



Influence of Phonological Awareness, Morphological Awareness and Non-verbal ability on Reading Comprehension in Malayalam

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Abstract

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In the context of observations that students lack mastery of elementary reading comprehension in Malayalam even by the end of 5-7 years of formal schooling, this study applies multiple regression analysis for reading comprehension. Longitudinal survey data from a representative sample of 159 lower primary students from grade 2 to 4 revealed Reading Comprehension as significantly and positively related to Morphological Awareness, Phonological awareness and Ravens non-verbal ability. The three predictors account for near 1/3 of the variation in reading comprehension in Malayalam of elementary school learners. Findings suggest enhancing phonological and morphological awareness in order to develop reading comprehension.

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Understanding meaning from the written text is crucial to effective reading. Meaningful reading is inevitable in education, and is indispensable for student and adult lives. Reading comprehension, a core component of language skills, is however an advanced and complicated skill. Comprehension allows the reader to interact with the text in a meaningful way. It is the bridge from passive reading to active reading i.e., from letters and words to characters and contexts. For younger children, reading comprehension is the foundation to future academic learning of all subjects. Reading with comprehension has its constructive effects on other aspects of language learning too. Enhanced vocabulary from meaningful reading makes children confident in speaking and writing. It helps learners in being proficient in making predictions, sequencing stories and in clarifying complex texts. Meaningful reading help learners to connect text with life experiences and prior knowledge, making them even better learners. Difficulties in reading with comprehension do significantly affect spoken language skills, causing difficulties in literacy, with associated spoken language deficits (Mayers & Bottin, 2008).

Reading comprehension, like any other complex skill, is developed gradually in phases. These phases are associated with the elements of language. The building blocks - phonemes, morphemes, syntax and semantics- together form specific characteristics of a language. Development of reading skill is from poorly interconnected to highly interconnected lexical components (Ehri, 1980; Perfetti, 1992).

During learning to read, children first acquire elementary decoding skills, and then gradually apply these skills with greater accuracy and speed, leading to an increasingly automated process that recognizes multi-letter units (consonant clusters, syllables, and morphemes) and whole words (Ehri, 2005). Pre-lexical role of phonology (Frost, 1998; Van Orden, Pennington, & Stone, 1990) and the automatic activation of phonological representation at the moment of lexical access (Perfetti, Zhang, & Berent, 1992) are established in the cognitive science of reading. There is now considerable evidence that phonological as well as graphemic units are activated in the reading of alphabetic systems (Ferrand & Grainger, 1992; Grainger & Ferrand, 1994). Morphological decomposition in reading complex words is a sign of learned sensitivity to the systematic relationships among the surface forms of words and their



meanings. Thus, phonological awareness and morphological awareness are likely to join in influencing the level of language abilities including complex ones like reading comprehension.

Need of the study

A sizeable proportion of students have a low level reading comprehension. Based on the observation that nearly half the pupils in upper primary school have difficulty in interpolating or extrapolating a simple passage, a study from Kerala (Gafoor & Kaleeludeen, 2008) has concluded that students at this stage of schooling lack mastery of elementary reading comprehension in Malayalam. A more detailed analysis (Gafoor, 2011) revealed that the elementary reading comprehension is not up to the level expected of Grade 3 students among around half the students in Grade 5, though it slightly improves in the next two grades. Comparing this observation with previous ones, the study revealed that comprehension and deriving conclusions, which are especially being focused in the present primary school curriculum with its leanings towards constructivist, critical pedagogy and issue-based approaches, have not enhanced after the educational reforms in Kerala during the first decade of 21st century. Hence, further progress in elementary education, among other things, calls for greater reliance on scientific evidence to guide educational policies for assessment and instruction on factors that contribute to early reading development.

Four focal variables involved in reading development are phonological awareness, naming speed, orthographic knowledge, and morphological awareness (Roman, Kirby, Parrila, Wade-Woolley, & Deacon, 2009). Morphological awareness between grade 3 and 5 affected reading comprehension (Kirby, Geier, & Deacon, 2009) and hence is associated with reading abilities in later elementary school. A quick review of literature demonstrated that studies on morphological and phonological awareness and their impact on language outcomes in preprimary and elementary grades are numerous in languages like English (Griva & Anastasiou, 2009), Chinese (Perfetti, et al. 1992), Arabic (Abu-Rabia & Abu-Rahmoun, 2012), and the same is not rare in French (Deacon & Wade-Wolley, 2005), Spanish (Dickinson, McCabe, Clark-Chiarelli, & Wolf, 2004), Korean, Iranian (Ghaemi, 2009), Finnish (Puolakanaho, 2007) and Japanese. However, studies on these variables in Indian languages, including Malayalam was hard to find.

Relevance of phonological and morphological awareness and non-verbal ability for reading

Phoneme is the smallest distinctive unit of sound system of a language. Phonology, the study of sound system of languages, is concerned with how sounds function in relation to each other in a language. Each language has its own phonological system. For instance, English Received Pronunciation has 44 distinctive sounds while standard Malayalam has a system of 52 (Syamala, 1996). Phonological awareness refers to the awareness of phonological structure or sound structure of spoken words in a given language.

In order to read the words in print, children must understand that speech is comprised of sound segments at the level of phonemes (Blachman, 1994; Liberman, Shankweiler, & Liberman, 1989; Yopp & Yopp, 2000). Studies demonstrate strong and specific relationship between phonological awareness and early acquisition of reading (Adams, 1990; Bradley & Bryant, 1983; Bryant, MacLean & Bradley, 1990; Goswami & Bryant, 1990; Stanovich, 1992; Wagner & Torgesen, 1987). Phonological awareness promotes children's understanding of the relationship between speech and alphabetic orthography.

Children who have better abilities in analyzing and manipulating rhymes, syllables, and phonemes are better at learning to read than children who have difficulties in acquiring these skills. The relationship between phonological awareness and early reading acquisition is present even after such factors as intelligence, vocabulary skills, and listening comprehension are partialled out (Bryant, MacLean, Bradley & Crossland, 1990; Stanovich, 1992; Wagner & Torgesen, 1987). Phonological awareness has a unique relation with word reading (Lonigan, Anthony, Philips, Purpura, Wilson, & McQueen, 2009). Further, phonological awareness enables children to produce possible words in context from the partially sounded out words by

elaborating similar phonemes in words. Indeed, children who are quick to develop the ability to analyze and to construct a connection between sound segments and letters almost invariably become better readers than children who have difficulties in developing these early skills (Share & Stanovich, 1995). A substantial positive correlation was found between the early phonological awareness and reading acquisition in kindergarten children in Hebrew. Phonological awareness had significant association with hearing children (Kyle & Harris 2006). Recent researches evidence not only that reading skills and phonological awareness are associated (Gray & McCutchen, 2006) but also that difficulties in phonological processing directly disturb the semantic process involved in comprehension. For instance, children with literacy disabilities presented deficits in phonological processing and language (Barbosa, Miranda, Santos, & Bueno, 2009).

Morphemes are the minimum meaningful units of a language. Study of structure of words, of how morphemes are put together or organized to form words, is called morphology or morphemics. Identification, analysis and description of the structure of morphemes are the tasks of morphology. Morphological awareness, a higher order cognitive ability, involves being conscious of and the ability to manipulate the morphological units. It involves the ability to identify root words and their inflected or derived forms. It is the ability to segment words into meaningful units and to manipulate morphemes to create new meanings, that is, to understand the structure of a word, its meaning, and the different combinations of its morphemes. Thus, morphological awareness refers to a conscious awareness of word structure and semantic-functional meanings while taking into consideration the root, structure, base form, and suffixes representing inflectional and derivational processes (Kieffer & Lesaux, 2008).

Stothard, Snowling, Bishop, Chipchase, and Kaplan (1998) provided further evidence linking spoken language issues with reading outcome. In a follow-up study of adolescents who were identified with specific language impairment (SLI) in preschool, Stothard and colleagues discovered that, when tested at age 15, those participants who had early diagnosis of SLI presented with later difficulties in word reading accuracy, reading comprehension and spelling. Moreover, intervention studies revealed that morphological awareness training has a positive effect on language processing in speech and reading (Elbro & Arnbak, 1996), including non-specific beneficial effects on word reading (Ghaemi, 2009).

It is clear that morphology plays a role in reading acquisition. Morphological awareness is in fact related to children's reading comprehension (Carlisle, 1995; 2000; Singson, Mahony & Mann, 2000; Kuo & Anderson, 2006; Nagy et al., 2006), especially in elementary grades (Carlisle & Fleming, 2003). Young readers are sensitive to the morphemic structure of written words (Casalis, Dusautoir, & Cole, 2009). And, normal readers' morphological awareness is crucial in predicting reading their comprehension (Siegel, 2008); and morphological awareness actually contributes to reading comprehension (Casalis & Louis-Alexandre, 2000; Kuo & Anderson, 2006; Nagy et al., 2006). This contribution increases with age as children are exposed to increasingly higher-level texts comprising unfamiliar everyday words (Kuo & Anderson, 2006). The importance of morphological knowledge for reading increases over the school years, side by side with children's growth in literate lexicon (Carlisle, 2000; Shankweiler et al., 1995; Singson et al., 2000). Indeed, morphological awareness in kindergarten was found to predict reading comprehension in the first three years of elementary school (Carlisle, 1995; Casalis & Louis-Alexandre, 2000). Morphological awareness contributed significantly to the explained variance in reading comprehension in both English and Chinese for second, fourth, and sixth graders (Kuo & Anderson, 2006). The contribution of morphological awareness to reading comprehension was higher for fifth graders than for third graders (Singson, Mahony, & Mann, 2000). Reading comprehension may be a matter of general language understanding and not a unique feature of reading (Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg, 2001). However, this applies more for adult and more fluent readers, than for those who learn to read.

While there can be relation between phonological and morphological awareness among learners, studies demonstrated that morphological awareness contributes to reading comprehension independently of phonological abilities (Deacon & Kirby, 2004; Nagy et al., 2006; Singson et al., 2000) and even beyond the contribution of phonological awareness (Casalis & Louis-Alexandre, 2000; Deacon & Kirby, 2004; Singson et al., 2000). Morphological awareness in normally reading fourth through ninth graders contributed a unique explanation of the variance in reading comprehension, beyond phonological abilities (Nagy et al., 2006).

Morphological awareness develops throughout children's time in school (Nagy, Diakidoy, & Anderson, 1993). Children at the age of three could create compound words to indicate meaning (Clark, 1995). Preschool children were able to begin to identify morphemes, including both inflections and derivations (Carlisle, 2003). In addition, third graders' knowledge of derived words increases sharply (Anglin, Miller, & Wakefield, 1993). Nagy et al. (1993) also suggested that as the morphological complexity of text continues to increase, different aspects of morphological awareness would grow through high school. As a result, it might be expected that the predictive role of morphological awareness in reading comprehension would also increase with age (Nagy et al., 2006). Morphological awareness affected reading comprehension directly. It is explained that morphological or syntactic awareness leads to increased breadth and depth of word knowledge, which in turn affects reading comprehension (Guo, Ying, Roehrig, Alysia, & Williams, 2011).

Intelligence is the best-documented predictor of achievement of literacy and other academic outcomes (Gottfredson, 1997; Hartigan & Wigdor, 1989). At the age of 10, intelligence explained an additional proportion of the variance in literacy skills (Alloway & Alloway, 2010). Though IQ plays important role in predicting reading comprehension (Tiu, Thompson, & Lewis, 2003), there are few studies on the relation of reading comprehension and intelligence. While verbal IQ predicted reading comprehension (Berninger, Abbott, Vermeuleu, & Fulton, 2006), nonverbal IQ is related to reading outcomes in children with language impairment (Catts, Fey, Tomblin & Zhang, 2002); in fact, nonverbal intelligence at kindergarten was the third strongest predictor of reading comprehension at second grade and the second strongest predictor of reading comprehension at fourth grade. While few studies connect reading comprehension and intelligence, at least one study, explored the influence of morphological skills on reading comprehension by controlling Ravens progressive intelligence (Mahfoudhi, Elbeheri, Al-Rashidi, & Everatt, 2010).

Method

This study investigates reading comprehension using phonological awareness, morphological awareness and non-verbal ability as the predictor variables. Longitudinal survey design is used in data collection (group and individual tests), as measure of reading comprehension was delayed for two years after the measures of predictor variables in grade 2.

Participants

Sample used for this study constitute lower primary students in Grade 2 to 4 from 11 Lower Primary Schools of Thrissur district in Kerala (N=159). The sample was representative of the population on sex ratio and type of school management.

Instruments

1. Test of Phonological Awareness: This individually administered test designed for Lower Primary students has three subtests, viz., picture-sound recognition, rhyme recognition and rhyme production. Picture-sound recognition test constitutes 45 colour pictures of objects familiar to children whose names correspond to 47 phonemes identified from syllabus for grade 1. Oral instruction was given to the students during administration. When the test administrator presents four pictures at a time and pronounces a

sound/phoneme, the child has to find the picture corresponding to the pronounced sound.

Rhyme recognition test has prompt pictures rhyming with one of the target pictures. Choosing the rhyming target picture is the task. The test consists of two practice items and five test items. Rhyme production test has prompt words for which respondent has to produce rhyming words or pseudo words. The whole test takes 20 minutes to administer per child. Test validity is indicated in loading of all the subtests on a single factor with loading ranging from .78 to .74.

2. Test of Morphological Awareness: This individual test meant for 2nd graders has eight categories of morphemes viz., gender, number, case, compound word, derived word, derived adjective, tense and *kevalaprayojaka*. Each has two practice items and following number of test items. For each subtest, oral instruction is given by the investigator as to what is expected from the student, a pause of 10-15 seconds were given for the student to respond with the answer for each item. The whole test takes 20 minutes to administer per child.
3. Test of Reading Comprehension: This is a subtest of the reading test (Gafoor & Khaleeludheen, 2008) for 4th grade students consisting of five passages with selection type multiple-choice items requiring factual understanding, interpolation and extrapolation of the content of the passages.

In addition to the above, score on Raven's Progressive Matrices (coloured) was used as measure of non-verbal ability.

Results

The values of Mean, Standard Deviation, Skewness and Kurtosis obtained for the variables under study are given in Table 1.

Table 1

Statistical Constants of Dependent and Independent Variables (N=159)

Variables	Mean	SD	Skewness	kurtosis
Reading Comprehension	4.34	2.45	-.05	-1.03
Morphological Awareness	3.05	1.80	0.36	-0.73
Phonological Awareness	0.84	0.88	0.79	-0.23
Non-verbal ability (RPM)	15.03	4.38	0.63	2.06

The indices of skewness (-.05) and kurtosis (-1.03) of the distribution of reading comprehension scores show that the distribution is symmetric and platykurtic. The inter-relationship between morphological awareness, phonological awareness and RPM, and their relationship with Reading Comprehension is given in table 2.

Table 2

Relationship among Morphological Awareness, Phonological Awareness and RPM (predictors) and Reading Comprehension (criterion)

	Morphological Awareness	Phonological Awareness	Non-verbal ability (RPM)	Reading Comprehension
Morphological Awareness	-	.43**	.29**	.49**
Phonological Awareness		-	0.15	.46**
Non-verbal ability (RPM)			-	.31**

**p<.01

Reading Comprehension is significantly and positively related to Morphological Awareness ($r=.49$, $P<.01$), Phonological awareness ($r=.46$, $P<.01$) and Ravens non-verbal ability ($r=.31$, $P<.01$). Table 2 further shows that the collinearity among the predictor variables is not considerable as the r 's obtained between the predictor variables is not as strong as the r 's between the same predictor variable and the criterion variable. Hence, in order to obtain the power of the predictors on the Reading Comprehension, multiple regression analysis was performed (Table 3).

Table 3

Multiple Regression Analysis for Reading Comprehension

Predictors	R*	B	SEB	β	t	$\beta \times r \times 100$
Morphological Awareness		-.409	.107	-.301	-3.822	14.66
Phonological Awareness	0.577	-.828	.216	-.292	-3.843	13.32
Non-verbal ability (RPM)		.099	.040	.176	2.495	5.39
					Total	33.36

*F=24.274 ($p<.01$), df (3,146)

The coefficient of multiple correlation in table 3 ($R = 0.57$, $F(3,146) = 24.274$, $p < .01$) reveals that there is 0.57 relationship between the actual reading comprehension score and the predicted score of reading comprehension from the three predictor variables. Coefficient of determination (R^2 or $\Sigma\beta \times r \times 100$) indicated in table 3 demonstrates that the three predictors together account for near 1/3 (33.36%) of the variation in reading comprehension in Malayalam of elementary school learners. The strength of the relationship of each predictor variable to the criterion variable is indicated by β ; accordingly for a change in one standard deviation (SD) unit in morphological awareness, there will be a corresponding .30 SD unit change in reading comprehension of elementary students. Likewise, influence of phonological awareness on reading comprehension is also to the tune of 0.29 SD units for the latter per one SD unit of the former. In the same vein, the influence of non-verbal ability on reading comprehension is significant ($t=2.50$, $p<.05$), but the increase is only 0.17 SD units per one SD increase of non-verbal ability. The most powerful of cognitive variables in effecting reading comprehension is Morphological Awareness (14.66%), followed by Phonological Awareness (13.32%) and Non-verbal ability (5.39%). To reiterate, the variables Morphological Awareness, Phonological



Awareness and Non-verbal ability together have 33.36 percent (more than 1/3) influence on student's reading comprehension.

Conclusion and Suggestions

This study confirms the influence of morphological awareness on the development of reading comprehension in Malayalam language, and it echoes the observations from related studies (Siegel, 2008; Casalis & Louis-Alexandre, 2000; Kuo & Anderson, 2006; Nagy et al., 2006;) based on other world languages. This study further confirms the hypothesized relationship between phonological awareness and reading comprehension, especially the significance of the former for the development of the latter, independent of factors like non-verbal ability and morphological awareness. Previous studies like Bryant, MacLean, Bradley and Crossland, 1990; Stanovich, 1992; and Wagner and Torgesen, 1987, suggested analogous relation between these variables. In theory, the observed importance of non-verbal ability for development of a principally verbal ability like reading comprehension requires further attention by future researches.

The findings of this study indicate that children who have better abilities in analyzing and manipulating rhymes, syllables, and phonemes, and having ability to identify root words and their inflected or derived forms are better at learning to read than children who have difficulties in acquiring these skills. Thus, importance should be given for the development of basic language skills and its sub skills during lower primary level when pupils begin to learn the language. The skills like morphological and phonological awareness will perform as the robust foundation for all other functional proficiency in using language. Quality of language instruction and learning is entailed in allowing the pupil learn the pure language forms better before penetrating into the issues of society. "A child knows not only how to understand and speak correctly but also appropriately in her language(s). She can modulate her behaviour in terms of person, place and topic. She obviously has the cognitive abilities to abstract extremely complex systems of language-from the flux of sounds. Honing these skills by progressively fostering advanced-level communicative and cognitive abilities in the classroom is the goal of first-language(s) education" (National Curriculum Framework., NCERT, 2005). For achieving these goals, a proper action programme be implemented and then, practiced. Kerala Curriculum Framework (SCERT, 2007) does not permit a linguistic component based language teaching approach, which findings of this study suggests is essential, for developing comprehension skills. Psychological and structure based approach can be adopted than a peripheral approach in language education.

Results of this study evidence that it is logical to improve phonological awareness and morphological awareness in order to develop reading comprehension. Morphological knowledge should be part of the literacy curriculum because of its strong predictive role, just as Carlisle (2003) suggested that including morphology in reading and spelling instruction early on could help children gradually master the many complex relations of morphology, phonology, and orthography. This can have a significant impact on reading skill (Berninger et al., 2003). Introduction of different dictation activities will help pupils to develop phonological awareness, and writing activities should include phonics dictation, picture dictation, keywords dictation, music dictation and running dictation. Exposing students to a variety of text types such as poems, diaries, school rules/game rules, posters, cartoons, news reports will acquaint them with different structures of the language. For developing phonological awareness and morphological awareness, methods like practicing phoneme blending through games, rhyming practice by small rhyming poems, conduct of competition in making rhyming words, playing 'guess the word', constructing word webs around morphemes or topic words, and categorizing words based on number of syllables, initial letter, nouns can be considered.



In addition, maintaining an optimum level of teacher-student relationship is helpful in developing reading comprehension (Remia & Gafoor, 2012). Effective and supportive communication can develop better comprehension characteristics in the student. By this, student will naturally be successful in reading comprehension. Certainly, effective interaction and communication can enhance language skills (Remia & Gafoor, 2012).

Professional development programmes for teachers can be used to strengthen teachers' skills and strategies in giving quality feedback - positive, encouraging and diagnostic. This may equip teachers in helping the learners in developing an awareness of the letter-sound relationships through explicit teaching, building up students' strategies for listening, discriminating sounds, speaking and decoding (in reading) and, in gaining confidence and competence in reading aloud and, in developing interest in reading books. Nonetheless, implementing and orchestrating all these may require whole-school language policy.

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