functioning processes below the conscious level (Shankweiler & Lundquist, 1993). In contrast, writing or reading requires some explicit understanding of the writing system. For example in an alphabetic writing system, a child must explicitly or implicitly gain knowledge on how letters and the sequence of letters correspond to speech segments. This notion implies that while language development is inborn and natural, literacy is a product of instruction (Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg, 2001) and it is closely related to the writing system of the spoken language (Caravolas, 2004; Yap, Rickard Liow, Jalil & Faizal, 2010; Ziegler, Perry, & Coltheart, 2000). In fact, the way a writing system is designed determines its instruction (McGuinness, 1999).

It is evident from cross-linguistic studies that task demands in reading and spelling are different among languages, due to phonological and orthographic differences. Language like Chinese has salient perceptual Chinese characters which require visual-orthographic skills to identify (Wang, Liu & Perfetti, 2004). Therefore the beginning learner needs to attend to orthographic details for character recognition skills. The learning of speaking and reading has to occur simultaneously as phonological and orthographic mapping is not as direct as alphabetic orthographies.

Orthography depth hypothesis proposed by Katz & Frost (1992) posits that consistency of mapping between phonology and orthography is a crucial contributing factor to the reading acquisition process and the acquisition rate of beginning readers. In shallow orthographies, such as Serbo-Croatian, Spanish, Dutch and Italian, there is a simple and transparent one-to-one mapping between graphemes and phonemes (Yap et al., 2010). In contrast, in deep orthographies, such as English and French, the grapheme-phoneme correspondence (GPC) is more complex or opaque. Therefore, reading acquisition and access to GPC are claimed to be more rapid in transparent orthography than other less consistent orthography (Caravolas, 2004; Goswami, 2003; Frith, Wimmer & Landerl, 1998; Seidenberg 2011; Seymour, Aro, & Erskine, 2003). A cross-language study comparing nonword reading skills of English and German-speaking children found that German eight year olds read faster and only made a fifth as many errors as the English-speaking children (Frith et al., 1998). Another study comparing English and Italian children also found Italian children acquire fluency in reading after a year compared to English children who achieve the fluency rate after three to five years (Thorstad, 1991).

In addition, semantic priming and word-frequency effects in naming were found to be significantly correlated with the depth of orthography (Frost, Katz & Bentin, 1987). In other words, deeper orthographies tend to depend more on semantic lexical quality and frequency of occurrence than assembled phonology while shallower orthographies rely more on serial nonlexical decoding (Yap et al., 2010).

Besides acquisition rate and acquisition process, studies on different aalphabetic orthographies also find different manifestations of reading difficulties (Miles, 2000; Orsolini, Fanari, Cerracchio, & Famiglietti, 2009). In deeper orthography, one grapheme may represent a number of different phonemes in different words (phonological inconsistency) and there are exceptions to the GPC rules (irregularities). For example, in English orthography, except for /b/, /d/, /f/, /l/, /n/, /r/, /v/, and /z/ which are represented by single letter graphemes, all other phoneme sounds in English can be represented by two or more letter graphemes, e.g. <c> in "cat" for /k/ and "cell" for /s/ (Gough, Juel and Griffith, 1992). Therefore, languages with more consistent GPC like Welsh, German and Italian found less reading difficulty in word recognition and nonword reading as compared to English (Ellis & Hooper, 2001; Landerl, Wimmer & Frith, 1997, Orsolini et al., 2009).

Studies comparing transparent and opaque orthographies explore the predictors of reading and spelling difficulties from the linguistic and cognitive related skills such as rapid naming, phonological and phonemic awareness, letter-sound knowledge and verbal memory span (Furnes & Samuelsson, 2011; Ziegler & Goswami, 2005). There are not many empirical studies which explore the language-specific processing which may affect the early acquisition of reading and spelling in Malay (Yap, et al., 2010). In a Malay Lexicon Project, Yap et al. (2010) compiled a database of lexical statistics for 9592 words. The lexical variables include letter length, syllable length, phoneme length, morpheme length, word frequency, orthographic and phonological neighborhood sizes and orthographic and phonological Levenshtein distances. The study finds word length as a better predictor than word frequency for lexical decision and speeded pronunciation performance for skilled adult Malay speakers. Similar result was found in the study on Welsh (Ellis & Hooper, 2001) whereby reliance on serial, sub-lexical procedure is heavier than frequency-sensitive procedure in word recognition.

Recent studies have placed important values on the lexical properties, such as word length, frequency of occurrence, imageability) and how these affect word recognition (Adelman & Brown, 2008; Cortese & Fugett, 2004; Yap & Balota, 2009). Studies also show effects of syllabic complexity, grain size, lexicality, frequency and word length (Seymour et al., 2003; Ziegler & Goswami, 2005). Most studies on this linguistic aspect focused on the psycholinguistic variables on word recognition using lexical decision and speed pronunciation tasks. The predictors for reading errors include word frequency, orthographic neighbourhood size, lexical variables, length, imageability, and syllable number (Avdyli & Cuetos, 2012; Perry, Ziegler & Zorzi, 2012). As literacy acquisition is closely related to the orthography of the language, it is thus important to gain an understanding of the orthography and the lexical properties of words. Therefore, this paper intends to explore decoding and spelling acquisition of young literacy learners in Malay from the perspective of lexical and sub-lexical properties of Malay words to extend knowledge on the possible factors affecting the reading and spelling acquisition of young literacy learners in Malay.

2. Malay Language and Orthography

Malay, a major language of Austronesian family, is the national language of Malaysia, Indonesia, Brunei and an official language in Singapore. Malaysian or Standard Malay is the official language of Malaysia and the first language of more than half of its population.

Most Malay words are bi- or multi-syllabic (Nik Safiah, Farid, Hashim, & Abdul Hamid, 2004; Yap et al., 2010). There are very few mono-syllabic native Malay words (Lee, et al., 2012). Most of the mono-syllabic words are function words such as "*di*" (at), "*ke*" (to) "*dan*" (and) and "*yang*" (which) or loanwords such as "*kad*" (card) and "*beg*" (bag)". Lee et al. (2012) found that about 80% of words from Malaysian Year 1 and Year 2 textbooks are either bi- or tri-syllabic. In fact, as compared to other languages spoken in Malaysia such as English and Mandarin, Malay words have typically more syllable sounds per word. This is demonstrated in Table 1.

Comparatively, Malay has a lesser number of phonemes in its phonology repertoire for the spoken language (Awang, 2004; Lee, 2008). As compared to English which has about 24 consonant and 20 vowel phonemes, Malay has approximately 25 consonant phonemes (inclusive of /q/ but exclude /x/) and 9 vowel phonemes (inclusive of 3 diphthong /ai/, /au/, and /oi/) (Asmah, 1985; Yap, et al., 2010; Zaharani, 1993). In fact, the multi-syllabic nature in Malay is closely related to the small number of phonemes in a syllable (not more than three for most native words) which in turn leads to a small number of permissible grapheme representations in a syllable. Likewise, the small number of permissible phonemes in a syllable in Chinese is compensated by adding tones to the syllable (Frost, 2012).

Malay was first found to be written in Pallava and Sanskrit-based alphabet of Kawi. Jawi, an Arabic-based script introduced by Arabic traders, became popular after the 15th century. During the colonial period in 17th century, the romanised script using Latin alphabet was introduced. According to Asmah (1989), the first Malay spelling system, known as the Wilkinson System was introduced in 1904. Twenty years later, a reform devised by Za'aba, a well-known Malay grammarian, replaced the vowel grapheme <u> with <o> in final closed syllables when the final consonant is represented by <k>, <h>, <ng> or <r> (e.g. "*burung*" [bird] was spelt "*burong*"). It also replaced <i> with <e> in final syllables, where <k> or <h> is the final consonant (e.g. "*itik*" (duck) was spelt "*itek*"). In addition, the Za'aba system also introduced a new grapheme which was <ĕ> for the schwa (Asmah, 1989).

After undergoing a few more reformation in between 1924 and 1972, a common spelling system was adopted by Malaysia and Indonesia. This common spelling system is characterised by four main traits: practicality, simplicity, symmetricity and flexibility (Asmah, 1989). No more diacritics and apostrophes are used. Hyphens are also not used between the affix *di-* (e.g. “*dibuat*” [is made]) or the postpositional emphatic word “*lah”* or the clitic form “*nya”* and the root word, or between certain prepositions and the nouns that follow them. Asmah (1989) commented that the spelling reform gives a standard norm in spelling the language and with its practicality and flexibility, it has paved the way for tremendous growth and development of the language.

As can be observed from the orthographic evolution, Standard Malay has a transparent and consistent spelling system. Most of the words can be read and spelled correctly using grapheme-phoneme correspondence rules. Standard Malay has an alphabetic writing system with 33 graphemes, to represent the 25 consonant sounds (represented by single-letter grapheme e.g. <c> or bi-letter grapheme [digraph] e.g. <ny>), 6 vowel sounds (represented by 5 single-letter graphemes), and 3 diphthong sounds (represented by bi-letter graphemes) (Awang, 2004). Consonant clusters only occur in loanwords (e.g. “*proses*” or “*plastik*”). A study on word count analysis of Malay language textbooks in Year 1 and Year 2 shows that words with single-letter grapheme are most common in Malay (Lee, et al., 2012).

As discussed earlier, different alphabetic orthographies display different consistency and regularity in grapheme-phoneme correspondence which affects the literacy acquisition. Reading and spelling may have different needs in English due to inconsistencies or irregularities in mapping and the convention of distinct spellings for homophones (e.g. right, write) and homographs (e.g. wind, read). Therefore, in English, spelling words requires greater orthographic knowledge than reading them (Shankweiler & Lundquist, 1993). In fact, most of the alphabetic orthographies are more transparent in grapheme-to-phoneme than phoneme-to-grapheme direction (Vaessen & Blomert, 2013) which implies that it is easier to decode (read) than encode (spell) in these orthographies.

In contrast, Malay orthography has both ways of nearly one-to-one mapping of grapheme-phoneme correspondences with only a few exceptions (e.g. the overlap grapheme code of <e> to represent the /e/ and /ə/ phonemes, giving very few homographs such as ‘*perang*’ as in / peraŋ/ [blond] or /pəraŋ/ [war]). There is also variation of some consonant sounds (allophones), such as /b/, /p/, /d/, /t/, and /k/when they are placed in the ending position of syllables (e.g. “*kakak*” (sister) is read as /ka//ka$^{>}$/, “*berat*” (heavy) is read as berat /be//rat$^{>}$/). In addition, the use of letter combination (digraph) to represent phoneme sounds is also limited such as <ng>, <ny>, <sy>, <kh> and <gh> for consonant sounds and <ai>, <au> and <oi> for diphthong sounds. In sum, Malay is transparent in both the directions of sound-to-letter (spelling) and letter-to-sound (decoding) mapping. This may influence the inter-relationship or interplay between reading (decoding) and spelling (encoding) acquisition.

Although the grapheme-phoneme correspondences in Malay are almost perfect (Awang, 2004; Yap, et al., 2010), there are certain orthography rules. For example, only nine consonant sounds /m/ /n/ /ng/ /r/ /s/ /t/ /h/ /l/ /p/ in original Malay words occur in the initial and ending sounds of a syllable. Another five consonant sounds /b/ /d/ /g/ /c/ and /j/ appear in the initial sound of a syllable but do not occur in ending syllable sound of original Malay words. However they appear in loanwords such as ‘*beg*’ (bag), ‘*sabtu*’ (Saturday), ‘*Ahad*’ (Sunday), and ‘*kolej*’ (college). Besides, /ny/, /w/, and /y/ never occur at the end of a syllable.

In a multi-syllabic orthography, phonological rimes are not salient than the syllable units (Winskel & Widjaja, 2007). Similarly, the more distinctive features about Malay orthography are its syllable structures (Lee & Wheldall, 2010; Yap et al., 2010) and clear syllable boundaries (Winskel & Widjaja, 2007). Syllables are basically classified as open syllables and close syllables. Malay open syllable is made up of (1) V (vowel) and (2) C (consonant)+V syllable structures while close syllable is made up of 1) V+ C and 2) C+V+C structures. Within the four syllable structures, there are different types of phonological structure. This is demonstrated in Table 2 with examples of syllable structure and examples of words. CV and CVC phonic structures occur most commonly in early literacy vocabulary (Lee, Low & Mohamed, 2013). There are also other phonic structures found in loanwords such as CCV - “***pl**astik*” (plastic) and “***kr**ayon*” (crayon).

As the phoneme is represented by minimum one and maximum two letter-graphemes, the letter length per syllable is relatively short, with minimum one letter or maximum five letters (See Table 2). As compared to other alphabetic orthographies, such as Dutch (M=3.27), German (M=3.27), English (M=3.41) and French (M=3.45), Malay has the fewest number of letters per syllable (M=2.54) (Yap et al., 2010).

Malay words are basically formed with the combination of syllables with different phonic structures as shown in Table 2. Therefore, the complexity of the word will probably depend on the number of syllables in the word, the number of complex phonic structure in the word (reflected in the number of letters or bi-letter graphemes in a syllable) and the sequence of the syllables in a word. As demonstrated, it is apparent that there is a predictable fine-grained sound unit of grapheme-phoneme mapping and on top of that, the coarse-grained size of syllable sound unit is equally predictable and consistent in Malay.

Besides the unique multi-syllabic and syllable structures, Malay has transparent derivational morphemes. A Malay word can be divided into discrete morphemes with clearly defined boundaries (Knowles & Mohd Don, 2006). There are basically four types of derivational affixes: prefixes (e.g. "***ber…***" as in "***ber****topi*" or "wearing a hat" from the root word "*topi*" or "hat"), suffixes (e.g. "***…an***" as in "*makan****an***" or "food" from the root word "*makan*" or "eat"), infixes (e.g. "***…er…***" as in "*r****er****ambut*" or "capillary" from the root word "*rambut*" or "hair") and confixes or circumfixes (e.g. "***ke…an***" as in "***ke****sihat****an***" or "health" from the root word "*sihat*" or healthy). Reduplication is also common in Malay to mark plurals (e.g. "*buku-buku*" or "books"). This agglutinative feature adds to the word length and complexity of syllable segmentation in decoding and synthesis in encoding (Miles, 2000).

The conventional way of Malay early literacy instruction predominantly focus on teaching the coarse-grained syllable sounds more than fine-grained phoneme sounds. The common sequence of instruction starts by letter naming, then memorizing the syllable sounds by combining the letter names (e.g. following consonant sequence "A" /a/, "B"+"A" /ba/, "C"+"A" /ca/, etc. or vowel sequence "B"+"A" /ba/, "B"+"I" /bi/, "B"+"U" /bu/, etc), followed by combination of syllable sounds to make a word (e.g. "M"+"A" /ma/, "T"+"A" /ta/, /*mata*/ ["eye"]) (Lee & Wheldall, 2010; Ng & Yeo, 2012; Rickard Liow & Lee, 2004) .

3. Purpose

Although growing concern is apparent in the research of reading acquisition in elementary Malay school learners (Lee & Wheldall, 2009, 2010), these studies mainly focus on reading or decoding and remediation in elementary school. Spelling is not studied simultaneously although it has been shown in studies that learning to read words and to spell words are closely related (Ehri, 2000; Berniger, et al., 2002; Conrad 2008). In view of this, it is essential to explore how the children read and spell in a transparent and consistent orthography and how these skills are correlated.

Thus, present study sought to further this understanding by examining the literacy development of kindergarten children who are the native speakers of Malay language. This understanding about the decoding and spelling skills in the orthography will provide precise descriptions for models of literacy learning and instruction as well as to inform the design of an early literacy intervention programme for at risk literacy learners in kindergarten. The following research objectives guided the present study.

1. To identify the decoding and spelling mastery of the sampled 6 year-old kindergarten children at word and syllable levels.
2. To examine decoding and spelling mastery of words with different lexical properties among the sampled 6 year-old kindergarten children.
3. To examine decoding and spelling mastery of syllables with different sub-lexical properties among the sampled 6 years old kindergarten children.

4. Methodology

4.1 Participants

A total of 35 kindergarten children from a public funded kindergarten in an inner city of West Malaysia involved in this study (21 boys and 14 girls; mean age 5.5 years). All the children were native speakers of Malay and came from predominantly average or low socioeconomic family backgrounds. Parents' informed consent was obtained prior to the study.

4.2 Measures

The following measures were developed and piloted by the researcher with another group of 25 kindergarten children with similar background. Content validity has been established by an expert panel which comprises one senior early childhood lecturer, one Malay Language lecturer and three senior kindergarten teachers. Reliability was estimated by the internal consistency of items, using Cronbach's alpha coefficients.

4.2.1 Malay Early Literacy Decoding Test (MELDT)

The MELDT consists of two subtests. The first subtest is real word decoding test while the second subtest is syllable decoding test. The word decoding list consists of 12 mono, di- or tri-syllabic familiar Malay words with different combination of syllable structures, chosen to give representation to the major spelling patterns of Malay (Lee, et al., 2012; Yap et al., 2010). The words are high frequency words which are in the children's listening vocabulary. All the words are non-inflected root-words as an earlier empirical study shows nearly half the amount of single lexical unit in Year 1 and Year 2 Malay textbooks are not inflected (Lee, et al., 2012). The syllable decoding list resembles the mono-syllabic non-word list which comprises 15 syllables of different complexity. The use of syllable list instead of non-word list is due to firstly the nature of Malay orthography which is generally decodable, be it real words or non-words; and secondly is the intention of the test to explore the children's mastery of syllable structure, a sub-lexical representation which is consistent and predictable in Malay orthography. Reliability of the decoding tasks is evident from the alpha Cronbach's coefficients (.899 and .879 respectively).

4.2.2 Malay Early Literacy Spelling Test (MELST)

The MELST also consists of two subtests. The first subtest is real word spelling test while the second subtest is syllable spelling test. The word spelling test consists of 12 mono-, di- and tri-syllabic familiar Malay words with different combination of syllable structures. The word choice for spelling task was parallel in terms of lexical properties and familiarity with the word decoding word list. The words were matched according to word length, syllable length and phoneme length.

The syllable spelling test consists of 15 syllables with different syllable structures of different complexities. The spelling list was deliberately matched to the decoding list according to word length, frequency and syllable structure. Reliability of the spelling tasks are also evident from the Cronbach's alpha coefficients of .893 and .867 respectively.

4.3Procedures

Both the decoding and spelling tests were administered individually to the child by the first author. For the decoding task, children were given list of words in Century Gothic Font 20 on A4 size paper. The participant was instructed to decode the word in the list as fast as possible from top to bottom. The same procedures were followed for the syllable decoding task. As for the spelling task, each participant was given a pencil and a student record sheet that was numbered and lined on A4 size paper. The first author dictated the word twice and the participant was asked to write down the answer. The same procedures were followed for the syllable spelling task. The test was administered individually at a quiet corner in the kindergarten. The responses were recorded as correct (accurate response), wrong (attempted with errors) and refusal (not attempted).

5. Results

5.1 Decoding and Spelling Performance of Sampled Children

The overall performance of children for decoding and spelling tests showed that there was heterogeneity of the sampled children. While there were 14.29% who scored 80 and above marks in real word decoding task, there were also 34.29% of the children who scored lower than 20 marks. Data captured for syllable decoding task showed a more normally distributed data with 31.43% children scoring between 40 to 59 marks. The performance for word spelling and syllable spelling results however showed positively skewed distribution. This showed that except for syllable decoding, the other three measures were relatively difficult for most of the students in the class. In fact this is reflected in the response rate of the participants in these measures. A comparison of scores in decoding tasks with spelling tasks reveals that the sampled children did better in decoding than spelling at both the word level and syllable level. 40% of the children scored 40 marks and above in word reading task but only 20% of the children score 40 marks and above in word spelling task. Similarly, while 51.43% of the children scored 40 marks and above in syllable decoding task, there were only 17.14% of the children scoring 40 marks and above in syllable spelling task (see **Figure 1**).

5.2 Word Decoding Mastery

From Table 3, it is clear that the word structure of open syllables V+CV gained the highest percentage of correct response (80.00%), followed by CV+CV (54.29% and 51.43% respectively). The next easiest structure is the mono-syllabic word with close syllable CVC (48.57%). Interestingly, other structures were mixed. For example, CV+CVC for "*panas*" (hot) was sequenced 6^{th} place while "*kotak*" gained lower position, in the list. This suggests that factors other than word structure, syllable number and phoneme number also impacted the word decoding mastery. A possible explanation may be the allophone of /$k^{>}$/ in the word "*kotak*". This will be examined more closely in syllable decoding test. Notably, the overall percentage of refusal was high (39.29%), especially for tri-syllabic words (68.57% and 62.86% respectively). This reveals that these children had not gained understanding of grapheme-phoneme knowledge even after five months in kindergarten.

Interestingly, the percentage of total wrong response (23.57%) was lower than the percentage of total correct response (37.14%) and percentage of total refusal (39.29%). This suggests that the children who attempted the items had a higher chance of getting the correct response. In other words, as long as children gained some understanding of the GPC, the chances of them getting the items right were relatively high. In addition, it is also interesting to note that items with higher percentage of wrong response were items with CVC syllable structures (e.g. "*jam*" [37.14%], "*panas*" [34.29%] and "*lampu*" [31.43%]. This also shows the progressive development of gaining some but inadequate knowledge of the GPC and syllable segmentation.

Correlation analysis using Spearman's rho was run to see the correlation between percentages of responses and syllable length, phoneme length and word length (see Table 7). Percentage of correct response shows significant negative correlation with phoneme length (ρ =-.851; $p<.01$) and word length (ρ=-.825, $p<.01$) but not syllable length in a word. This shows that syllable structure impacted the decoding more than the number of syllables in a word. It somehow reflects more deficiency in relating the phoneme sound with the grapheme representation (especially in close syllables) than syllable segmentation skills. Scrutinizing the percentage of refusal response found significant correlations with word length (ρ =-.925, $p<.01$), phoneme length (ρ =.923, $P<.01$) and syllable length (ρ =.664, p<.05). This indicates that children refused to attempt words which had more syllables, more letters and more phonemes. This refusal rate was relatively high as compared to other transparent orthography, e.g. German, with slightly older children (Wimmer & Hummer, 1990). This may also reflect the lack of segmentation skill or a general psychological obstacle among children to decode longer words.

5.3 Word Spelling Mastery

Apparently more than half of the children (58.00% of refusal) were not able to do the word spelling task (see Table 4). Similar pattern with word decoding was identified in the percentage of response: the refusal percentage being the highest followed by correct response percentage (24.86%) and wrong response percentage (17.14%). In addition, there were similar patterns in the correct response percentage based on the lexical properties with exception for the CVC mono-syllabic word structure ("*bas*", 45.71% correct response) being the easiest item to encode. This may due to the high frequency of the print in the environment (printed on school buses). Nevertheless, items with similar lexical properties also show different mastery level in the hierarchy. For example the CV+CVC word structure showed different position in the items difficulty hierarchy: "*makan*" (eat) being the highest followed by "*datuk*" (grandfather) and "*burung*" (bird). Again, this may due to the allophones of /k$^{>}$/ or confusion of /u/ and /o/ sound. Similarly, the word with the bi-letter grapheme "*burung*" (bird) (compatible with "*tolong*" [help] in the decoding list) was also lowest in the CV+CVC word structure.

Similar significant correlation patterns were found in word spelling between percentage of correct response and lexical variables: word length (ρ =-.842, p<.01) and phoneme length (ρ =-.800, p<.01). These similar response patterns with word decoding reflect the consistent GPC in both directions. The same correlation pattern applied to percentage of refusal (see Table 7). This indicates that children refused to attempt to spell words with more letters and more phonemes, as well as more syllables.

5.4 Syllable Decoding Mastery

As shown in Table 5, syllable decoding task had a lower percentage of refusal (35.43% as compared to word decoding task, 45.71%). This implies that syllable decoding task was more manageable for the participants. As anticipated, open syllable structures (CV) with single letter grapheme (e.g. <*so*>, <cu>, <*gi*>, <*ke*> and <*ha*> received most percentage of correct (ranged from 65.71% to 74.29%) and lowest percentage of refusal. Interesting results shown in the mastery of CVC structure may explain the difference in the word decoding for the same combination of syllable structure. The results showed differentiation in mastery of items with single grapheme CVC structure. For example < *ber*> (37.14%) showed higher correct percentage than <*tal*> (31.43%) compared to <*duk*> (25.71%) and <*jip*> (20.00%). <*duk*> and <*jip*> have allophones of /k$^{>}$/ and /p$^{>}$/ as ending consonant sounds. Similarly, in word decoding task, <*kotak*> with /k$^{>}$/ allophone also scored lower correct response percentage than <*panas*>. This demonstrates that CVC structures which end with allophones /k$^{>}$/ and /p$^{>}$/ are more difficult to decode. It is however not surprising to observe that syllable structures with bi-letter graphemes to represent digraphs (<*ng*i>, <*nyu*> and <*nang*> or diphthong <*sau*>) were the most difficult to decode.

Spearman analysis of correlations shows that number of bi-letter graphemes (ρ =-.774, p<.01) and number of letters (ρ =-.745, p<.01) in the syllable were significantly correlated in negative direction with percentage of correct response but no significant correlation was found with number of phoneme (see Table 7). In other words, syllables with more letters or more bi-letter graphemes were more difficult to decode. This shows lack of phonemic awareness and knowledge of the phoneme sounds which are represented by bi-letter graphemes. It is also interesting to note that the percentage of refusal was also significantly correlated with number of letters (ρ =.783, p<.01) and number of bi-letter graphemes (ρ =.629, p<.05) but not the number of phoneme.

5.5 Syllable Spelling Mastery

It was clear that the participants were less competent in syllable spelling (23.24%) as compared to syllable decoding (38.29%) (see Table 6). Similarly, open syllables with single-letter grapheme topped the list for the percentage of correct response and percentage of least refusal to respond. Likewise, spelling mastery for CVC structures varied in the item difficulty hierarchy in the same observed manner as discussed above. Unexpectedly, <gak> was the most wrongly answered item (57.14%). Perhaps, it was difficult to "hear" and cipher the /k$^{>}$/ allophone which is very similar to the /ga/ sound. This was also observed in another CVC structure <kup> with allophone /p$^{>}$/.

Spearman's correlation analysis (Table 7) showed that percentage of correct response was significantly but negatively correlated with number of letters (ρ =-.638, p<.05) and number of bi-letter grapheme (ρ =-.529, p<.05) in the syllable. In addition, it was also observed that percentage of wrong response correlated significantly with the number of phoneme in a syllable (ρ =-.527, p<.05). This suggests that more number of phonemes invited more chances of wrong responses in spelling. This was reflected in the wrong attempts in CVC structures, indicating incomplete representation of graphemes to phoneme sounds. On the other hand, the percentage of refusal response showed significant correlation with number of letters (ρ =-.691, p<.01) but not number of phonemes and bi-letter graphemes. This is also interesting, as it shows that children refused to spell words with more letters but not words with more phonemes and bi-letter graphemes although the accuracy rate was low for these items. This may indicate that there was deficiency in phonological awareness to discriminate sounds and retrieve corresponding graphemes from the orthography lexicons.

6. Discussion & Implication

The findings show that at this developmental age, Malay kindergarten children have gained some understanding of phonological and orthographic knowledge of the language. This can be demonstrated in both decoding and spelling tasks at word and syllable levels. Nevertheless, this study finds signs of gap in the development among the children with same linguistic background, learning in the same setting and using the same consistent orthography. The first grade Malay children in Lee and Wheldall's (2009) study demonstrate similar kinds of difficulties in processing words with more complicated structures. This proves the needs for intervention or extra scaffolding and support for the slow progress literacy learners before they enroll into formal school setting in the following academic year. Intervention is essential as research shows that "*if slow reading acquisition is allowed to continue, the more generalized the deficits will become, seeping into more and more areas of cognition and behavior*" (Stanovich, 1986, p.390).

The scrutiny of children's mastery of decoding and spelling skills has been done by analyzing the percentage of responses towards items with different lexical and sub-lexical qualities at real word and syllable levels. The frequency of occurrence or the familiarity of the items has been controlled by selecting familiar words within the early reading materials and the children's oral language repertoire. The correlations between lexical qualities (in terms of word length, syllable length and phoneme length in each word) and children's types of responses in word decoding and spelling as well as between sub-lexical quality (in terms of number of phoneme, number of letter, and number of bi-letter grapheme in each syllable) were analysed respectively.

A summary of the results for word and syllable decoding and spelling is presented in Table 7. The findings indicated that at word level, syllable length or number of syllables in a word had no significant correlation with the percentage of correct or wrong response. However it correlated positively with percentage of refusals in both decoding and spelling tasks. This shows that the sampled children might be intimidated by the longer syllable sounds and syllable blending in a word and subsequently refused to answer in the reading or spelling tasks.

However, it is not surprising to find that the phoneme length or number of phonemes in a word correlated significantly with the percentage of correct and refusal responses. This may due to more opportunities of inaccuracy with the increase number of phonemes to decode and encode. It may also due to the cognitive load of remembering and blending of more sounds to form words. This unique feature poses a hurdle to children with poor phonological memory, especially when they are taught using the conventional sounding out the letter name to form syllable sound before combining the sounds to make words. This type of approach involves the manipulation of two types of grain-sizes at the word level which inevitably burdens the cognitive load (Lee, et al., 2013).

Similar results were found on the significant correlation of letter length with the percentage of correct and refusal responses. This finding corroborates with the results of Yap et al.'s (2010) study whereby word length was found to be "*a marker of serial sub-lexical processing*" (p.1001), predicting both lexical decision and speeded pronunciation performance in Malay. Other possible reasons are children's incompetency of segmentation and blending skills with longer words.

It is interesting to note that, at syllable level, the number of phonemes was not significantly correlated with any types of responses in decoding and spelling skills except for the percentage of wrong response in syllable spelling. This may due to unequal mapping of phonemes to graphemes (e.g. digraphs and diphthongs items). This implies that phoneme quality more than phoneme number which will have effect on decoding and spelling accuracy. This results show extra difficulties in phonemes with allophones and phonemes which are represented by bi-letter graphemes.

In addition, the result also indicates that syllables with digraphs and diphthongs had the same impact in both decoding and spelling tasks. This is evident in the negative correlations between percentage of correct and number of bi-letter graphemes in both the tasks. This implies that it is both difficult for the children to decipher the bi-letter graphemes to represent a single phoneme in digraphs and diphthongs (e.g. <ng> and <ai>) as well as to cipher the single phoneme digraphs and diphthongs using bi-letter graphemes. This suggests that diphthongs and digraphs need to be taught explicitly using alternative effective strategies. For example, in teaching the <ng> grapheme, teacher can tell a story about two good friends, <n> and <g>. When they meet, they will stick together; when they cry they will make the same sound /ŋ//ŋ/ /ŋ/ (associating the /ŋ/ sound with the crying sound as in "*menangis*"). Nevertheless, the frequency of occurrence for digraphs and diphthongs is low relatively in early reading texts, except for /ng/ and /ny/ (Lee, et al., 2013). Therefore, they could be placed in the later part of learning module.

The negative correlation between number of letters and percentage of correct response and also the positive correlation with the percentage of refusal response are, however, not surprising. This implies that the more letters in the syllable, the less accurate responses were found in both decoding and spelling tasks. This is also apparent in the higher accuracy rate in the CV syllable structures.

In sum, the sampled children's mastery of decoding and spelling tasks in Malay orthography reflects the instruction which focuses more on decoding task than encoding task. In other words, the instruction did not take advantage of the consistent both-ways mapping of phonological-orthography to complement the interplay between reading and spelling acquisition skills. This implies that instruction and intervention of reading and spelling skills at both grain-sizes (phoneme and syllable) could be done concurrently (not subsequently as it is done in current practice) as these two skills share the same orthography and phonological lexicons and thus complement each other's learning.

As basic Malay root words without the inflection forms of affixation do not contain semantic information, the lexical representation contains only phonetic information. These are "low quality" words according to lexical quality hypothesis (Perfetti, 2007). Nevertheless, the lexical representation of these words has a fully specified orthographic representation and redundant phonological representations (Perfetti, 2007). As demonstrated in the sub-lexical representation of Malay syllables, it is clear that the orthographic representation of the syllable structures is highly coherent and redundant. These qualities enable reliable retrieval of syllables from mental sub-lexicon. Therefore, we argue that for Malay orthography with multisyllabic words and simple syllable structures, early literacy intervention could be focused on the limited sub-lexical representation at syllable levels to reduce cognitive load of remembering the sounds in short-term memory before production.

Nevertheless, the learning at the phonemic and syllable level could be more meaningful, efficient and fun if we include the phonological awareness and GPC training in context. In other words, instead of rote memory of the abstract syllable sounds which are abundant to remember and as such poses as a formidable task for at risk kindergarten learners, we suggest employing fun association of phoneme-grapheme mapping to acquire sight syllable recognition using animated songs and stories. This will provide learners with alphabetic knowledge as well as enhance perceptual skills in listening (audio) and reading (visual) skills. In addition, the design of literacy intervention content will be integrated in a meaningful context to rope in the semantic and pragmatic aspects of linguistic components.

7. Limitation & Recommendation

The study used syllable decoding and spelling tasks instead of non-word tasks to focus on the sub-lexical property of Malay word, which is a complete sound unit on its own. However, this limits the understanding of syllable segmentation process. Therefore, the tasks were not meant to compare with real word decoding and spelling tasks. Nevertheless, future studies can explore the difference between real word and non-word decoding and spelling using real word and non-word items with similar lexical properties. Future studies can also take into consideration the response time in decoding and encoding to capture the data for fluent, automatic decoding instead of just focusing on visual and lexical characteristics.

8. Conclusion

As part of an ongoing project on early literacy intervention in kindergarten, this study aimed to explore kindergarten children's decoding and spelling mastery in Malay, a transparent and consistent orthography. This paper discussed the quantitative aspect of literacy mastery in the lens of lexical and sub-lexical qualities using percentages of correct, erroneous and refusal responses. The intention was to gain an insight into the difficulty level of different word and syllable structures. If the hypothesis that "*individuals will learn to read and spell accurately faster when a shallow orthography is involved*" (Geva, Wade-Wooley & Shany, 1993, pp. 384) is held true, then there should be a faster rate in literacy acquisition of a less complex orthography like Malay provided if the identified difficulties were duly given focus with effective intervention. In sum, the study gives valuable input on lexical variables which will provide informed decision of the content choice and sequence for the design and development of an early literacy intervention project for kindergarten children at risk for literacy difficulties.

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Table 1: Comparison of Syllable Sound Number in Malay, English and Mandarin Words

	Malay	#Syllable Sound	English	#Syllable Sound	Mandarin	# Syllable Sound
1	Satu	2	One	1	一	1
2	Dua	2	Two	1	二	1
3	Tiga	2	Three	1	三	1
4	Empat	2	Four	1	四	1
5	Lima	2	Five	1	五	1
6	Enam	2	Six	1	六	1
7	Tujuh	2	Seven	2	七	1
8	Lapan	2	Eight	1	八	1
9	Sembilan	3	Nine	1	九	1

Table 2: Common Types of Syllable, Syllable Structure and Phonic Structure in Malay Orthography

Open Syllable	Phonic Structure	Example of syllable	Example of word	Close Syllable	Phonic Structure	Example of syllable	Example of word
1. V	1.V	***i***	***i***bu (mother)	3. VC	1.VC	***am***	***Am***bil (take)
2. CV	2.CV	***ba***	***ba***pa (father)		2.VCC	***ang***	***ang***sa (goose)
	3.CCV	***nya***	***nya***nyi (sing)	4. CVC	3.CVC	***kan***	i***kan*** (fish)
	4.CVV	***lau***	pu***lau*** (island)		4.CCVC	***ngan***	ta***ngan*** (hand)
	5.CCVV	***ngai***	su***ngai*** (river)		5.CVCC	***bang***	a***bang*** (elder brother)
					6.CCVCC	***nyang***	ke***nyang*** (full)

*V= vowel; C = consonant; CC = Digraph; and VV=Diphthong

Table 3: Word Decoding Responses Based on Lexical Properties

	Word Structure	Syllable Number	Phoneme Number	Items	% Correct	% Wrong	% Refusal
1	V+CV	2	3	*ibu (*mother)	80.00	8.57	11.43
2	CV+CV	2	4	*cuci* (wash)	54.29	28.57	17.14
3	CV+CV	2	4	*mari* (come)	51.43	25.71	22.86
4	CVC	1	3	*jam* (clock)	48.57	37.14	14.29
5	CV+CVC	2	5	*panas* (hot)	40.00	34.29	25.71
6	CVC+CV	2	5	*lampu* (light)	34.29	31.43	34.29
7	CV+CVC	2	5	*kotak* (box)	31.43	17.14	51.43
8	V+CVC	2	4	*enam* (six)	28.57	25.71	45.71
9	CV+CVCC	2	5	*tolong* (help)	22.86	25.71	51.43
10	CV+CV+CV	3	6	*kereta* (car)	22.86	14.29	62.86
11	CVC+CVC	2	6	*nampak* (see)	20.00	14.29	65.71
12	CVC+CV+CVC	3	8	*jambatan* (bridge)	11.43	20.00	68.57
			Total		37.14	23.57	39.29

Table 4: Word Spelling Responses Based On Lexical Properties

	Word Structure	Syllable Number	Phoneme Number	Items	% Correct	% Wrong	% Refusal
1	CVC	1	3	*bas* (bus)	45.71	17.14	37.14
2	V+CV	2	3	*ini* (this)	34.29	34.29	31.43
3	CV+CV	2	4	*lima* (five)	34.29	31.43	34.29
4	CV+CV	2	4	*suka* (like)	31.43	31.43	37.14
5	CV+CVC	2	5	*makan* (eat)	25.71	28.57	45.71
6	V+CVC	2	4	*atas* (on top of)	22.86	31.43	45.71
7	CV+CV+CV	3	6	*kerusi* (chair)	11.43	25.71	62.86
8	CV+CVC	2	5	*datuk* (grandfather)	8.57	48.57	42.86
9	CVC+CV	2	5	*jumpa* (meet)	8.57	37.14	54.29
10	CV+CVCC	2	5	*burung* (bird)	8.57	34.29	57.14
11	CVC+CVC	2	5	*lompat* (jump)	8.57	28.57	62.86
12	CVC+CV+CVC	3	8	*hadapan* (in front)	8.57	22.86	68.57
Total					24.86	17.14	58.00

Table 5: Syllable Decoding Mastery Based on Phonic Structure

	Syllable Structure	Number of Phonemes	Number of Letters	Number of bi-letter graphemes	Decoding Items	% Correct	% Wrong	% Refusal
1	CV	2	2	0	*so*	74.29	11.43	14.29
2	CV	2	2	0	*cu*	74.29	14.29	11.43
3	CV	2	2	0	*gi*	74.29	17.14	8.57
4	CV	2	2	0	*ke*	71.43	11.43	17.14
5	CV	2	2	0	*ha*	65.71	20.00	14.29
6	CVC	3	3	0	*ber*	37.14	20.00	42.86
7	CVC	3	3	0	*tal*	31.43	31.43	37.14
8	VC	2	2	0	*om*	25.71	48.57	25.71
9	VC	2	2	0	*is*	25.71	45.71	28.57
10	CVC	3	3	0	*duk*	25.71	28.57	45.71
11	CVC	3	3	0	*jip*	20.00	31.43	48.57
12	CCV	2	3	1	*ngi*	14.29	22.86	62.86
13	CVV	2	3	1	*sau*	14.29	11.43	74.29
14	CVCC	3	4	1	*nang*	11.43	57.14	31.43
15	CCV	2	3	1	*nyu*	8.57	22.86	68.57
			Total			38.29	26.29	35.43

Table 6: Syllable Spelling Response Based on Phonic Structure

	Syllable Structure	Number of Phonemes	Number of Letters	Number of bi-letter graphemes	Decoding Items	% Correct	% Wrong	% Refusal
1	CV	2	2	0	ma	65.71	11.43	22.86
2	CV	2	2	0	ke	60.00	14.29	25.71
3	CV	2	2	0	to	57.14	20.00	22.86
4	CV	2	2	0	lu	54.29	22.86	22.86
5	CV	2	2	0	ri	31.43	34.29	34.29
6	VC	2	2	0	am	14.29	51.43	34.29
7	CVC	3	3	0	nas	11.43	51.43	37.14
8	CVC	3	3	0	jar	11.43	48.57	40.00
9	CCV	2	3	1	nyi	8.57	40.00	37.14
10	VC	3	3	0	un	8.57	37.14	54.29
11	CVCC	3	4	1	tang	5.71	57.14	37.14
12	CVC	3	3	0	kup	5.71	51.43	42.86
13	CCV	2	3	1	nga	5.71	37.14	57.14
14	CVV	2	3	1	lau	5.71	20.00	74.29
15	CVC	2	2	0	gak	2.86	57.14	40.00
			Total			23.24	40.95	35.81

Table 7: Comparison of Correlations between Lexical and Sub-lexical Properties and Types of Responses in Word and Syllable Decoding and Spelling Tasks

	% of Correct		% of Wrong		% of Refusal	
	Decoding	Spelling	Decoding	Spelling	Decoding	Spelling
Lexical Properties						
Syllable Length	-.546	-.473	-.536	-.154	.664*	.622*
Phoneme Length	-.851**	-.800**	-.312	-.135	.923**	.878**
Word Length	-.825**	-.842**	-.357	-.150	.925**	.923**
Sub-lexical Properties						
Number of phonemes	-.231	-.314	.478	.527*	.328	.380
Number of letters	-.745**	-.638*	.380	.442	.783**	.691**
Number of bi-letter graphemes	-.774**	-.529*	.070	.088	.629*	.458

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

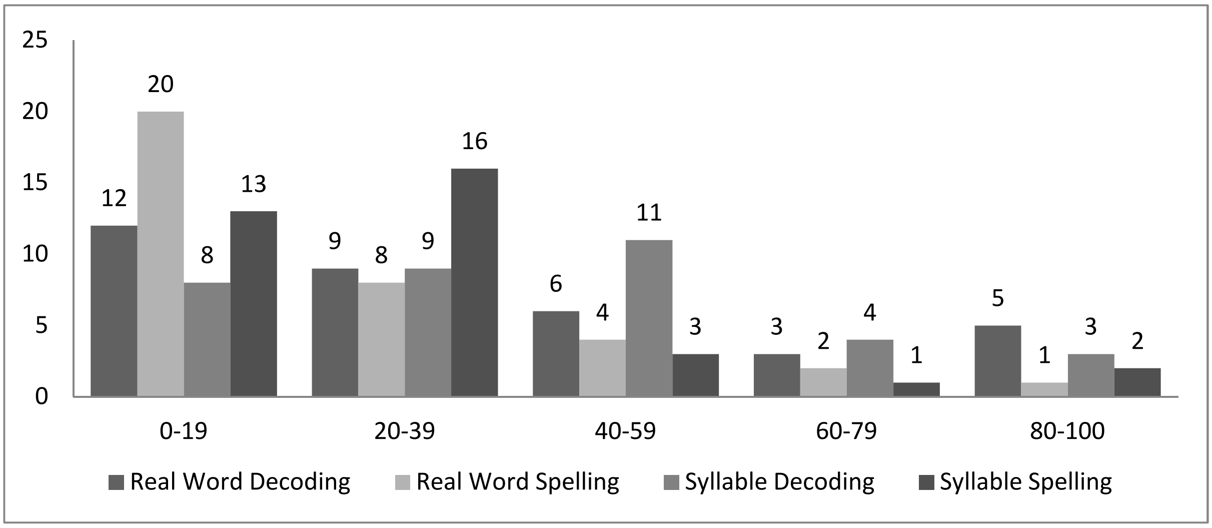

Figure 1: Summary of Scores in Decoding and Spelling Tests