An Adaptation of Early Reading Skills in Malayalam (ERS-M)

Project under AIISH Research Fund (ARF)
(2016-2017)

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Sanction no: SH /SLP/Research/ ARF 46/2016-17
Total grants: Rs. 4,93,000.00

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TABLE OF CONTENTS

Chapter No.	Title	Page No.
	List of Tables	i
	List of Figures	ii
I	Introduction	1-9
II	Review of Literature	10-32
III	Method	33-59
IV	Results	60-106
V	Discussion	107- 139
VI	Summary and conclusion	140-146
	References	147-188
	Appendix I	
	Appendix II	
	Appendix III	
	Appendix IV	

List of Tables

Table No.	Title	Page Number
1	Materials available for reading assessment and training in Indian Languages.	22-24
2	Sections and Sub-sections of ERS-M.	34-37
3	Revisions incorporated in the stimulus material of ERS-M after content validity rating.	38
4	Mean and standard deviation of scores obtained by TDC in various sections and sub-tests of ERS-M.	62-63
5	Mean, Median and Standard deviation of ERS-M sub-test scores obtained by participants across grades.	65-66
6	Comparison of ERS-M sub-test scores of Grade I TDC across grades II to VIII. Given are the |Z| values and the significances are indicated.	68-69
7	Comparison of ERS-M sub-test scores of Grade II TDC across grades III to VIII. Given are the |Z| values and the significances are indicated.	69-70
8	Comparison of Grade III and IV across higher grades using Mann Whitney U Test. Given are the |Z| values and the significances are indicated.	71-72
9	Comparison of Grade VI, VII and VII across higher grades using Mann Whitney U Test. Given are the |Z| values and the significances are indicated.	73
10	Distribution of children diagnosed with reading/ learning difficulties across grades	90
11	Summary of sections and sub sections of ERS-M	141-142

List of Figures

Figure No.	Title	Page Number
1	Preferred seating for administration of ERS-M	43
2	Mastery of reading skills in ERS-M represented across grades.	74-75
3.a	Comparison of mean scores obtained by group I to the population statistic in Auditory Identification sub-test across grades.	78
3.b	Comparison of mean scores obtained by group I to the population statistic in Auditory Recall sub-test across grades.	78
3.c	Comparison of mean scores obtained by group I to the population statistic in Auditory Discrimination sub-test across grades.	79
3d	Comparison of mean scores obtained by group I to the population statistic in Visual Discrimination (Level 1) sub-test across grades.	79
3.e	Comparison of mean scores obtained by group I to the population statistic in Visual Discrimination (Level 2) sub-test across grades.	80
4.a	Comparison of mean scores obtained by group I to the population statistic in Syllable-Grapheme Correspondence: Beginning Consonant (Level 1) sub-test across grades.	81
4.b	Comparison of mean scores obtained by group I to the population statistic in Syllable-Grapheme Correspondence: Ending Consonant (Level 1) sub-test across grades.	81
4.c	Comparison of mean scores obtained by group I to the population statistic in Syllable-Grapheme Correspondence: Consonant Cluster (Level 1) sub-test across grades	82
4.d	Comparison of mean scores obtained by group I to the population statistic in Syllable-Grapheme Correspondence: Vowel Sounds (Level 1) sub-test across grades.	82
4.e	Comparison of mean scores obtained by group I to the population statistic in Syllable-Grapheme Correspondence: Beginning Consonant (Level 2) sub-test across grades.	83

4.f	Comparison of mean scores obtained by group I to the population statistic in Syllable-Grapheme Correspondence: Ending Consonant (Level 2) sub-test across grades.	83
4.g	Comparison of mean scores obtained by group I to the population statistic in Syllable-Grapheme Correspondence: Vowel Sounds (Level 2) sub-test across grades.	84
5.a	Comparison of mean scores obtained by group I to the population statistic in blending skills (Level 1) sub-test across grades	85
5.b	Comparison of mean scores obtained by group I to the population statistic in blending skills (Level 2) sub-test across grades.	85
6.a	Comparison of mean scores obtained by group I to the population statistic in structural analysis (Level 1) sub-test across grades.	86
6.b	Comparison of mean scores obtained by group I to the population statistic in structural analysis (Level 2) sub-test across grades.	87
6.c	Comparison of mean scores obtained by group I to the population statistic in structural analysis (Level 3) sub-test across grades	87
7.a	Comparison of mean scores obtained by group I to the population statistic in oral reading (Level 1) sub-test across grades	88
7.b	Comparison of mean scores obtained by group I to the population in oral reading (Level 2) sub-test across grades	88
7.c	Comparison of mean scores obtained by group I to the population statistic in oral reading (Level 3) sub-test across grades	89
7.d	Comparison of mean scores obtained by group I to the population statistic in oral reading (Level 4) sub-test across grades	89
8.a	Comparison of mean scores obtained by children with reading/ learning difficulty to the population statistic in auditory identification sub-test across grades.	91

8.b	Comparison of mean scores obtained by children with reading/ learning difficulty to the population statistic in auditory recall sub-test across grades.	92
8.c	Comparison of mean scores obtained by children with reading/ learning difficulty to the population statistic in auditory discrimination sub-test across grades.	93
8.d	Comparison of mean scores obtained by children with reading/ learning difficulty to the population statistic in visual discrimination (Level 1) sub-test across grades.	94
8.e	Comparison of mean scores obtained by children with reading/ learning difficulty to the population statistic in visual discrimination (Level 2) sub-test across grades.	95
9a.	Comparison of mean scores obtained by children with reading/ learning difficulty to the population statistic in syllable grapheme correspondence: Beginning consonants (Level 1) sub-test across grades.	94
9b.	Comparison of mean scores obtained by children with reading/ learning difficulty to the population statistic in syllable grapheme correspondence: Ending consonants (Level 1) sub-test across grades	94
9c.	Comparison of mean scores obtained by children with reading/ learning difficulty to the population statistic in syllable grapheme correspondence: consonant cluster (Level 1) sub-test across grades	95
9.d	Comparison of mean scores obtained by children with reading/ learning difficulty to the population statistic in syllable grapheme correspondence: Vowel sounds (Level 1) sub-test across grades	95
9.e	Comparison of mean scores obtained by children with reading/ learning difficulty to the population statistic in syllable grapheme correspondence: Beginning consonants (Level 2) sub-test across grades.	96
9.f	Comparison of mean scores obtained by children with reading/ learning difficulty to the population statistic in syllable grapheme correspondence: Ending consonants (Level 2) sub-test across grades.	97
9.g	Comparison of mean scores obtained by children with reading/ learning difficulty to the population statistic in syllable grapheme correspondence: Vowel sounds (Level 2) sub-test across grades.	98

10.a	Comparison of mean scores obtained by children with reading/ learning difficulty to the population statistic in blending section: Level 1 sub-test across grades.	99
10.b	Comparison of mean scores obtained by children with reading/ learning difficulty to the population statistic in blending section: Level 2 sub-test across grades.	100
11.a	Comparison of mean scores obtained by children with reading/ learning difficulty to the population statistic in structural analysis section (Level 1) sub-test across grades.	101
11.b	Comparison of mean scores obtained by children with reading/ learning difficulty to the population statistic in structural analysis section (Level 2) sub-test across grades.	102
11.c	Comparison of mean scores obtained by children with reading/ learning difficulty to the population statistic in structural analysis section (Level 1) sub-test across grades.	103
12.a	Comparison of score obtained by a child with reading/ learning difficulty to the population statistic in oral reading skill (Level 1) sub-test.	104
12.b	Comparison of score obtained by a child with reading/ learning difficulty to the population statistic in oral reading skill (Level 2) sub-test.	105

CHAPTER I

INTRODUCTION

Language is a complex phenomenon and defining it is even more complex. Language is a purely human and non instinctive method of communicating ideas, emotions and desires by means of voluntarily produced symbols (Sapir, 1921). In the words of Lee and Chomsky (1957), "Language is a set (finite or infinite) of sentences each finite in length and constructed out of a finite set of elements". It is also known that language is a set spoken, written or tactile symbols that convey meaning and it consists of rules for combining those symbols that can be used to generate an infinite variety of messages (Weiten, 2007). The hence generated message is conveyed through variety of modalities, such as vocal and non-vocal modalities.

Writing is one such form of expression of language, while reading is an act of comprehension of print or orthographic symbols. Downing (1984) defined reading as a complex neuro-psycholinguistic process that has linguistic, perceptual, cognitive, motivational and neurobiological components. The human brain is hard wired to learn spoken language, and it is therefore a naturally occurring process (Shaywitz, 2003). Exposure facilitates acquisition and production of spoken language in typically developing children. However, children may find reading not as "natural" as speaking. Snowling and Hulme, (2005) stated that reading/ writing are late-acquired skills compared to spoken language skills such as speaking or understanding. Reading and writing has to be explicitly taught through formal and structured exposure to orthography.

The National Reading Panel (2000) identified five components to reading instruction that are essential for a student to learn this skill. These five components are also referenced in Individuals with Disabilities Education Improvement Act, USA (IDEA, 2004). The five essential components for reading instruction are phonemic awareness, phonics, reading

fluency, comprehension, and vocabulary. Phonemic awareness is the knowledge that words are made up of a combination of individual sounds. For example, the word ‘cat’ is made up of three sounds (phonemes) namely /k/ /a :/ and /t/. Phonics is the relationship between a specific orthographic symbol and its auditory symbol. Phonics is used, for example, when a reader comes across an unknown word. With knowledge of phonics, one can try to read the word by focusing on the specific sound of each letter or combination of letters. For example, if a child does not recognize the word chant, he might break the word apart into pieces, such as |tʃ|/ |ɑː| /|n| /|t | assigning an appropriate sound to each separate letter or combination of letters. Reading fluency is the ability to read text accurately and smoothly. A fluent reader’s reading expression, intonation and pacing sounds natural and similar to that of speaking. Comprehension is the interaction that happens between the reader and text. More than merely decoding written or printed words on a page, comprehension is the intentional thinking process that occurs as we read. Also, the National Reading Panel (NRP, 2000) explains how the five components are important in developing early reading skills. Phonemic awareness is more than recognizing sounds. It also includes the ability to hold on to those sounds, blend them successfully into words, and take them apart again. Phonics helps a child in his reading skill acquisition period as the child need to blend sounds together to decode words, and they need to break spoken words into their basic sounds in order to write them. As the child progresses in the reading skill, fluency enables him to move from decoding words to sight-reading. Growth in vocabulary parallels this development. Finally comprehension is the intentional thinking process that occurs as we read. This makes the reading process complete. Any factors that affect any one of these processes can lead to a generic difficulty in learning to read and/ or interpret words, letters, and other form of non-vocal symbols. This condition will be characterized by difficulties in accurate and/or fluent word recognition, poor spelling,

poor decoding abilities, difficulties in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge.

For the acquisition of reading, intact phonological skills (Torgessen, 1985), higher order linguistic skills such as syntactic (Vogel, 1974), semantic (Goodman, 1969) and metalinguistic skills (Ehri, 1978) are important. Parallel breakdown in one or many of these skills are observed in children with reading disorders (Joanisse, Manis, Keating,& Seidenberg, 2000). Also, these children tend to exhibit problem in oral language development as reading skills is also a language mediated process. Development of reading is influenced by the child's spoken language and/or the language on which the child is dependent to derive meaning of the read words and sentences (Kamhi & Catts, 1986; Perfetti, 2003). Hence, the characteristics of the spoken language, which child the child also learns to read influences the pattern of reading he/she acquires in the particular language.

Earlier, it was assumed that the features of acquisition of reading processes are universal across orthographical systems. This assumption was opposed by the Orthography Depth Hypothesis (ODH, Katz & Frost, 1992) which proposed that reading acquisition is orthography dependent. This hypothesis suggested that length of literacy acquisition period depends on the relative depth of the orthography in which a language is written. As per the propositions of ODH, the immediate and automatic matching of graphemes and phonemes to produce word recognition plays a more important role in lexical access in 'shallow orthographies', where the correspondences of graphemes to phonemes are more direct and consistent (e.g. Finnish, Spanish, Turkish, Kannada, Malayalam) than in 'deep orthographies', where the mapping of letters to sounds is less direct and less consistent (e.g. English, Chinese). Individuals learning to read and write shallow orthographies grasp them rapidly and easily compared to deep orthographies. The inconsistencies of deep orthographies make the learning of generalizable grapheme-phoneme rules in the language a complex

process in its acquisition. Hence transparency and degree of phoneme - grapheme correspondence (PGC) in the language is found to significantly influence reading acquisition process (Katz & Frost, 1992). Evidence for this interaction can be extracted from the study of Seymour, Aro and Erskine (2003) on a group of 5-6 year old children which found a delay in acquisition of basic decoding skills in English speaking beginner reader compared to a beginner reader of shallow orthography. They compared the acquisition of letter knowledge and the reading of simple, familiar words and non-words in 5 to 7 year old children from 14 European countries. The results of this project showed that word reading accuracy was dependent on orthography depth. Reading accuracy was highest for transparent or shallow orthographies like Finnish, Greek and German (100%) and least for English (34%) by the end of 1st year of school. Other languages like Italian, Spanish, Dutch (92-95%) and French, Portuguese and Danish (70-80%) fell within this continuum. Even by the end of the 2nd year at school, English learners were able to read only 76% of simple, real words and 64% of non-words indicating that the development of foundation literacy skills in English-speaking children occurs twice as slowly as in non-English-speaking European children, Thus, orthographical features of a language may facilitate or slow down reading acquisition process (Lyytinen et.al., 2004; Zeiglar & Goswami, 2005). This reading-orthography dependency cautions against generalization of research on reading acquisition in one language to other languages and therefore cross language and language specific studies to learn the typical and atypical reading skill development is necessary.

It may also be of interest to understand features of typical development of reading process in a multilingual child who is exposed to multiple orthographical systems simultaneously or sequentially. Ryan and Meara (1991) investigated reading acquisition in a group of Arabic speakers (L1) who are also English language learners (L2) and found that L1 orthography has a long and lasting impact on L2 processing. This conclusion was derived

from the finding that Arabic ESL learners were considerably slower and less accurate in detecting the missing vowel than non-Arabic counterparts. The attempts to learn the influences of L1 phonology on L2 word recognition and reading showed that while acquiring new vocabulary in L2 , phonological patterns (Phonotactics) that are already familiar to them or already in their repertoire might be generalized. Similar scenario may exist in multilingual society like that of India, where multiple languages are introduced at early developmental ages in the formal education system.

Typically children enrolled into formal elementary education are introduced to one Indian and one foreign language simultaneously along with or without an additional Indian language, depending on the education system followed. For a child who is introduced to any native Indian language (for example, Malayalam) and a foreign language (for example, English) as part of schooling acquires an extremely opaque orthography of English along with the transparent orthography of Malayalam. While English language follows alphabetic script comprising of roman alphabets, Indian languages follow alpha-syllabic writing system. English is a good example of opaque orthography. For example, the phoneme /k/ can map to various graphemes like '*c'* as in the word *cat*, '*cc'* as in the word *soccer* or '*ck'* as in the word *sick*. English is not a 'typical' language; it is regular and unpredictable with complex grapheme-phoneme rules that are frequently ambiguous and often difficult to learn. The 40 sounds of spoken English may be represented in 1120 possible letters or letter combinations (Nyikos, 1988). It will be interesting to study the reading development in children exposed to such extremes of orthography simultaneously.

Researchers and clinicians pointed out that, professionals often have little understanding of issues related to multi language exposure and proficiency, which may lead to misinterpretation of data gathered as part of the referral and evaluation process. Hence it is imperative to develop reliable and validated language specific tests of reading acquisition

which effectively serve for children whose activity and participation is restricted due to some reading deficits in early stages of schooling. With the availability of range of such tools, professionals, such as Speech- Language Pathologists(SLPs), can obtain the complete profile of a child with reading deficits, and also derive or confirm diagnosis so that directives for reading intervention can be determined early. With this aim, the present study was planned for development of a reliable and validated test for early reading skill acquisition in children exposed to multiple languages with different orthographical system during their schooling years.

Among the very few language specific reading skill assessment tests available in Indian languages, adaptation of Early Reading Skill in Hindi (Priyadarshi & Goswami, 2012) is applicable to a wide age range and also includes variety of reading items ranging from early reading skills to the complex reading abilities: Perceptual Skills, Phoneme Grapheme Correspondence, Phonetic Manipulation, Structural Analysis and Reading Comprehension. This test was an Indian adaptation of the widely used Early Reading Skill (ERS) test proposed by Rae and Potter (1973; 1981) in the book titled 'Informal Reading Diagnosis: A Practical Guide for the Classroom Teacher'. The test is simple and is used to assess the developmental progression of English reading skill in school going children. Hence adapting this comprehensive tool in other Indian languages can provide an effective method to overcome the constraints faced in assessment and management of typically and atypically developing multilingual children in their reading abilities.

This study was planned with the aim of adapting the Early Reading Skills (ERS) to Malayalam language. Malayalam is a Dravidian language which is spoken by a large proportion of highly educated people in the south-western part of India. The orthography of Malayalam share features with other Indian language systems but differ from features of English language (Bright, 1996; Padakannaya & Mohanty, 2004; Syamala, 1996). The

writing system of Malayalam is derived from the 'Brahmi' script and it contains 16 vowels and 36 consonants contrary to the 44 distinctive sounds of English language (Syamala, 1996). Similar to other Indic scripts, the orthography of Malayalam is alpha-syllabary and 'akshara' is the basic unit of Malayalam orthography. The grapheme is mapped onto sounds at the level of syllables unlike phonemes in English language. The 'akshara' in Malayalam orthography generally have a vowel ending (CV) (Bright, 1996). The orthography-reading relationship proposed by ODH contributes to the hypotheses that the process of reading and its acquisition in Malayalam and English language are likely to differ.

Being a highly educated society, beginner readers of Malayalam are commonly acquiring literacy in two or more languages simultaneously. The pattern of acquisition in this peculiar group is rarely studied. The output of the current research was expected to provide SLPs and other rehabilitation professionals with an effective tool for identification, profiling, and diagnosis of reading difficulties in multilingual children with Malayalam as their native language.

Need for the Study

1. Recent research suggests that reading acquisition is spoken language dependent (Perfetti, 2003; Price, 2012). Thus literature on reading acquisition from foreign languages may not generalize to Indian population.
2. Reading acquisition is found to be orthography dependent (Aaron, & Joshi, 2012). Indian orthography varies a great deal from English and other orthographical systems across the globe (Share& Daniels, 2016). Understanding this variation in the process of simultaneous acquisition of reading of two different orthographical systems can provide theoretical insights into this area of research.

3. India is a multilingual country that consists of more than 5 language systems each with its typical linguistic and script features (Padakannaya & Mohanty, 2004). Preliminary evidence on differences in sequence of reading acquisition across western and Indian orthography system has been reported in literature (Priyadarshi & Goswami,2012;Padakannaya & Mohanty, 2004). Literature revealed a dearth of research in this direction. It is not clear if there are any differences in the acquisition process of reading across various Indian languages.
4. Prevalence of reading/writing difficulties is higher in multilingual children compared to monolingual children (Goldstein, 2006). Indian society, being largely multilingual, may be estimated to have around 35 billion children with academic difficulties (DAI, 2013). Early identification and intervention is the key for effective training of these children. This requires quick, easy, sensitive screening and diagnostic measures in Indian languages.
5. There is limited number of reliable tools for identification and diagnosis of reading disability in Indian languages. This puts Indian children at disadvantage by over or under diagnosis of a condition that require professional intervention. This negligence or scarce level of awareness can have a long term impact on their academic, cognitive, psychological, emotional and social development (Maughan, 1995).
6. Malayalam is one amongst the prominent languages spoken (3.21%- 2011 census) in India by a highly literate society. This suggests that a large number of Malayalam speaking children are exposed to formal education with simultaneous or sequential acquisition of reading in multiple orthographies. But reliable, validated, standardized tests for assessment and diagnosis of reading skills in this population are scarce.

Aim

The present study aimed at developing a reliable and valid tool for assessment of reading acquisition and diagnosis of reading difficulties in children acquiring Malayalam orthography by adapting the widely used Early Reading Skill (ERS) test (Rae & Potter, 1973).

Objectives of the Study

This study was done with the following objectives:

1. To adapt Early Reading Skill (ERS) test (Rae & Potter, 1973; 1981) to Malayalam language (ERS-M).
2. To compare the reading skill scores in ERS-M across gender in typically developing children.
3. To compare the reading skill scores in ERS-M across grades in typically developing children.
4. To study the pattern of acquisition of reading skills in Malayalam speaking typically developing children.
5. To establish inter-judge and intra-judge reliability of ERS-M
6. To validate ERS-M for identification and diagnosis reading deficits in children with Malayalam as their native language.

CHAPTER II

REVIEW OF LITERATURE

Reading and writing are a form of communication similar to speaking. While spoken language was a natural evolutionary phenomenon, written language was a human invention (Pinker & Bloom, 1990). While spoken language is the result of conversion of thoughts and ideas into acoustic symbols, reading and writing involves conversion of spoken language into visual symbols (Modrak, 2001). Decoding these visual symbols is reading while encoding the symbols are called writing. Historically, writing precluded invention of reading. The initial writing was limited to few symbols for name, commodity and amount (Fischer, 2003). The process of improvisation and elaboration of writing system was initiated around 6000 years ago and this process resulted in alphabet writing with consonants, vowels, punctuation marks, and spacing between written units that constitute the basic elements of written language (Powell, 2009).

Evolutions in written language made reading significantly easy to train and learn. Initially, reading was limited to decoding the simple skeleton of written language (name, commodity and amount) and individuals who read were given high social importance (Fischer, 2003). Elaborate writing system facilitated task oriented reading, narration, public orations that decreased the demand on human memory but increased the demand for reading skill. Increased availability of text placed demand for readers and pressurized individuals to learn to read as a matter of prestige, trust as well as necessity. Conversely, increased number of readers demanded more text to be made available and hence lead to the global focus on literacy skills. Simultaneous revolutions in trade, agriculture, religion and culture also placed deciphering of complex accounts and document a mandatory requirement for prosperity. In

modern day world, reading is also a means of long and short distance communication, as well as language acquisition.

Reading is also a cognitive process, similar to language skills. There exists a complex interaction between the text and the reader which is shaped by the reader's prior knowledge, experiences, attitude, and language which is culturally and socially situated. It is dependent on cultural transmission for its continued existence (Padakannya & Mohanty, 2004). To acquire reading, children must learn the coding system used in their culture for representing speech as a series of visual symbols. Irrespective of language or culture, this acquisition is a process that is contributed by three factors, as described by Ziegler and Goswami (2005): (1) availability of different sound units in the language and orthographical system, (2) degree of consistency in the sounds- symbol association and (3) granularity of coding system, that is, the level of mappings between the sounds and symbols in the language. This framework, called the Psycholinguistic Grain Size Theory, considers reading development as dependent on the abstraction of optimal mappings between orthographic units and the sounds of the language. The extent of granularity seems to vary across languages and hence process of reading acquisition will also vary with languages.

A reading-writing system that satisfies these factors is acquired through formal training and follows a series of stages. According to Chall (1983), there are two major stages of reading: period when children "learn to read" (grades 1, 2, and 3) and a period when children "read to learn" (grades 4 and beyond). Learning to read would involve the awareness, identification, discrimination of visual symbols, sound-symbol mapping and phonetic manipulation of these symbols to read words or non-words. Whereas, older children who "read to learn" starts to interact with the text and associate the read material into their experiences to develop on-line comprehension of the read content. Development of meta-cognitive-linguistic skills correlates with this stage of development suggesting the interaction

of these higher level skills in acquisition of reading (Cutting& Scarborough, 2006). This suggests that the process of reading is dynamic and vary with the complexity of material being read.

This suggestion is supported by various theories of reading that have been proposed by pioneers in this domain. The earliest theories were perceptual based that focussed on the visual perception of text (Orton, 1925). Gradually, the researchers realized that reading is not just perception of visual symbols but involve a complex two-way interaction process between visuo-cognitive- linguistic systems. This led to proposition of various information processing models of reading (LaBerge & Samuels, 1974; Samuels, 1994). But these models could only partially explain reading of complex text material. Currently reading is explained by various connectionists and parallel distributed processing models (McClelland & Rumelhart, 1986; Rumelhart, Hinton & McClelland, 1986). These models consider that there exist two independent but simultaneously active routes for reading: a lexical route for reading familiar text and a phonemic route for reading novel/unfamiliar/irregular text. The latest models consider that these two routes operate based on specific processing units that are acquired through learning and exposure. The networking between the processing units and reading routes form the bases of reading mastery. If so, dyslexia or reading difficulties may be explained as deviations in identification of processing units or in establishing strong neural networks or also as impairment in the established networks.

Further models of reading proposed various stages in reading acquisition rather than the process of reading itself. A standard model of reading acquisition was proposed by Frith (1986) who divided reading acquisition into three stages: (1) logographic (logo means picture/symbol) stage when the child processes words like visual object or symbol (2) alphabetic stage the child represents ordered sequences of letters and (3) orthographic (spelling) lexicon the child stores whole-word grapheme sequences. This model was re-

defined by Ehri (1992) who suggested a four staged development of reading: (1) Pre-Alphabetic stage where, the reader uses visual clues of the printed word to identify the word as no appreciation of the alphabetic principle exists (2) Partial Alphabetic Stage, where the reader focuses on specific and easily identifiable parts of the word (3) Fully Alphabetic stage where the words are memorized as a unit known by sight and finally (4) the consolidated alphabetic stage where the readers store letter patterns across different words after repeated encounters with the words. While Frith (1986) and Ehri (1992) focussed on stages of acquisition, Share (1995) detailed the processes of reading acquisition. The phonological and self-teaching hypothesis details three components in reading acquisition (Share, 1995). The first component is translation of print into sound based on the frequency of exposure to words. With multiple exposures to sounds and their visual representation, children learn to pick up on regularities beyond letter–sound correspondences, including morphemic boundaries. The third key feature is the involvement of phonological and orthographic components that contribute to the word recognition.

All these models base their hypotheses on typical reading acquisition of an alphabetic orthography. Recent evidences suggest that the stages in reading acquisition vary with the orthographical system being acquired (Padakannaya & Mohanty, 2004) Based on symbol-phoneme mapping, orthographical system can be classified into logographic-phonetic, syllabic, or alphabetic (De Francis, 1989). Indian orthographic system is derived from the *Brahmi* script and falls between syllabic and alphabetic writing systems and is often referred with various names such as semi-syllabic, semi-alphabetic, alphabetic-syllabary, and syllabo-alphabetic. The most recent and currently preferred name for Indian orthography is 'alphasyllabary' (Bright, 1996). The basic unit of Indian orthography is *'aksara'* which can represent syllables of different types such as V, CV, CCV, CCCV, CVC, and VC with single orthographical symbols. But the symbols and its principles of combination vary with the

language it represents. Therefore, the above mentioned stages of reading development described in the western models may not be applicable to literacy acquisition of Indian orthography system. Primary evidences of these differences have surfaced from the studies of Karanth and Prakash (1996) which failed to record a logographic stage in the early reading acquisition of Kannada language. When differences in applicability of models are found, alternate hypotheses are generated that should expand the models of reading acquisition to suit the specific literacy-language culture. However, there is a lack of researches in this domain and the current tendency is to generalize the existing data on other orthographic systems to Indian scenario. Patel and Soper (1987) and Prakash (1999), tried to fit the reading acquisition pattern in Gujarati and Oriya into Frith's (1985) model.

An exception to this was the report of Padakannaya and Mohanty (2004) that studied reading acquisition in Kannada orthography, an Indian alphasyllabary system. They suggested a tentative model for the process of reading based on 'akshara', the orthographical unit of alphasyllabary system. According to this model, reading acquisition follows a simple to complex hierarchy which starts from orthographical knowledge of specific 'akshara' for initial vowels and consonants, diacritics for other vowels, ligatures, geminates, consonant blends and clusters. This knowledge flags off the associations between grapheme-sound that further facilitates reading in beginners. Continued and multiple exposure to orthography is the key to mastery and the speed of processing plays a crucial role in delineating good and poor readers (Cunningham & Stanovich, 1990). This report warrants the researchers in India against generalizing the western models of reading acquisition to Indian orthography as there are many conceptual differences in the writing systems between these two worlds.

The modern Indic writing system that considers 'akshara' as it's grapheme is written from left to right. This grapheme is post-phonemic but pre-logographic. In the Indic writing system, there is single grapheme for initial vowels and consonants with inherent /a/ vowel.

Other post consonant vowels and diphthongs are indicated using specific diacritics for each short and long vowel placed at specific spatial locations around the 'akshara'. The system also has ligatures for segmenting few 'akshara' at the pre-vocalic position. Conjunct consonants are represented using rules of combination of 'akshara' and consonant clusters use combinations of ligatures and 'aksharas'. In the transparency continuum, Indic writing falls into the transparent spectrum with nearly one to one relation in grapheme – sound association, with very few exceptions in certain languages of the sub-continent (Eg: Tamil). The 'akshara' are named by the sound it represents unlike the roman script which has alphabet names that may or may not relate to its acoustic counterpart. Also, there are no capital and small letter differentiations in the Indic writing system. Unlike the logographic system, 'akshara' has no similarity to the meaning or concept it represents. Altogether, the concept of 'akshara' is totally different and is very much unlike other writing systems of the world.

The Indian subcontinent is the hub of 780 spoken languages (People's Linguistic Survey of India, 2012) among which writing and publishing are done in substantial quantity in at least 50 Indian languages (Mahapatra, 1989). The scripts of these languages are derived from 'Brahmi' and follows alpha-syllabary system. The culture is largely multilingual with individuals exposed to more than one orthography system as a part of their education and/ or occupation. The odds of developing reading/ writing difficulties in multilingual children are reported to be higher (RCI report).

The Diagnostic and Statistical Manual of Mental Disorders (DSM-V) and the fifth edition of the classification by the American Psychiatric Association (2014) estimates the prevalence of all learning disorders to be about 5–15% worldwide. The incidence of dyslexia in India is believed to be 15% (Dyslexia Association of India, 2013). A more recent report estimated that among the 228,994,454 students enrolled in recognized schools approximately

35 million are at risk of reading/writing difficulties (Times of India, 2013). In the state of Kerala, 8-10% of the school population has learning disability of one form or the other (Sree Chithira Thirunal Institute of Medical Sciences and Technology, 1997). The Institute for Communicative and Cognitive Neurosciences (ICCONS), Kerala, has been conducting research programs in 162 child language disorders and developing research and rehabilitation programs for learning disabilities. Screening for learning disability for Classes I to VII in schools by experts in 10 panchayaths in Kerala revealed that 16% of school going children showed symptoms of learning disability (Suresh, 1998). The exact estimate of reading difficulties may be much higher because of socio - cultural variations, absence of literary environment at home, age of enrollment to school, preschool exposure and literacy support available in their respective homes during the school years (Karanth, 2002). Also, multiplicity of languages one is exposed to the gap between the home language and school language ill equipped schools (RCI)can be attributed to this high risk of learning difficulties in school going children in India (Padakannaya & Mohanty, 2004). Yet, we do not have a clear idea about the incidence and prevelanace of learning disabilities in the country as a whole.

Dyslexia is a developmental arrest or inability of children to move on to the next phase of reading acquisition (Padakannaya & Mohanty, 2004). The presence of dyslexia in school going children is a major concern in the course of academic ladder. Existing literature on children with dyslexia or reading difficulties suggests that their symptoms originate from difficulties in word recognition (Metsala, 1997), decoding (Gough & Tunmer, 1986), comprehension and also written spelling (Karanth, 2002). When reading aloud, they tend to omit or distort pronunciations of words to an extent unusual for their age. The rising graph of research suggests that dyslexia is a manifestation of malfunction of neurological wiring that is required for reading (Hynd& Semrud-Clikeman, 1989; Breznitz,& Lebovitz, 2008) Also,

the complexity of language and its orthographic system has a direct association with reading difficulty.

Many children with dyslexia are misunderstood as lazy, careless, attention seeking, unmotivated and sometimes mentally retarded. These 'titles' tag these children and also bring down the morality of the child as well as their family members. Psychological stress and reduced productivity in the daily course of life may bring out family disputes and many uninvited consequences (KPMG, 2006).Lack of awareness on dyslexia among the instructors, teachers, school management, family and common public is a fact that needs remediation through structured programs (Nakra, 1996). Dyslexia also has long term consequences in various domain of an individual's life (Riddick, 2010). Long term consequences of literacy difficulties in social aspect include unemployment, consequent mental health problems and remedial antisocial behavior as major social concerns of uncorrected learning difficulties (KPMG, 2006).

Though dyslexia has now become a known condition of learning difficulty, optimum awareness has not been established in Indian society. Improving awareness about existence and features of dyslexia is indisputably the first step in tackling this long term crisis. Dyslexia association of India is one such organization that works towards awareness promotion and issues of individuals with learning difficulties with or without co-morbidities across life span in various social strata. Since children with Dyslexia are in present our education system, there is an urgent need for capacity building of trained personnel in the field. It is vital to train psychologists, special and regular school teachers in understanding and helping these children. In addition, awareness has to be created about LD amongst policy makers, parents and community bodies. Some initiatives are being made in the country through the special courses and training programs such as B.Ed. degree in Special Education (LD), Integrated

B.Ed- M.Ed in specific learning disability offered by various universities and colleges across the country.

Dyslexia, being a condition that can be effectively trained and rehabilitated, rightly deserves its significance in early identification. Research indicates that severity of reading problems and its consequences can be reduced with early intervention (National reading Panel, 2000). For early intervention to take place, the children need to be identified in their early childhood but the primary symptom of dyslexia being reading difficulty it typically takes time till the child is subjected to any structured reading instruction (Catts, 2017). Vellutino, Scanlon, Zhang and Schatschneider (2008) employed a screening procedure at the beginning level of kindergarten but results yielded were very scarce in predicting the reading outcomes of children. Thus the process of identification of children with reading deficits get delayed till grade 2 or later (Catts, 2017). Bowyer-Crane (2008) found that dyslexic children who were intervened early in life performed significantly better on tests of phoneme awareness, letter-sound knowledge, and reading and spelling skills than those who the participants even after the intervention was terminated. This group of research clearly emphasize on role of early intervention on identification, diagnosis and intervention as the basis for effective management of reading/writing difficulties.

The right approach to early identification and training is based on availability of reliable and validated screening and diagnostic tools developed for this purpose. A diagnostic tool for dyslexia should ensure hold on all process of reading that interacts to derive the meaning out of the text (Valencia, 1990). Example: checklist for LD in the Sarva Shiksha Abhiyan Manual (SSA, 2003). Roman, Kirby, Parrila, Wade-Woolley, & Deacon, (2009) suggested four variables that are involved in reading development. These were as follows:

1. Phonological Awareness:

Phonological awareness refers to the awareness of the structure of phonological or sound system in a spoken language. Stringer and Stanovich (2000) reported a strong relationship between reading achievement and phonological awareness. There are now neuro-physiological evidences that phonological as well as graphemic units are activated in the reading of alphabetic systems (Bentin, Mouchetant-Rostaing,Giard,Echallier& Pernier 1999; Rey, Ziegler& Jacobs 2000; Ehri 2005).The same is also supported by few training efficacy studies that specifically targeted on phonological awareness skills to improve reading abilities (Bryant & Bradley, 1985; Vadasy, Jenkins& Pool, 2000). Also, deficits in phonological awareness is reported as root cause of developmental dyslexia (Kamhi & Catts, 2013) Contrastively, Indian children and adults read Indian alphasyllabary proficiently even if they are poor on phonemic skills (Padakannaya, 2000; Prakash , Rekha, Nigam and Karanth,1993)

2. Naming Speed:

   The speed of naming, also called the rapid automatized naming (RAN) is now recognized as an important component of reading acquisition (Wolf, Bowers & Biddle,2000), though disputes still persists (Wolf,O'rouke,Gidney,Lovett,Cirino&Morris,2002). Though routine practice includes non-orthographical as well as orthographical stimulus for screening reading difficulties, recent studies suggest clear association between reading abilities and RAN scores for letters and digits only (Blachman, 1984). In a longitudinal study that documented RAN and reading scores from Kindergarten to grade V established a positive relation between the two and concluded that these two attributes improve with age (Kirby, Parrila & Pfeiffer, 2003). Role of RAN in reading can also be inferred from the findings that individuals with poor RAN are at high risk of reading difficulties (Puolakanaho et al, 2008).

3. Orthographic Knowledge:

   Orthography is defined as the relationship between script and its language (Scheerer, 1986). According to Goswami and Bryant (1990), phonological awareness and orthographic

knowledge are the core skills that a beginning reader should foster for reading acquisition. Based on the position of orthography on the transparency continuum, the pace of reading acquisition varies (Katz & Frost, 1992; Seymour, Aro & Erskine., 2003). Landerl, Wimmer, and Frith (1997) found that children with normal reading development sometimes give responses that are based on orthographic rather than phonological information while in dyslexic children, the number of occurrences of such orthographic associations was significantly lower and it shows the possible deficit in the orthographic knowledge they acquire.

4. Morphological Awareness:

   This is the conscious awareness of word structure, its boundaries and semantic–functional meanings of these units while taking into consideration the root, structure, base form, and suffixes representing inflectional and derivational processes (Kieffer & Lesaux, 2008). This awareness helps in pseudo word reading and comprehension in beginners but is not a significant contributes to single word reading (Carlisle& Feldman, 1995; Carlisle, 2000; Deacon & Kirby, 2004). Casalis, Cole and Sopo (2004) found morphological awareness to be dependent on phonological skills and were lower than typically developing readers in children with reading difficulty. Seigal (2008) stated that lack of morphological awareness may be a significant contributor to the deficits in reading and spelling characteristic of dyslexic readers and suggested that morphological awareness assessment and treatment should be administered in children with reading difficulty.

Overall review to this point suggested that reading is a multi-dimensional and dynamic process and a reading assessment tool should consider the range of cognitive processes, affective responses and literacy activities that the child is exposed to. Thereby, a good assessment tool should profile the overall development of each process, the level of mastery in the process, the expected level of performance, categorize the atypicality in

responses and also identify the warning signs that demands for professional attention. According to Snowling and Stackhouse (1996), a comprehensive assessment of reading should include single word reading test, text reading test, non-word reading test and a test of alphabet knowledge. There are a number of assessment tools for reading acquisition that are prevalent across the globe. A commonly used diagnostic tool that extensively tests for reading processes was published by Rae and Potter (1973; 1981). This test comprises of simple alphabet identification, alphabet recall, auditory and visual discrimination skills, phoneme-grapheme correspondence tests, meta-phonological skills and proceeds to higher level interaction between words of written text and also between the reader and text, thereby covering a wide range of processes known to participate in successful reading of English orthography. The test was originally standardized on 40 school going children aged 6 to 13 years. Monica Loomba (1995) standardized this test on Indian children exposed to English through formal schooling. The results revealed a difference in the age of mastery of these skills in Indian children though the development sequence of English reading remained same. This standardized version with Indian norms can be used for screening Indian school going children for reading acquisition of English orthography.

There exist limited tools for assessment of reading skills in native Indian orthography (Table 1). This suggested a need for adapting the Early Reading Skills (Rae & Potter 1973; 1981) into Indian languages. This was expected to help address the lacunae of unavailability of test materials available for reading assessment in Indian Languages.

In one such attempt, adaptation of Early Reading Skills in Hindi (ERS-H) was done by Priyadarshi and Goswami (2012). The findings showed that there existed a sequential acquisition pattern in the development of reading skills in typically developing children learning to read Hindi. As India has an abundant language repository, adaptation of Early Reading Skills to one language becomes insufficient for practical use. Therefore further

adaptations into other languages become a research interest as well as practical need. Malayalam, a Dravidian language, is spoken by more than thirty million people in Kerala, the south-western state of India. The language is unique in its characters and has major differences in the linguistic features when compared to Hindi language.(Mohanan & Mohanan, 1984).Also, it is spoken in the most literate state of India (Census of India, 2011), where the number of school going children is considerably high. With this fact in consideration, as well as scarce background research in the area of reading and related practice in Malayalam language, adaptation of Early Reading Skills becomes productive and significant.

Table 1.

Materials available for reading assessment and training in Indian Languages.

Sl. No.	**Title of the test**	**Author**	**Age range**	**Language**	**Sections**
	Assessment Materials				
1.	Oral Reading Test in Kannada	Bai (1958)	8 – 10 years	Kannada	Single Word recognition
2.	Reading Readiness Test in Kannada	Devi (1978)	3 - 6.5 years	Kannada	Vocabulary Auditory Discrimination Visual Discrimination Attention Left to right orientation
3.	Graded Reading Comprehension Test	Mohanty and Sahoo (1985)	6 - 12 years	Oriya	Reading comprehension

4.	Checklist For Screening Language Based Reading Disabilities (Che-SLR)	Swaroopa & Prema (2001)	3 - 5 years	Malayalam	Rhyming and alliteration Verbal Memory Word retrieval Rapid Alternating Naming Language Comprehension Speech Production Language expression Listening Skills Non – Verbal imitation
6.	Remediation Manual of Meta-phonological Skills in Kannada.	Shilpashri (2004)	11 years	Kannada	Rhyme recognition, Syllable reversal, Syllable deletion, Syllable oddity, Phoneme deletion, Phoneme Oddity
7.	Dyslexic Assessment profile for Indian Children	Kuppuraj S. (2009)	6 - 10 years	English	Alphabet Shape copying Spelling Word and Non-word reading Phonological Awareness Word and Non-word

					repetition Sound Discrimination Rapid Naming
8.	Adaptation of Early Reading Skills in Hindi	Priyadarshi and Goswami (2012)	6 - 13years	Hindi	Auditory and Visual Perceptual Skills Syllable- Grapheme Correspondence Phonetic Manipulation Structural Analysis Reading Comprehension.
Treatment Materials					
1.	Remediation Manual of Meta-phonological Skills in Kannada.	Shilpashri (2004)	11 years	Kannada	Rhyme recognition, Syllable reversal, Syllable deletion, Syllable oddity, Phoneme deletion, Phoneme Oddity
2.	Treatment manual in English for Indian children with dyslexia.	Ranjini (2010)	11-13years	English	Listening Comprehension Oral reading Reading Comprehension Skills Phonological Awareness

A review of Malayalam orthography is obligatory in the context of this study. Mohanan and Mohanan (1984) opined that Malayalam is of high interest to phonologist as it possesses the rare seven-place of articulation contrast in stops and nasals which is not found in other sister Dravidian languages like Kannada, Tamil, Telugu or Tulu. The grapheme primarily maps on to syllable levels rather than phoneme and the sound corresponding to the 'akshara' have a vowel ending (Bright, 1996). The features of traditional Malayalam script were described by the renowned linguist, Hermann Gundert (1872) which formed the basis of English-Malayalam Dictionary. But, many words and features described in this book are obsolete or reformed to form the modern Malayalam script which was officially adopted by the Government of Kerala for all official, media and technology purposes on 15th April 1971 (G.O.(P)37/71/edtn). The new script is simpler with reduced number of symbols and more regular representation of features than the traditional form. The basic features of modern Malayalam script called the '*puthiya lipi'* are as follows:

a. Each consonant is represented by a basic consonant symbol with an inherent short vowel |a| (Example: പ /pa/). There are 36 akshara that represent this form of consonant syllables.

b. All other vowels are written as obligatory symbols placed on the top/left/right/ combined position of the consonant symbol For example, diacritic for the long vowel |a:| with the consonant |p| is placed on the right as പാ, diacritic of the short vowel |e| with the consonant |p| is placed on the left as പെ; diacritic of the short vowel |o| with consonant |p| is placed on the combined position as പൊ. There are 14 different diacritics that are attached to consonant syllables that indicate the following vowel sound.

c. A vowel and diphthong occurring in initial position is not written as a diacritic but as an independent symbol and is considered as an akshara by its own. For example, short vowel |a| in the initial position is written as അ, diphthong /au/ in the initial position is written as ഔ.

There are 14 vowel symbols and 2 diphthongs that are not considered diacritic when occurring in the initial word position in Malayalam.

d. There is a diacritic for nasalization of preceding vowel called ‘anusvaram’. In Malayalam language this diacritic indicates the conversion of preceding vowel into nasal consonant /m/. For example, അം indicates that the short vowel /a/ is followed by the consonant /m/ without its inherent /a/ and is read as /am/ and not /ama/. Hence, in Malayalam script, anusvara is considered as a special vowel.

e. Similar to anasvaram, there is a diacritic for /h/ sound that follows the vowel. This is called ‘visargam’. This is also a special symbol and is not followed by the inherent vowel. For example, അഃ indicates that the short vowel /a/ is followed by the consonant /h/ without its inherent /a/ and is read as /ah/ and not /aha/.

f. Certain consonants are represented in their ‘base consonant’ form without the inherent vowel /a/. These forms are considered as independent ‘akshara’ when not followed by a vowel. There are 5 common and 1 rare glyph variant of normal consonant symbol. For example, the akshara ര represents the consonant /r/ with inherent vowel /a/ read as /ra/. The variant ർ is used to represent the base consonant /r/ without /a/ vowel read as /r/.

g. When a consonant is not followed by inherent or any other vowel, a diacritic called *chandrakkala* is inserted on top of the consonant symbol. For example ക represents /ka/ but ക് represents /k/. The same diacritic is also used to represent a half- vowel such as ന /na/ and ന് /nŭ/. It may or may not be followed by another consonant.

h. There are many consonant-consonant ligatures that are used in the Malayalam orthography. The reformed script recommends use of ligated or non-ligated forms of common consonant-consonant ligatures but only non-ligated forms for rare consonant-consonant combinations. There are 15 ligatures identified as common that may be represented in ligated or non-ligated

forms. For example: /kka/ may be represented as ക്ക or ക്ക but the uncommon combinations like /gda/ is represented only as ഗ്ദ only.

i. In addition to the independent symbols for liquids and laterals (/ja/, /ra/, /la/, /va/) there are diacritics for the same when it occurs in the post consonant position. For example, ക /k/ + യ /ja/ is ക്യ, ക /k/ + ല /la/ is ക്ല, ക /k/ + ര /ra/ is ക്ര and ക /k/ + വ /va/ is ക്വ.

j. The consonant ligatures for / nṯa/ is written as /n/ ന് + /ṟa/ റ but pronounced as /nda/. Similarly the ligature for /ṯṯa/ is written as /ṟ/ റ് + /ṟa/ റ. These may be written in ligated or non-ligated forms.

The Malayalam orthography and its phonemic repertoire are unique for the varied number of place and manner of articulation (Mohanan & Mohanan, 1984). Phonological awareness and meta-phonological skills are found to contribute in reading skills of older children (Ponnumani, 2003; Seetha, 2002). There are no many studies on the reading acquisition of this unique orthography in beginner readers. Generally, acquisition of writing followed reading and writing acquisition was not complete by the age of 12 years (Seetha, 2002). Clearly, there is a lack of research and understanding of reading acquisition process in Malayalam speaking children of younger ages. Also, the development of specific reading processes and variables that influence this development are not revealed. The variations in performance of Malayalam speaking children with and without reading difficulties in these reading processes are also not well delineated. Hence, there is a need to study the typical as well as atypical reading acquisition of Malayalam script using a standardized material. With these research lacunae in mind, the present study was planned with the aim of developing a test that could assess the development of reading skills in children acquiring literacy instructions in Malayalam orthography.

The detailed review on reading and its acquisition in Indian languages suggested many areas of information lacunae. The research reports published in the literature from Indian context continue to generalize models of reading alphabetic orthography into Indic scripts even when the background literature emphasize that reading is orthography (Padakannaya & Mohanty 2004) and spoken language (Perfetti, 2003) dependent. The specific processes of reading and its contribution in reading alpha-syllabary scripts are not very well established. However, it may be inferred from the available literature that some established processes of reading alphabet script remain significant, independent of orthographical variations. To read a written/printed/typed text, the reader should have fine perceptual skills (Hook, Macaruso, & Jones, 2001; Kavale,1981; Schatschneider,Fletcher& Francis, 2004), knowledge of linguistic units of the spoken language (Catts & Kamhi, 1999, Juel,Minden, Cupp, 2000) knowledge of symbol-sound associations in the read language (Bihop & Adams,1990; Ball & Blachman, 1991; Wren, 2004), meta-phonological skills (Carillo,1994; Capellini, dos Santos, & Uvo, 2015; Paul, Murray,Clancy& Andrews, 1997) and adequate language development (Chomsky, 1972; Owens,2016; Seigel, 1993;Wise, 2007) for comprehension of read material. Hence, these processes may be assumed to contribute to Indian orthography reading as well (Ponnumani, 2003; Seetha, 2002) but the extent of significance of these processes in reading alpha-syllabary script is not scientifically established.

Not just the nature of reading but also its acquisition remains under explored in Indian context when primary evidences of differences have been reported. The report of Karanth (2002) on reading acquisition of Kannada suggested a development sequence but different from that of prevailing models of alphabet reading such as that of Frith (1985). Prakash's (1999) attempt to fit the reading acquisition pattern in Oriya to Frith's model clearly revealed the inadequacy of such models to explain literacy acquisition in diverse Indian orthographies.

This suggests that there is a need to study Indian languages in specific to understand the nature, sequence, mastery and significance of reading processes.

Reading is not a function that is acquired naturally such as walking or talking. It is a human invented skill that is acquired through formal instructions. The characteristics of this instruction will then play a major role in reading acquisition apart from the linguistic and orthographical variables. Educational system in India places a great deal of importance to literacy not only in Indian but also foreign languages, primarily English. Typically, children acquire their first spoken language (L1) before joining formal education system. They are introduced to Indian (mostly L1) orthography and also a foreign (mostly English) orthography simultaneously or sequentially in their initial years of school, depending on the educational system. Some are also introduced to another Indian orthography as third language. With the Government of India initiatives on improving national literacy, the percentage of school going children have increased from 64.8 % to 73% (Census, 2011). A large percentage of these children are exposed to multiple spoken languages and scripts that vary in their orthographical units, linguistic rules, and also in the orthographical transparency continuum. Hence, the acquisition of reading in Indian context is unique not only because of orthographical differences but also for its multi-linguistic-literacy features.

Higher prevalence of dyslexia in multi-lingual children (Kamala & Ramganesh, 2015) warrants the professionals for early detection of symptoms, identification and training of children with dyslexia. Early identification and intervention cannot be ignored in Indian scenario, considering the increment in the ratio of school going population (Census of India, 2011), scarcity of professionals available for long-term training and rehabilitation (Kamala & Ramganesh, 2015) and also the long term multi-dimensional impact of dyslexia (Barbara, 2010). Early intervention has proven to be efficient as well as effective (Bowyer-Crane et al. 2008) and may reduce the training time required to overcome the symptoms. Fletcher, Lyon,

Fuchs, and Barnes (2006) suggests that dyslexia can be identified as early as 5 years. Mandatory screening for symptoms of dyslexia in all school going children irrespective of the language (s), socio-economic status, syllabus, and school management can prune the symptoms and mould the child's academic future for the better. However, professionals face a number of challenges in meeting these criteria.

The main limitation that would be faced by the Indian professional working towards early identification of dyslexia is the lack of tests for reading difficulties that are specifically developed for the target population. This puts Indian children at disadvantage by over or under estimation of a condition that require professional intervention. This negligence or scarce level of awareness can have a long lasting impact on their academic, cognitive, psychological, emotional and social development.

Therefore, there is a need for professionals like speech-language pathologists, psychologists, special educators, and teachers to equip themselves with the right screening and diagnostic tools for identification of children who need professional help in overcoming their dyslexia. The tool should essentially be language specific, culture specific, orthography based and independent of gender, socio-economic status, school syllabus, and other environmental factors. Also, such a tool should be reliable in its findings and validated for typical and atypical reading acquisition.

Table 1 of the previous section indicated that such tests are scarcely available and are targeted only few Indian languages. The available materials vary in their target age group and reading processes assessed. Hence, there is a need to develop screening and diagnostic tools that are not only specific but also comparable in the processes that they test, so that the profiling of reading skills in a child can be compared across languages.

Among the 5 language systems with its typical linguistic features prevailing in Indian subcontinent. Malayalam language falls into the Dravidian family. This language is spoken

by 33,066,392million people in the country and is used by the group of highest literate society among the Indian states (Census of India, 2011). This suggests the high level of emphasis on school education that exposes children to multiple ortho-linguistic systems. Kerala is also one of the most developed states of the country; the reason may be its high literacy rates that lead to academic and social growth. This completes a vicious circle that further demands literacy in the society. Children of this society, hence, should be screened for symptoms of dyslexia from early schooling years for early identification and intervention. However, there are no tools developed for this purpose.

A language, culture and orthography dependent tool that could identify symptoms of atypical reading acquisition would be of great help for Speech-Language Pathologists, Psychologists, Special Educators and typical school instructors in identifying warning signs in literacy development with a specific orthography. Identification the typical and atypical variations in reading acquisition are important in deciding the need for professional intervention in overcoming these difficulties. Further, a test that assesses all basic processes of reading acquisition with age, gender, and culture matched normative data can locate the presence and extend of deviation in performance further assisting in setting criteria for correction. This could guide the professionals in selecting the intervention goals along with performance criteria for attaining typical range of performance for each age. Performance can also be monitored across time with re-administration of the test and comparison of scores across sessions.

The present study was planned with the aim of developing a reliable, validated and standardized diagnostic tool for reading difficulties in Malayalam speaking school going children that can assess specific reading processes from early to late schooling years. This proposed test was targeted to assess the language independent processes of reading proposed by Rae and Potter (1973; 1981) in the book titled ‘Informal Reading Diagnosis: A Practical

Guide for the Classroom Teacher'. This test is widely used for assessment of reading in English language and Indian norms have been established (Monica Loomba, 1995). This was also adapted to Hindi language (Priyadarshi & Goswami, 2012), a language that is learnt by Malayalam speaking school going children as their third language in formal education system. Hence, adaptation of this test in Malayalam language would provide professionals a tool that can profile the reading development in a child across languages that the child is exposed to.

For this purpose, the widely used and comprehensive test of Early Reading Skill (ERS), originally developed by Rae and Potter (1973; 1981) was adapted to Malayalam language considering the linguistic, orthographic, and cultural variations. The output, titled Early Reading Skill (ERS) test in Malayalam (ERS-M) was subjected to various tests of reliability and criterion-validity for its applicability in assessment of typical and atypical reading development. The normative reading skill performance scores were also established for school going Malayalam speaking children of Grade I to VIII.

CHAPTER III

METHOD

The present study primarily aimed at adaptation of Early Reading Skill (ERS) test published in the text titled " Informal Reading Diagnosis (Rae & Potter, 1973; 1981)" to Malayalam language without interfering with its application in diagnosis of reading difficulty in children of Grade I to Grade VIII irrespective of gender. This adapted version of ERS in Malayalam (ERS-M) was validated for studying the typical and atypical features of acquisition of reading skills in Malayalam language. Validation of ERS-M for studying the sequential acquisition of Malayalam reading skills was established by administration of the procedure on a group of typically developing children (TDC). Similar administration of the test on children diagnosed with reading/learning disability validated the application of ERS-M in identifying atypical acquisition in children with reading/learning disability (ATDC). Attempts were also made to establish reliability in the administration procedure across sessions and across investigators. The detailed method of the current research study is described below:

Phase-I: Development of the test material and pilot study

Development of the test material

***Syllable and Word Stimuli*:** Extensive review of linguistic features of Malayalam language, its orthographical features and typical acquisition was conducted by referring various books, articles and published reports. A list of language specific features that are to be included in the stimulus material of ERS-M was prepared and Malayalam syllable/ word stimuli that satisfied these characteristics were listed. This was used for preparation of syllable/word stimuli for each section and sub-section of ERS (Rae & Potter, 1973). Cultural appropriateness, familiarity and uniformity across dialects were the prime focus during preparation of word stimuli for ERS-M.

***Picture / + Word Stimuli*:** Stimuli that required associated pictures were prepared, considering the possibility of iconic representation without interfering with cultural appropriateness, familiarity and dialectal variability. Pictures were accessed from web sources and text books and were adapted or re-drawn for the purpose of this test material.

Table 2.

Sections and Sub-sections of ERS-M.

Sections	**Subsections**	**Purpose of the sub-section**	**Levels**	**Before Pilot Study**		**After Pilot Study**	
				Num. of stimuli	**Max Score**	**Num. of Stimuli**	**Max Score**
Perceptual Discrimination Skills	Auditory Identification	Identification of the 'akshara' that corresponds to a spoken symbol.	1	30	30	30	30
	Auditory Recall	Identification of the sound the corresponds to an orthographical symbol	1	30	30	30	30

Sections and Sub-sections of ERS-M contd…..

Sections	Subsections	Purpose of the sub-section	Levels	Before Pilot Study		After Pilot Study	
				Num. of stimuli	Max Score	Num. of Stimuli	Max Score
	Auditory Discrimination	Fine discrimination of spoken symbols	1	40	40	30	30
	Visual Discrimination	Fine discrimination of non-orthographical symbols	1	22	22	20	20
		Fine discrimination of orthographical symbols	2	25	25	25	25
Syllable-Grapheme Correspondence	Beginning Consonants	Ability to segment words into its basic components and identify the sound representation (s) at specific word positions when the word is provided.	1	26	26	20	20
	Ending Consonants		1	28	28	20	20
	Consonant Blends		1	28	28	20	20
	Vowels		1	20	20	20	20

Sections and Sub-sections of ERS-M contd…

Sections	Subsections	Purpose of the sub-section	Levels	Before Pilot Study		After Pilot Study	
				Num. of stimuli	Max Score	Num. of Stimuli	Max Score
	Beginning Consonants	Ability to segment words into its basic components and identify the sound representation (s) at specific word positions when the sound representation is provided	2	30	30	30	30
	Ending Consonants		2	30	30	30	30
	Vowels		2	20	20	10	10
Blending	-	Ability to manipulate the sound system of the language to form meaningful words	1	12	12	12	12
			2	8	8	8	8
Structural Analysis	-	Ability to identify word and morphemic boundaries in words	1	15	15	15	15
			2	24	24	24	24
			3	14	14	14	14
Reading Passage	-	Ability to interact linguistically with the read material.	1	4	4	4	4
			2	4	4	4	4
			3	4	4	4	4
			4	5	5	4	4

***Adapted Test Material*:** The adapted ERS-M consisted of 5 sections with 8 sub-sections and 419 syllable/ word/ picture stimuli (Table 2).

Table 3.

Revisions incorporated in the stimulus material of ERS-M after content validity rating.

Sl. No.	**Suggestions provided by the judges**	**Number of judges who provided the suggestion**	**Action taken**
1.	Size of characters is less and spacing between stimuli is reduced. Hence the overall appearance of the test material was congested**.**	3/3	The font size and the spacing between lines were adjusted accordingly without increasing the overall stimulus bulk.
2	Instruction for the subsection PGC Level II and Superlative degree in structural analysis are ambiguous.	2/3	The instructions were elaborated to improve understanding. Examples were modified.
3	Spelling mistakes present.	3/3	The entire stimulus was proof read by a SLP proficient in the orthography of Malayalam script. Suggestions were incorporated.

***Content Validity of Stimuli*:** The adapted syllable/ word/ picture stimuli were then subjected to content validity and familiarity rating. The list of stimuli in each sub-sections along with the instructions for each task were distributed to three native Malayalam speaking qualified Speech-Language Pathologists (SLPs). Each SLP rated the stimuli and instructions for

appropriateness and familiarity using the standard rating scale developed in a previous research (Goswami, Shanbal, Samasthitha & Navitha, 2010). This nominal rating scale included ratings from 'very poor' to 'excellent' on 17 parameters of the resource material. Option to mark their suggestions for improvement of the material was also provided to all the three judges.

The suggestions, and ratings provided independently by the judges were placed before a committee of qualified linguist and SLPs. Revisions proposed by the judges were discussed and scrutinized. After deliberations, the revisions accepted by the committee were incorporated for preparation of the final stimuli of ERS-M (Table 3). The finalized stimuli were digitized using an Indian Language Software (Baraha, Version 10.10.164) and provided to a graphic designer for preparation of the layout of test material. The designed test material included an examiner's manual, stimulus booklet, response sheet and a score sheet (Appendix I). The layout of the stimulus booklet was designed in a calendar format considering the appeal, visibility, and ease of administration of the test on one-to-one basis.

Pilot Study

A pilot study was conducted on TDC with specific objectives, as mentioned below:

a) Familiarize the investigator in implementation of the test procedure of ERS-M.
b) Validate the instructions for each sub-section of ERS-M to facilitate hassle free administration of the final output.
c) Ensure familiarity and cultural appropriateness of test stimuli of ERS-M.
d) Confirm the convenience and practicability of layout of ERS-M.
e) Identify typical variability in responses.
f) Set the scoring criteria for each sub-section.

Participants: A total of 16 school going Malayalam speaking TDC from grade I to grade VIII (n=2 in each grade; 8 Males and 8 Females)

Material used: The prepared manual, stimulus booklet, response sheet and score sheet of ERS-M.

Testing Environment: The test was carried out in a well-ventilated, quiet, single room set up within the school premises. The seating was arranged with comfortable chairs and the investigator sitting across the table, facing the participant. Writing materials and other stationery items were provided to the participant before the commencement of test.

Instructions: The participant was instructed to listen to the investigator carefully and perform the tasks to the best of their ability. Investigator provided oral as well as visual (written) instructions for all tasks as given in the stimulus booklet.

Procedure: School authorities were approached for permission to collect data with a written correspondence, detailing the purpose of the visit, rationale of the work, the content of the work and a request to participate in the project. If approval was sanctioned by the higher authorities, staff members were approached for selection of possible candidates. The new test material of ERS-M was administered on two students from each grade (I-VIII grade) who satisfied the below mentioned inclusion criteria.

1. Age range of 6;0 to 12.11years.
2. Native speaker of Malayalam.
3. No history of grade repetition or poor academic performance in school and minimum of 60% marks obtained in the final examination of the previous grade (B2/ Good with a grade point of 7) in language and other subjects.

This phase of ERS-M development did not aim at assessing the accuracy of performance of the participant. Hence, no corrections or feedback about the performance was provided to the participants in the pilot study. All participants were asked to respond to all stimuli in the

pilot test administration. This was done in order to organize the stimuli from easy to most difficult, wherever possible. Also, the approximate time taken to run the entire test was estimated from the pilot phase so as to prepare a procedure time line for the next phase of validation. The responses of these 16 participants were analyzed and a scoring system was developed. The stimuli were reorganized, modified, corrected and finalized for preparation of the final stimulus of ERS-M. Summary of the revisions incorporated into the content validated stimulus after pilot study is given below.

a. The number of stimuli in few subsections (table 2) was modified so as to avoid repetitions of similar response characteristics. For example: |avasaram| അവസരം and |b^{h}a:ram| ഭാരം gave the same response of ending consonant |ra| ര.
b. Unfamiliar words or words that were not uniform in its cultural appropriateness were removed and replaced with familiar words. Eg: |vjad^{h}i|
c. Unclear/ abstract instructions of the section on Syllable-Grapheme Correspondence (subsections- vowels), Structural Analysis (Level II - Superlatives, Negation) were reframed and were made consistent by adding examples.
d. Typographical errors were rectified and overall layout and formatting was refined considering practical issues and experience during the pilot testing.
e. The response sheet was modified and formatted.

Phase-II: Administering the test on TDC.

Participants: A total of 240 Malayalam speaking TDC from grade I to VIII (n= 30 in each grade, 15 males and 15 females) participated in the study. These participants were selected based on the following inclusion criteria:

a) Age range of 6.0 to 12.11 years
b) Malayalam as their native language.

c) Exposure to more than one language and orthography

d) No delay in motor or communication milestones

e) No history or symptoms of hearing impairment.

f) No symptoms of visual impairment. However, participants with corrected vision were included.

g) No history of grade repetition or poor academic performance in school.

h) Minimum of 60% marks obtained in the final examination of the previous grade (IV th grade/ B2/ Good with a grade point of 7) in language and other subjects.

i) No complaints of psychological/ behavioural issues.

Few participants satisfying inclusion criteria were excluded because of:

1. Difficulty in comprehending instructions given in Malayalam language due to limited exposure to mother tongue, such as home returned Non-Resident Indians (NRI)
2. Limited formal training in reading Malayalam due to change of school or syllabus

Several government and private schools in the city of Thiruvananthapuram, Kerala were contacted via telephone and letter/mail correspondence. Authorities were approached officially with correspondence letter from the host institution that included information related to the rationale, importance and outcome of the current project. A short orientation session was provided to the school officials and authorities regarding reading/writing/learning difficulties and about the necessity of early identification and correction of these deficits as well as the possible role of ERS-M in this regard. After obtaining consent of the concerned school authority, the staff members of each grade (I- VIII) were approached for identification of students satisfying the inclusion criteria. Also, a request was made to send the consent form to the parents/guardians of identified participants for obtaining written consent before

enrolling the students for participation in the study. A work schedule was made in consultation with the existing academic time table so as not to disturb the routine working of the education institute.

Materials used: Final ERS- M Manual, stimulus booklet, response sheet and scoring sheet.

Testing environment: All procedures were carried out in a well lit and ventilated room. The participant and the investigator were seated across a table with minimal distractions. The same investigator administered ERS –M on all the participants to eliminate tester bias. All sessions for data collection were conducted on a one-to-one basis.

Procedure: A complete administration of ERS-M lasted for a minimum of 45 minutes. The time was distributed for various procedures as mentioned below:

a) Rapport building (5-6 minutes): The investigator introduced themselves to the participant and a light conversation about family and friends was initiated. This was done to make the participant comfortable and stress free during the administration session. Gradually, the test procedure was explained to the participants verbally and a request was made to cooperate. They were informed that completion of the procedure would earn them a re-inforcement token at the end of the session. This was done to motivate the child and also to keep the performance quality towards the better.

b) Setting up the testing environment (5-10 minutes): The participant was given a copy of response sheet, a pen and/or a pencil. The investigator placed the stimulus book between the child and themselves with the stimuli side facing the child and backside or reference side facing the investigator The investigator placed the score sheet and a pen/ or pencil in their side of the table such that the scores are not readily visible to the child. Lighting, ventilation and seating comfort of the participant was ensured before moving on with the procedure.

Figure 1. *Preferred seating for administration of ERS-M*

c) Test procedure (45-60minutes): After obtaining consent to initiate the procedure from the participant, the first section of ERS-M was introduced. The investigator read out the section specific task instruction from the reference side of the stimulus book. The first example of the section was completed jointly by the examiner and the participant while the second example was completed by the participant themselves. This ensured complete comprehension of the task before introducing the test stimuli. Each participant was given adequate time to respond and if required instructions were repeated. Also, participants were given break period while carrying out the task based on the cooperation and motivation they exhibited. The investigator completed scoring the responses simultaneous to the participant's performance. Children were reinforced appropriately for correct responses and tokens were given to each participant for being a part of the study. The complete ERS-M was administered in the same sequence to all participants. Each section and subsection was introduced with instruction and example before introducing the test stimuli. The specific instructions and examples provided for the participant are elaborated below:

Section I: Perceptual Discrimination Skills

a) Auditory Identification

This section assesses the ability of the participant to identify the akshara for sound representations in Malayalam language.

Instruction: "Carefully go through each row of akshara given below. Circle the akshara I say. Are you ready?"

Mode of response: Graphic

Example : The investigator says |ka| ക. The participant is expected to identify and circle 'ക' from the row of aksharas given as shown below.

ഛ	ത	ബ	ക	ഷ	ഊ	ല
ʧʰa	ʈa	Ba	ka	ʃa	u:	La

Scoring: Correct response without assistance- 1

Correct response with assistance- 0.5

Incorrect response- 0

b)Auditory Recall Level

This sub-section assesses the ability to identify the sound symbol that corresponds to an orthographical symbol.

Instruction: "Carefully go through each row of aksharas given below. Tell ne the name of the akshara that is underlined. Are you ready?"

Mode of response: Verbal

Example : /ʈa/ ട is the stimulus underlined in the first row of aksharas. The participant was expected to say / ʈa/ .

ല ഝ ര ത

/la/ /ɟa/ /ra/ /ʈa /

Scoring: Correct response without assistance- 1

Correct response with assistance- 0.5

Incorrect response- 0

c) Auditory Discrimination Level

This section assesses the ability to perceive the differences in spoken symbols through auditory mode. There are 30 word pairs in this section among which 20 are different and 10 are identical. The identical pairs are used to ensure that the responses given by participant are not rote.

Instruction: "I am going to say two words in a sequence. Listen carefully and say whether they are same or different. Are you ready?"

Mode of response: Verbal

Example: The investigator says the word pair /paʈa/ പത and |paʃa| പശ. The participant is expected to listen to the words carefully and say വേറെ' |ve:re| (different) for the current stimulus.

പത - പശ

/paʈa/ - /paʃa/

Similary. when the stimulus are identical (see the example below), the participant is expected to say ഒരുപോലെ |orupo:le| (Same)

പശ - പശ

/paʃa/ -/paʃa/

Scoring: Correct response without assistance- 1

Correct response with assistance- 0.5

Incorrect response- 0

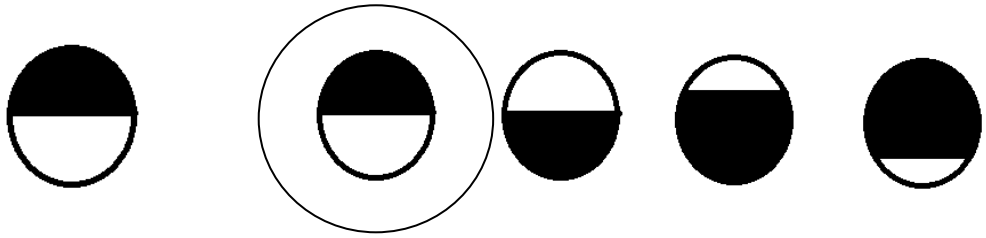
d) Visual Discrimination

This section assesses the ability to perceive the differences in visual symbols through visual mode. Two levels of discrimination were included in this sub-test: non-orthographic symbols and orthographic symbols. The instructions and scoring system for these levels were identical.

Instruction:"Look at the symbols on each row carefully. Circle the symbol that matches with the first symbol in each row. Are you ready?"

Mode of response: Graphic

Example:



ഇത ഇന ഉണ ഇത ഉത

/Iţa/ /Ina/ /Uɳa/ /Iţa/ /uţa/

Scoring: Correct response without assistance- 1

Correct response with assistance- 0.5

Incorrect response- 0

Section II: Syllable Grapheme Correspondence

This section consists of tasks that assess word segmentation skills to identify the syllable grapheme correspondence and grapheme syllable correspondence at various word positions.

a) Level 1: Syllable-Grapheme Correspondence

Beginning consonant

This sub test assesses the ability of the participant to segment the word into its basic components and identify the grapheme at the word initial position. The target response was the akshara or the first complete independent unit, thus excluding diacritic and ligatures.

Instruction:"I am going to say a word. Listen carefully and write the first akshara of the word in your answer sheet. Are you ready?"

Mode of response: Written

*Example:*The investigator says /pe:na/ പേന. The participant was expected to write /pa/ 'പ' as the initial akshara.

Scoring: Correct response without assistance- 1

Correct response with assistance- 0.5

Incorrect response- 0

Ending Consonant

This sub test assesses the ability of the participant to segment the word into its basic components and identify the grapheme at the word final position. The target response was the akshara or the last complete independent unit, thus excluding diacritic and ligatures.

Instruction: “I am going to say a word. Listen carefully and write the last akshara of the word in your answer sheet. Are you ready?”

Mode of response: Written

*Example:*The investigator says /pe:na/ പേന. The participant was expected to write /na/ ‘ന’ as the final akshara.

Scoring: Correct response without assistance- 1

Correct response with assistance- 0.5

Incorrect response- 0

Consonant Clusters

This sub test assesses the ability of the participant to segment the word into its basic components and identify the complex combination of graphemes to represent phoneme clusters (gemminates and consonant clusters) in various word positions.

Instruction: “I am going to say a word. Listen carefully and write the combined consonants or clusters in the said word in your answer sheet. Are you ready?”

Mode of response: Graphic

*Example:*The investigator says /akkam/ അക്കം. The participant was expected to write ‘ക്ക’/kka/ as the consonant cluster.

Similarly, the investigator says /avasʈ^{h}a/ അവസ്ഥ. The participant was expected to write സ്ഥ /sʈ^{h}a/ as the consonant cluster.

Scoring: Correct response without assistance- 1

Correct response with assistance- 0.5

Incorrect response- 0

Vowel Sounds

This sub-test assessed the ability of the participant to segment the word into its components and identify the vowel sound at various word positions. If there were more than one vowel in the word stimulus, the primary vowel was taken as the targeted vowel.

Instruction: "I am going to say a word. Listen carefully and write the vowel in the said word in your answer sheet. Are you ready?"

Mode of response: Graphic

*Example:*The investigator says /paṇam/ പണം. The participant was expected to write ' അ' /a/ as the vowel

Similarly, the investigator says /Chukk/ ചുക്ക് . The participant was expected to write 'ു' /u/ as the vowel

Scoring: Correct response without assistance- 1

Correct response with assistance- 0.5

Incorrect response- 0

b) Level 2: Grapheme-Syllable Correspondence

This level assessed the ability of the participant to relate a grapheme to the spoken phoneme in a given word position. The participant was provided with the akshara before the stimuli and was asked to identify if the stimuli comprised of the akshara in specific word position indicated by the investigator. The sub-section on identification of vowel sound did not test grapheme-syllable correspondence but required identification of diacritics as vowels in multiple stimuli. The task was higher

in the difficulty continuum and hence included in this level. This difference was due to Malayalam orthography specific features, as discussed in Section II.

Beginning consonant

This section assessed if the participant could identify if the given akshara was present in the initial position of the spoken word stimuli. The investigator read out each word in the given row, one after the other with a pause of 2 seconds between words. The participant was expected to mark his/her response after each spoken stimulus in the row.

Instruction: "I am going to say a few words. Listen carefully and if the word I say starts with ____(say the target akshara), put a ✓ here (point to the spaces provided in the answer sheet). If the word I say do not start with ___(say the target akshara), put a X here (point to the space provided in the answer sheet). Are you ready?"

Mode of Response: Graphic

Example: The investigator says the instruction with /ka/ ക as the target akshara and then reads out the following words with 2 second pause between words.

/kari/	/paka/	/ku:tt/	/gada/	/ka:jal/
കരി	പക	കൂട്ട്	ഗദ	കായൽ

The participant was expected to mark the following responses in the answer sheet after each word stimulus.

✓ × ✓ × ✓

Scoring: Each response (✓/×) was scored for its accuracy. Hence, the maximum score for each stimulus set was 5. The scoring system was as follows:

Correct response without assistance- 1

Correct response with assistance- 0.5

Incorrect response- 0

Ending Consonant

This section assessed if the participant could identify if the given akshara was present in the final position of the spoken word stimuli. The investigator read out each word in the given row, one after the other with a pause of 2 seconds between words. The participant was expected to mark his/her response after each spoken stimulus in the row.

Instruction: "I am going to say a few words. Listen carefully and if the word I say ends with ____(say the target akshara), put a ✓ here (point to the spaces provided in the answer sheet). If the word I say do not end with ___(say the target akshara), put a X here (point to the space provided in the answer sheet). Are you ready?"

Mode of Response: Graphic

Example: The investigator says the instruction with /pa/ പ as the target akshara and then reads out the following words with 2 second pause between words.

തപം	ബിംബം	പാപി	പുലി	കഫം
/t̪apam/	/bimbam/	/pa:pi/	/puli/	/kap^{h} am/

The participant was expected to mark the following responses in the answer sheet after each word stimulus.

✓ × ✓ × ×

Scoring: Each response (✓/×) was scored for its accuracy. Hence, the maximum score for each stimulus set was 5. The scoring system was as follows:

Correct response without assistance- 1

Correct response with assistance- 0.5

Incorrect response- 0

Vowel Sounds:

This section assessed if the participant could identify if the target vowel was present in multiple spoken word stimuli. The investigator read out each word in the given row, one after the other with a pause of 2 seconds between words. The participant was expected to mark his/her response after each row of stimuli.

Instruction: "Listen carefully. I am going to say three words. Two of these words have the same vowels in them. Identify these words with the same vowel and write the akshara of the vowel here (point to the spaces provided in the answer sheet). Are you ready?"

Mode of Response: Graphic

Example: The investigator reads out the following words with 2 second pause between words.

രാവ്	തബല	താളം
ra:vu	tabala	ţa:lam

The participant was expected to write 'ആ' /a:/ as it is common in /ra:vu/ രാവ് and /ţa:lam/ താളം.

Scoring: Correct response without assistance- 1

Correct response with assistance- 0.5

Incorrect response- 0

Section III: Blending

This section consisted of tasks that assess the ability of the participant to hold on to a symbol (orthographic/ non-orthographic) and manipulate them to derive meaning from the visual information provided. The blending sub-test included two tasks that varied in difficulty continuum.

a) Level 1: Picture + Orthography Blending

The sub-section assessed the participant's ability to join the idea of a picture to written orthographic symbol and to derive a meaningful word from the combination.

Instruction: "Look at these carefully. There is a picture and a written word. Join these two together and form a single word. Write the word in your answer sheet. Are you ready?"

Mode of Response: Graphic

Example: The investigator shows the first stimulus page in the blending section.

കൊടി koṭi + 

The participant was expected to write the response as കൊടിമരം /koṭimaram/

Scoring: Correct response without assistance- 1

Correct response with assistance- 0.5

Incorrect response- 0

b) Level II: Blending boundary

This section assessed the ability of the participant to identify the word boundary indicated among a set of other possible boundaries.

"I am going to show you some words that can be split in different ways. Look at these words carefully and circle the combination that I say. Are you ready?"

Mode of Response: Graphic

Example: The investigator shows the first stimulus and says കണ്ട് + മുട്ടി

/kandə +muitt/ with one second pause at the blending boundary. The participant was expected to identify the written combination from the set of three possible word boundaries and circle it as shown below

കണ്ടു+ മുട്ടി കണ്ട്+ മുട്ടി കണ്ടു+ ഉട്ടി

Scoring: Correct response without assistance- 1

Correct response with assistance- 0.5

Incorrect response- 0

Section IV: Structural Analysis

This section assessed the ability of the reader to apply their knowledge of grammar to read a written/typed material. The section included three sub-sections.

a) Word identification

This sub-section assessed the participant's ability to identify and select the most appropriate word in a given grammatical context.

Instruction: " Read each sentence carefully and fill in the blanks with appropriate word from the options given. Are you ready?"

Mode of Response: Graphic

Example: The investigator shows the first stimulus to the participant.

കാക്കയ്ക്ക് _____ നിറം ആണ്.

[കറുപ്പ് , ചുവപ്പ്, പച്ചപ്പ്]

/ka:kkajkk _____ niram aanə/

[/ karupp/, /ʧuvapp/, /paʧʧapp/]

The participant was expected to write the word കറുപ്പ്/ karupp/ in the blank space.

Scoring: Correct response without assistance- 1

Correct response with assistance- 0.5

Incorrect response- 0

b) Morpheme Identification

This section assessed the participant's ability to identify the affixes or suffixes to a written word (written morphemes) that indicated a meaning.

Instruction: "Read each row of words carefully. In each row, identify the word that indicate _____(Target morpheme) and circle it."

Mode of Response: Graphic

Example: The investigator instructs the participant with 'Plurals' as the target morpheme and points to the first row. The participant was expected to circle the word that indicated plural as shown below:

പൂക്കൾ	പൂവ്	താങ്കൾ
/pu:kkal/	/pu:vu/	/ţa:ngal/

Scoring: Correct response without assistance- 1

Correct response with assistance- 0.5

Incorrect response- 0

c) Root word Identification

This section assessed the ability of the participant to identify the root word (the base word to which one or more affixes is added) from multiple word stimuli.

Instruction:

"Read the four words in each row carefully. Three of these words have one common base word that cannot be separated. But the fourth word does not have this base word. Identify this one without the base word and circle it."

Mode of Response: Graphic

Example: The investigator shows the first row of words. The participant was expected to circle the word that does not have a suffix or prefix as shown below:

പൂർവ്വകാലം സന്തോഷപൂർവം പൂർവസ്ഥിതി പൂർവികം

Scoring: Correct response without assistance- 1

Correct response with assistance- 0.5

Incorrect response- 0

Section IV: Oral Reading

This section included four passages in the order of decreasing level of cohesion, increasing number of grammatical units and concept complexity. Four questions were derived from each of these passages. They were arranged in increasing complexity of construct. The expected answers varied from simple single word utterances to complete meaningful sentences with increased level of reading passages. After providing the passage appropriate time shall be provided to the participant for reading and comprehension. As observed from the pilot study, the following are the maximum duration required for each passage comprehension for typical readers:

Level 1: 3 minutes

Level 2: 5 minutes

Level 3: 5-8 minutes

Level 4: 5-8 minutes

Reminder for indicating completion shall be provided two minutes before the expected time.

*Instruction: "*Read this passage carefully. After you are done, tell me. I will ask you few questions based on this passage. Write your answer in the answer sheet. Are you ready?"

Mode of Response: Graphic

Example: The investigator asks the first question following passage 1:

1. മിന്നുവിന് എത്ര പൂച്ചക്കുട്ടികൾ ഉണ്ടായിരുന്നു?

   /minnuvinə eṯra puːʧʧakkuʈʈikaḷ unʈaːjirunnu??/

The participant was expected to write the answer shown below:

രണ്ട് /ranʈə/

Scoring: Correct response without assistance- 1

Correct response with assistance- 0.5

Incorrect response- 0

Analysis: The responses obtained from each participant were scored manually as per the scoring system developed for each section and sub-test. The raw score of 240 participants were digitized and fed into statistical software for further analysis. Appropriate statistical tests were run on the raw data to answer the specific objectives of the study.

Phase-III: Establishing reliability and validity of the test.

Inter-judge Reliability

A random set of 24 audio-video recorded samples of the final data (10%) was presented to another qualified Malayalam speaking SLP. Scores for each task was provided independently in an ERS-M score sheet. The scores of the investigator (Judge 1) and the second qualified Malayalam speaking SLP (Judge 2) were compared using statistical methods for establishing inter-judge reliability.

Test retest Reliability

ERS-M was administered again on a set of 24 TDC selected from the 240 TDC enrolled for the study. The scores of the test 1and test 2 were compared using statistical methods for establishing test – retest reliability.

Validity

Population validity

The complete ERS-M was administered in a new group of 24 TDC fulfilling all the inclusion criteria considered for the study. Means scores obtained by 24 TDC were compared with the normative data derived in Phase II for establishing population validity.

Discriminant validity

This phase of ERS-M developed ensured that the test developed for identification and diagnosis of reading difficulty could identify children with reading difficulties effectively.

Participants: A total of 10 children (n=10) diagnosed with learning/reading difficulties participated in this phase of study. These children were selected from special schools and training centers for learning difficulty, based on the following inclusion criteria.

Inclusion criteria

1. Age range of 6.0 to 12.11 years
2. Malayalam as their native language.
3. Exposure to more than one language and orthography
4. No history or symptoms of hearing impairment.
5. No symptoms of visual impairment. However, participants with corrected vision were included.

Few participants satisfying inclusion criteria were excluded because of:

1. Difficulty in comprehending instructions given in Malayalam language due to limited exposure to mother tongue, such as home returned Non-Resident Indians (NRI)
2. Limited formal training in reading Malayalam due to change of school or syllabus

Materials used: The final ERS-M Manual, stimulus booklet and score sheet.

Testing environment: All procedures were carried out in a well lit and ventilated room. The participant and the investigator were seated across a table with minimal distractions. The same investigator administered ERS –M on all the participants to eliminate tester bias. All sessions for data collection were conducted on a one-to-one basis.

Procedure: Procedure carried out for administration of ERS-M was similar to TDC on all aspects, except for few adaptations made as mentioned below:

a) Lengthier time was taken to establish rapport with the child as most of the children were shy and withdrawn to communicate with a new person such as the investigator.
b) Instructions were explained multiple times.
c) Each participant was given additional time to respond than TDC and if required instructions were repeated.
d) Participants were given break period, which was also lengthier and more frequent than TDC while carrying out the task based on the cooperation and motivation they exhibited.
e) On consecutive 3 erroneous or no responses, a sub-test was discontinued and the next sub-test was introduced without providing a positive or negative feedback on performance.

Analysis: The responses obtained from each participant were scored manually as per the scoring system developed for each section and sub-test. The raw score of 10 participants were digitized and fed into statistical software for further analysis.

CHAPTER IV

RESULTS

The present study aimed to adapt Early Reading Skill (ERS) test (Rae & Potter, 1973; 1981) to Malayalam language (ERS-M) without interfering with its application, reliability, or validity in assessment of typical and atypical reading abilities in Malayalam speaking school going children. The content of the adapted material was subjected to validity check by target users and a pilot study was conducted for feasibility of the test procedure (Detailed in Chapter III). The final adapted material was administered on a representative group of typically developing children (TDC, n= 240) from Grade I to VIII for establishing the normative scores for each section and its sub-tests. The scores obtained were then tested for reliability and validity measures using statistical procedures. The test was also administered on another group of TDC (n= 24) and also children diagnosed with reading difficulties/ dyslexia (n= 10) for validation of scores in differentiating the typical and atypical group based on ERS-M scores.

The raw scores obtained by each participant were subjected to statistical analysis using Statistical Package for Social Sciences (SPSS, Version 20). Descriptive statistics (Mean and Standard deviation) was obtained for TDC across gender in each grade (Table 4). This data was treated for further analysis with the purpose of meeting the study objectives as mentioned in the previous chapters. Shapiro Wilk's test of normality was run on the raw scores to study the distribution of data. The result indicated that the data did not follow a normal distribution (AI: $W = 0.137$, $p < 0.05$; AR: $W=0.552$, $p < 0.01$; VD-1: $W=0.38$, $p < 0.05$; VD-2: $W = 0.285$, $p < 0.01$; BC-1: $W=0.418$, $p < 0.01$; EC-1: $W=0.636$, $p < 0.01$; CC-1: $W=0.823$, $p < 0.01$; V-1: $W=0.725$, $p < 0.01$; BC-2: $W=0.655$, $p < 0.01$; EC-2: $W=0.567$, $p < 0.05$; V-2: $W=0.611$, $p < 0.05$; Bl-1: $W=0.661$, $p < 0.05$; Bl-2: $W=0.570$, $p < 0.01$; SA-1:

W=0.509, $p < 0.01$; SA-2: W=0.611, $p < 0.01$; SA-3: W=0.796, $p < 0.05$; RP-1: W=0.697, $p < 0.05$; RP-2: W=0.638, $p < 0.05$; RP-3: W=0.742, $p < 0.05$; RP-4: W=0.581, $p < 0.05$).

Table 4.

Mean and standard deviation of scores obtained by TDC in various sections and sub-tests of ERS-M.

Grade	I		II		III		IV		V		VI		VII		VIII	
Sections	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
AI	28.90 (2.86)	30.00 (0)	29.80 (0.51)	29.40 (0.83)	30.00 (0)	30.00 (0)	30.00 (0)	29.90 (0.25)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)
AR	29.10 (0.74)	29.50 (0.50)	29.50 (0.74)	29.20 (0.77)	29.00 (0.79)	29.20 (0.77)	29.00 (0.79)	29.80 (0.41)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)
AD	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)	29.73 (0.60)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)
VD-1	19.50 (0.91)	19.60 (0.61)	20.00 (0)	19.60 (0.72)	19.80 (0.56)	19.90 (0.25)	20.00 (0)	20.00 (0)	20.00 (0)	20.00 (0)	20.00 (0)	19.70 (1.03)	20.00 (0)	20.00 (0)	20.00 (0)	20.00 (0)
VD-2	23.90 (1.32)	24.60 (0.63)	24.10 (0.70)	24.2 (0.70)	24.6 (0.63)	24.4 (1.55)	24.8 (0.35)	24.9 (0.25)	25.0 (0)	25 (0)	25 (0)	24.9 (0.25)	25 (0)	25 (0)	25 (0)	25 (0)
BC-1	17.40 (1.5)	18.86 (0.74)	18.46 (1.3)	19.00 (0.88)	19.2 (1.14)	19.06 (1.33)	19.33 (0.97)	19.73 (0.45)	19.80 (0.41)	19.80 (0.41)	20.00 (0)	19.30 (1.29)	20.00 (0)	20.00 (0)	20.00 (0)	20.00 (0)
EC-1	14.7 (2.01)	14.4 (1.8)	16.0 (1.06)	16.26 (0.70)	17.5 (1.3)	18.3 (1.1)	18.06 (1.83)	18.9 (0.79)	19.2 (0.70)	19.8 (0.41)	19.33(0.81)	19.4 (1.05)	19.6 (0.63)	19.8 (0.35)	20 (0)	20 (0)
CC-1	-	-	11.2 (2.6)	10.7 (2.21)	14.5 (3.2)	16.0 (1.5)	16.93 (2.28)	17.83 (1.4)	18.60 (0.82)	18.73 (0.70)	17.7 (1.48)	18.13 (1.12)	18.4 (1.05)	19.86 (0.74)	19.1 (0.53)	19.06 (0.44)
V-1	-	-	-	-	15.86 (1.5)	17.33 (1.9)	17.20 (1.8)	18. (1.2)	19.53 (0.53)	19.86 (0.41)	18.66 (2.52)	19.3 (1.2)	19.66 (0.61)	19.5 (0.74)	19.92 (0.26)	19.8 (0.34)
BC-2	-	-	-	-	29.40 (1.0)	29.40 (1.1)	29.33 (0.97)	29.66 (0.73)	29.26 (0.88)	29.73 (0.59)	29.66 (0.61)	28.86 (0.12)	30.00 (0)	30.00 (0)	30.00 (0)	30.00 (0)

Mean and standard deviation of scores obtained by TDC in various sections and sub-tests of ERS-M contd…

Grade / Sections	I		II		III		IV		V		VI		VII		VIII	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
EC-2	-	-	-	-	27.66 (1.8)	27.50 (1.6)	27.20 (3.5)	28.86 (0.91)	29.00 (1.3)	29.00 (1.06)	28.66 (1.6)	28.33 (2.3)	29.86 (0.35)	29.99 (0.25)	30.00 (0)	30.00 (0)
V-2	-	-	-	-	8.46 (1.4)	8.73 (1.5)	8.73 (0.96)	8.73 (1.2)	9.73 (0.5)	9.46 (0.74)	9.46 (1.06)	9.2 (0.5)	9.76 (0.35)	9.86 (0.35)	10.00 (0)	9.86 (0.34)
Bl-1	-	-	9.26 (2.08)	8.66 (2.22)	10.533 (1.5)	11.20 (1.4)	11.66 (0.63)	116.6 (0.73)	12.00 (0)	12.00 (0)	11.40 (1.8)	11.40 (1.8)	12.00 (0)	12.00 (0)	12.00 (0)	12.00 (0)
Bl-2	-	-	6.7 (1.03)	6.5 (1.03)	7.5 (0.63)	7.73 (0.45)	7.80 (0.41)	7.80 (0.56)	8.00 (0)	8.00 (0)	7.86 (0.25)	7.86 (0.51)	8.00 (0)	8.00 (0)	8.00 (0)	8.00 (0)
SA-1	-	-	10.33 (1.04)	10.53 (0.99)	13.0 (1.5)	13.4 (1.5)	13.8 (1.08)	14.3 (0.81)	14.6 (0.48)	14.8 (0.41)	14.4 (2.06)	14.6 0.81	15 (0)	15 (0)	15 (0)	15 (0)
SA-2	-	-	-	-	-	-	11.93 (1.5)	11.66 (3.85)	15.46 (1.3)	15.8 (1.1)	22.00 (2.2)	22.2 (2.9)	22.6 (1.5)	22.60 (1..4)	23.64 (0.63)	23.68 (0.60)
SS-3	-	-	-	-	-	-	11.73 (0.88)	12.33 (1.04)	12.33 (0.5)	12.3 (0.14)	12.06 (2.42)	12.66 (2.5)	13.33 (1.29)	14.00 (0)	13.92 (0.26)	13.50 (1.5)
RP-1	-	-	-	-	-	-	3.73 (0.45)	3.86 (0.41)	3.93 (0.25)	4.00 (0)	3.93 (0.2)	3.92 (0.51)	4.00 (0)	4.00 (0)	4.00 (0)	4.00 (0)
RP-2	-	-	-	-	-	-	-	-	2.20 (1.2)	2.20 (0.70)	0.75 (1.18)	3.86 (0.75)	3.8 (0.41)	3.46 (0.63)	3.96 (0.26)	3.81 (0.40)
RP-3	-	-	-	-	-	-	-	-	-	-	3.00 (1.4)	2.06 (0.96)	2.06 (0.70)	2.86 (0.63)	2.85 (0.66)	2.62 (0.5)
RP-4	-	-	-	-	-	-	-	-	-	-	-	-	1.73 (0.88)	2.00 (0.75)	2.50 (0.85)	2.12 (0.61)

Note: AI: Auditory Identification; AR: Auditory Recall; AD: Auditory Discrimination;VD-1: Visual Discrimination (Level 1); VD-2: Visual Discrimination (Level 2); BC-1: Beginning Consonant (Level 1); EC-1: Ending Consonant (Level 1); CC-1: Consonant Cluster (Level 1);V-1: Vowel Sounds (Level 1); BC-2: Beginning Consonant (Level 2); EC-2: Ending Consonant (Level 2); V-2: Vowel Sounds (Level 2); Bl-1: Blending (Level 1); Bl-2: Blending (Level 2); SA-1: Structural Analysis (Level 1); SA-2: Structural Analysis (Level 2); SA-3: Structural Analysis (Level 3); RP-1: Reading Passage (Level 1); RP-2: Reading Passage (Level 2); RP-3: Reading Passage (Level 3), RP-4: Reading Passage (Level 4).

Hence further analysis was carried out using appropriate non-parametric tests for each comparison. The statistical test run, statistic obtained and interpreted results of each analysis are presented under the following headings.

1. Effect of gender on section and sub-test scores of ERS-M
2. Effect of grades on section and sub-test scores of ERS-M
3. Sequence of mastery of reading skills in ERS-M
4. Inter-judge and intra-judge reliability of scores in ERS-M
5. Population and Discriminant validity of ERS-M

1. Effect of gender on section and sub-test scores of ERS-M

The descriptive statistics data obtained (Table 4) suggested that the scores obtained in sub-tests of ERS-M did not differ significantly across gender. This hypotheses was subjected to verification using Mann-Whitney U-test with gender as the between subject factor. The results accepted the null hypotheses and revealed no significant difference in sub-test scores of ERS-M across gender (AI: $|Z|= 0.257$, $p > 0.05$;AR: $|Z|= 0.212$, $p > 0.05$; AR: $|Z|= 1.008$, $p > 0.05$; VD-1: $|Z|= 0.211$, $p > 0.05$; VD-2: $|Z|= 1.518$, $p > 0.05$; BC-1: $|Z|= 0.628$, $p > 0.05$; EC-1: $|Z|= 1.095$, $p > 0.05$; CC-1: $|Z|= 0.777$, $p > 0.05$; V-1: $|Z|= 1.034$, $p > 0.05$; BC-2: $|Z|= 0.932$, $p > 0.05$; EC-2: $|Z|= 0.284$, $p > 0.05$; V-2: $|Z|= 0.116$, $p > 0.05$; Bl-1: $|Z|= 0.465$, $p > 0.05$; Bl-2: $|Z|= 0.376$, $p > 0.05$; SA-1: $|Z|= 0.835$, $p > 0.05$; SA-2: $|Z|= 0.278$, $p > 0.05$; SA-3: $|Z|= 0.661$, $p > 0.05$; RP-1: $|Z|= 0.262$, $p > 0.05$; RP-2: $|Z|= 0.447$, $p > 0.05$; RP-3: $|Z|= 0.956$, $p > 0.05$; RP-4: $|Z|= 0.211$, $p > 0.05$). Therefore, it was concluded that the performance scores in all the sub-tests of ERS-M was not significantly different across male and female TDC. Therefore, for all further analysis, male and female TDC were considered as one group. Table 5 shows the combined mean, median and standard deviation of TDC across grades. This data was used for all further statistical analysis as described in the sections below.

Table 5.

Mean, Median and Standard deviation of ERS-M sub-test scores obtained by participants across grades.

Grade	I		II		III		IV		V		VI		VII		VIII	
	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median
AI	29.46 (1.94)	30.00	29.66 (0.71)	30.00	30.00 (0.0)	30.00	29.96 (0.18)	30.00	30.0 (0.0)	30.00	30.0 (0.00)	30.00	30.0 (0.00)	30.00	30.0 (0.00)	30.00
AR	29.36 (0.76)	29.00	30.0 (0.0)	30.00	29.13 (0.77)	29.00	29.76 (0.50)	30.00	30 (0.0)	30.00	30.0 (0.0)	30.00	30.0 (0.0)	30.00	30.0 (0.0)	30.00
AD	29.33 (0.66)	30.00	30.0 (0.0)	30.00	30.0 (0.0)	30.00	29.96 (0.18)	30.00	30 (0.0)	30.00	30 (0.0)	30.00	30 (0.0)	30.00	30 (0.0)	30.00
VD-1	19.60 (0.77)	20.00	19.33 (1.99)	20.00	19.86 (0.43)	20.00	19.97 (2.5)	20.00	20.0 (0.0)	20.00	20.0 (0.0)	20.00	20.0 (0.0)	20.00	20.0 (0.0)	20.00
VD-2	24.26 (1.11)	25.00	24.20 (0.80)	24.00	24.53 (1.16)	25.00	24.90 (0.30)	25.00	25.0 (0.0)	25.00	25.0 (0.0)	25.00	25.0 (0.0)	25.00	25.0 (0.0)	25.00
BC-1	18.13 (1.40)	18.00	18.76 (1.13)	19.00	19.1 (1.22)	20.00	19.5 (0.77)	20.00	19.8 (0.40)	20.00	19.8 (0.18)	20.00	19.7 (0.50)	20.00	20.0 (0.0)	20.00
EC-1	14.60 (1.92)	15.00	16.13 (0.89)	16.00	17.9 (1.25)	18.00	18.50 (1.45)	19.00	19.26 (0.63)	19.00	19.36 (0.92)	20.00	18.63 (0.92)	20.00	20 (0.0)	20.00
CC-1	00.00	00.00	11.0 (2.4)	10.00	15.26 (2.62)	16.00	17.4 (1.92)	18.00	18.66 (0.54)	19.00	17.93 (1.3)	18.00	19.6 (0.67)	19.00	19.1 (0.48)	19.00
V-1	00.00	00.00	8.9 (2.14)	00.00	16.6 (1.92)	17.00	17.6 (1.58)	18.00	19.66 (0.54)	20.00	19.0 (2.0)	20.00	19.6 (0.67)	20.00	19.9 (0.30)	20.00
BC-2	00.00	00.00	00.00	00.00	29.43 (1.07)	30.00	29.46 (0.86)	30.00	29.5 (0.77)	30.00	29.3 (0.9)	30.00	30.0 (0.0)	30.00	30.0 (0.0)	30.00
EC-2	00.00	00.00	00.00	00.00	27.60 (1.71)	28.00	28.03 (2.65)	29.00	29.0 (1.2)	29.00	28.5 (1.9)	29.00	29.9 (0.30)	30.00	30.0 (0.0)	30.00
V-2	00.00	00.00	00.00	00.00	8.56 (1.47)	9.00	8.73 (1.11)	9.00	9.6 (0.67)	10.00	9.3 (1.2)	10.00	9.8 (0.4)	10.00	9.9 (0.25)	10.00
BL-1	00.00	00.00	8.1 (2.14)	00.00	10.86 (1.54)	12.00	11.6 (0.67)	12.00	12 (0.0)	12.00	11.43 (1.7)	12.00	12.0 (0.0)	12.00	12.0 (0.0)	12.00

Mean, Median and Standard deviation of ERS-M sub-test scores obtained by participants across grades contd….

Grade	I		II		III		IV		V		VI		VII		VIII	
	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median
BL-2	00.00	00.00	6.6 (1.15)	00.00	7.63 (0.55)	8.00	7.80 (0.48)	8.00	8 (0.0)	8.00	8.00 (0.4)	8.00	8.0 (0.0)	8.00	8.0 (0.0)	8.00
SAT-1	00.00	00.00	10.43 (0.81)	00.00	13.26 (1.50)	14.00	14.06 (0.98)	14.00	14.7 (0.44)	15.00	14.5 (1.5)	15.00	15.0 (0.0)	15.00	15 (0.0)	15.00
SAT-2	00.00	00.00	00.00	00.00	00.00	00.00	11.7 (2.89)	12.00	15.6 (0.44)	16.00	22.1 (2.6)	23.00	22.6 (1.47)	23.00	23.6 (0.60)	24.00
SAT-3	00.00	00.00	00.00	00.00	00.00	00.00	12.03 (1.01)	12.00	12.3 (1.2)	12.00	12.3 (2.4)	14.00	13.6 (0.9)	14.00	13.7 (1.1)	14.00
RP-1	00.00	00.00	00.00	00.00	00.00	00.00	3.76 (0.43)	4.00	3.96 (0.18)	4.00	3.9 (0.4)	4.00	4.0 (0.0)	4.00	4.0 (0.0)	4.00
RP-2	00.00	00.00	00.00	00.00	00.00	00.00	2.00 (0.80)	00.00	2.26 (0.98)	2.00	3.1 (0.7)	3.00	3.6 (0.55)	4.00	3.86 (0.34)	4.00
RP-3	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	1.7 (1.1)	2.00	2.4 (0.77)	2.5.00	2.7 (0.58)	3.00
RP-4	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00		00.00	1.8 (0.81)	2.00	2.3 (0.74)	2.00

Note: AI: Auditory Identification; AR: Auditory Recall; AD: Auditory Discrimination;VD-1: Visual Discrimination (Level 1); VD-2: Visual Discrimination (Level 2); BC-1: Beginning Consonant (Level 1); EC-1: Ending Consonant (Level 1); CC-1: Consonant Cluster (Level 1);V-1: Vowel Sounds (Level 1); BC-2: Beginning Consonant (Level 2); EC-2: Ending Consonant (Level 2); V-2: Vowel Sounds (Level 2); Bl-1: Blending (Level 1); Bl-2: Blending (Level 2); SA-1: Structural Analysis (Level 1); SA-2: Structural Analysis (Level 2); SA-3: Structural Analysis (Level 3); RP-1: Reading Passage (Level 1); RP-2: Reading Passage (Level 2); RP-3: Reading Passage (Level 3), RP-4: Reading Passage (Level 4).

2. Effect of grades on section and sub-test scores of ERS-M

The combined group scores for each grade (Table 5) were used for analysis of effect of grade on test scores and it was observed that the scores in each sub-test improved towards higher grades. Few sub-test scores (Example: AI, AD) reached maximum scores in the early grades while few other scores continued to improve till grade VIII (Example: CC-1, RP-1). This indicated that, there is, probably, a development trend in sub-test performance scores with grades. This hypothesis was subjected to statistical analysis using Kruskal Wallis One-way ANOVA at 95% confidence level ($p < 0.05$).

In support of the observation made from Table 5, the results of statistical analysis rejected the null hypotheses and showed significant effect of grades on all sub-test scores (AI: $H(7)= 28.84$, $p < 0.05$; AR: $H(7)=90.38$, $p < 0.05$; VD-1: $H(7)=25.76$, $p <0.05$; VD-2: $H(7)=74.95$, $p <0.05$; BC-1: $H(7)=100.31$, $p <0.05$; EC-1: $H(7)=170.20$, $p <0.05$; CC-1: $H(7)=173.76$, $p <0.05$; V-1: $H(7)=193.88$, $p <0.05$; BC-2: $H(7)=184.36$, $p <0.05$;EC-2: $H(7)=185.34$, $p <0.05$; V-2: $H(7)=174.81$, $p <0.05$; Bl-1: $H(7)=173.41$, $p <0.05$;BL-1: $H(7)=169.79$, $p <0.05$;BL-2: H(7)=, $p <0.05$; SA-1: $H(7)=193.21$, p <0.05; SA-2: $H(7)=225.50$, $p <0.05$; SA-3: $H(7)=222.10$, $p <0.05$; RP-1: $H(7)=226.19$, $p <0.05$; RP-2: $H(7)=221.77$, $p <0.05$; RP-3: $H(7)=215.61$, $p <0.05$; RP-4: $H(7)=234.00$, $p <0.05$) except AD ($H(7)= 7.0$,$p>0.05$) In sub-test AD, maximum score was obtained by participants from Grade I itself and the performance was maintained till Grade VIII. It may be inferred that TDC acquire AD skills before Grade I, probably as a pre-requisite to reading development. All other sub-test scores showed a significant improvement with higher grades suggesting a development trend in these reading skills as assessed using ERS-M.

Since significant effect of grade was obtained for all the subsections except AD, a post hoc analysis was carried out using Mann Whitney U test to understand the differences in performance of participants in various sub-sections. The results are summarized in Table 6 to

Table 9. Mann Whitney U test run for Grade I (Table 6) across grades II to VIII showed significant differences in CC-1, V-1, BL-2, SA-1 and SA-3 in all the grades, indicating a development of these skills after grade I. The scores of BC-1, EC-1, BC-2, EC-2, V-2 and BL-1 indicted significant difference from Grade III onwards suggesting that these skills start developing only after grade III and remains in the baseline measure from Grade I to Grade III. The subsections AR, SA-2, SA-3, RP-1 and RP-2 were significantly different from grade IV to grade VIII whereas VD-1 showed significant differences only from Grade V onwards. The remaining subsections of RP-3 and RP-4 showed significant differences between Grade I and Grade VII and VIII.

Similar comparisons were carried out for grade II (Table 7) with higher grades (III to VIII). The results indicated that AI, VD-2, EC-1, CC-1, V-1, BC-2, EC-2, V-2, BL-1, BL-2, and SA-1 were significantly different between grades II to VIII. Other sub-tests such as AR, VD-1, BC-1, SA-2, SA-3, and RP-1 indicated significant differences only from grade VI onwards whereas, the sub-section RP-2 showed no significant difference till Grade VI. Further, sub-sections RP-3 and RP-4 showed significant difference in the higher grades VI, VII and VIII.

Comparison of Grade III to the higher grades (Table 8) revealed that AR, V-1, SA-2, SA-3, RP-1and RP-2 were significantly different in all the grades. The findings of the comparison indicated that differences in reading scores reduced from grade III to grade VIII except in few sub-tests such as VD-1, SA-3 and RP-4 that had significant differences across grades. Table 8 also includes comparison of grade IV across higher grades using Mann Whitney U Test. The results showed that AR, V-1, SA-1. SA-2, SA-3, RP-2 showed significant difference across grades V, VI, VII and VIII where as AI, VD-1 did not show any significant differences in the comparisons carried out. Certain sub sections showed significant difference in only one comparison, they include VD-2 (grade VIII), RP-1 (grade V) and RP-4 (Grade VII) when

compared with Grade IV. Grade VI was found to be significantly different with two of the higher grades (VII and VIII) in BC-1, BC-2 and EC- 2. Further, the results revealed that in EC-1, CC-1, V-2, BL-1, and BL-2 grade IV differed significantly with Grade V, VII and VIII while RP-3 showed difference in grades VI, VII and VIII.

Comparison of Grade V with grade VI, VII and VIII revealed significance across all the three grades in RP-4, RP-3, RP-1 and SS-3 whereas AI, AR, VD-1, VD-2, BC-1, SA-1 and RP-2 failed to show the same. It was also observed that SA-2, V-2, EC-2, CC-1and EC-1 were significantly different in grade VII and VIII when compared. The scores of BC-2 and BL-2 showed significance in grade VIII and VI respectively. In the following analysis where comparison of Grade VI with grade VII and VIII was estimated, CC-1, BC-2, EC-2, BL-1, SA-1, SA-3, RP-2, RP-3, and RP-4 were found significantly different in grade VII. Grade VIII showed significance with grade VI in the sub-tests RP-1, AI, AR, VD-1and VD-2. In the final comparison between grade VII and VIII, significance was obtained only for AR.

Table 6.

Comparison of ERS-M sub-test scores of Grade I TDC across grades II to VIII. Given are the |Z| values and the significances are indicated.

GRADE I							
Sections	|Z|						
	II	III	IV	V	VI	VII	VIII
AI	6.38	2.05*	1.419	2.051*	2.051*	2.051*	2.051*
AR	0.38	0.97	2.85*	4.79**	4.79**	4.79**	4.79**
VD-1	0.00	1.66	1.00	3.00*	2.40*	3.00*	3.00*
VD-2	0.57	1.57	2.45*	4.20**	3.85**	4.20**	4.20**
BC-1	0.85	3.15*	3.20*	5.49*	5.52**	6.40**	6.40**

Comparison of ERS-M sub-test scores of Grade I TDC across grades II to VIII. Given are the |Z| values and the significances are indicated contd…

EC-1	1.82	5.76**	4.38**	6.70**	6.60**	6.85**	7.12**
CC-1	3.47*	6.98**	5.95**	7.05**	7.01**	7.03**	7.20**
V-1	6.80**	7.13**	7.00**	7.30**	7.20**	7.29**	7.51**
BC-2	0.00	7.29**	7.13**	7.27**	7.38**	7.68**	7.68**
EC-2	0.00	7.13**	7.27**	7.17**	7.15**	7.51**	7.68**
V-2	0.00	7.15**	7.13**	7.29**	7.24**	7.39**	7.56**
Bl-1	0.00	7.19**	7.14**	7.68**	7.42**	7.68**	7.68**
Bl-2	7.13**	7.28**	7.29**	7.68**	7.56**	7.68**	7.68**
SA-1	7.151**	7.16**	7.42**	7.33**	7.42**	7.68**	7.68**
SA-2	7.170**	0.00	7.17**	7.15**	7.14**	7.15**	7.32**
SA-3	0.00	0.00	7.14**	0.00	7.19**	7.46**	7.46**
RP-1	0.00	0.00	7.16**	7.62**	7.56**	7.68**	7.68**
RP-2	0.00	0.00	7.35**	7.15**	7.18**	7.28**	7.46**
RP-3	0.00	0.00	0.00	0.00	6.40**	7.18**	7.24**
RP-4	0.00	0.00	0.00	0.00	0.00	7.21**	7.19**

*Note: *p<0.05,**p<0.01*

AI: Auditory Identification; AR: Auditory Recall; AD: Auditory Discrimination;VD-1: Visual Discrimination (Level 1); VD-2: Visual Discrimination (Level 2); BC-1: Beginning Consonant (Level 1); EC-1: Ending Consonant (Level 1); CC-1: Consonant Cluster (Level 1);V-1: Vowel Sounds (Level 1); BC-2: Beginning Consonant (Level 2); EC-2: Ending Consonant (Level 2); V-2: Vowel Sounds (Level 2); Bl-1: Blending (Level 1); Bl-2: Blending (Level 2); SA-1: Structural Analysis (Level 1); SA-2: Structural Analysis (Level 2); SA-3: Structural Analysis (Level 3); RP-1: Reading Passage (Level 1); RP-2: Reading Passage (Level 2); RP-3: Reading Passage (Level 3), RP-4: Reading Passage (Level 4).

Table 7.

Comparison of ERS-M sub-test scores of Grade II TDC across grades III to VIII. Given are the |Z| values and the significances are indicated.

GRADE II						
Sections	|Z|					
	III	IV	V	VI	VII	VIII
AI	2.55*	2.04*	2.55*	2.55*	2.55*	2.55*
AR	1.22	2.27*	4.20**	4.20**	4.20**	4.20**
VD-1	1.10	1.95*	2.55*	1.91**	2.55**	2.55*
VD-2	2.38*	3.91**	4.76**	4.46**	4.76**	4.76**
BC-1	1.60	2.95**	4.18**	4.37**	5.49**	5.49**
EC-1	5.01**	5.37**	6.75**	6.52**	6.90**	7.18**
CC-1	4.99**	6.22**	6.73**	6.51**	6.69**	6.88**
V-1	7.13**	7.13**	7.30**	7.20**	7.29**	7.51**
BC-2	7.29**	7.27**	7.27**	7.38**	7.68**	7.68**
EC-2	7.13**	7.13**	7.17**	7.15**	7.51**	7.68**
V-2	7.15**	7.14**	7.29**	7.24**	7.39**	7.56**
Bl-1	3.62**	5.35**	6.39**	5.14**	6.39**	6.39**
Bl-2	3.48**	4.24**	5.30**	4.77**	5.30**	5.30**
SA-1	5.59**	6.63**	6.88**	6.46**	7.17**	7.17**
SA-2	0.00	7.14**	7.15**	7.14**	7.15**	7.32**
SS-3	0.00	7.16**	0.00	7.19**	7.46**	7.46**
RP-1	0.00	7.35**	7.62**	7.56**	7.68**	7.68**
RP-2	0.00	0.00	7.15**	7.18**	7.28**	7.46**
RP-3	0.00	.00	0.00	6.40**	7.18**	7.24**
RP-4	0.00	0.00	0.00	2.55*	7.21**	7.19**

*Note:*p<0.05, **p<0. 01*

AI: Auditory Identification; AR: Auditory Recall; AD: Auditory Discrimination;VD-1: Visual Discrimination (Level 1); VD-2: Visual Discrimination (Level 2); BC-1: Beginning Consonant (Level 1); EC-1: Ending

Consonant (Level 1); CC-1: Consonant Cluster (Level 1);V-1: Vowel Sounds (Level 1); BC-2: Beginning Consonant (Level 2); EC-2: Ending Consonant (Level 2); V-2: Vowel Sounds (Level 2); Bl-1: Blending (Level 1); Bl-2: Blending (Level 2); SA-1: Structural Analysis (Level 1); SA-2: Structural Analysis (Level 2); SA-3: Structural Analysis (Level 3); RP-1: Reading Passage (Level 1); RP-2: Reading Passage (Level 2); RP-3: Reading Passage (Level 3), RP-4: Reading Passage (Level 4).

Table 8.

Comparison of Grade III and IV across higher grades using Mann Whitney U Test. Given are the |Z| values and the significances are indicated.

	GRADE III					GRADE IV			
Sections	||Z||					||Z||		
	IV	|V|	VI	VII	VIII	V	VI	VII	VIII
AI	1.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00
AR	3.46**	5.14*	5.14*	5.14**	5.14**	2.55*	2.55*	2.55*	2.55*
VD-1	1.00	1.76*	0.97	1.76*	1.76	1.00	0.02	1.00	1.00
VD-2	0.99	3.00*	2.52*	3.00*	3.00*	1.76	1.02	1.76	1.76**
BC-1	1.71	2.50*	2.84*	4.19**	4.19**	1.17	1.60	3.21*	3.21**
EC-1	1.34	4.38**	4.49*	5.62**	6.58**	2.04*	2.62	4.01*	5.48**
CC-1	1.88	5.62**	4.32*	5.48**	6.29**	2.89*	0.950	2.79*	4.30**
V-1	3.29*	5.87**	4.83*	5.74**	6.32**	5.51**	4.16**	5.27**	6.21**
BC-2	2.12	0.18	0.86	3.21*	3.21*	0.04	1.11	3.42*	3.42*
EC-2	0.20	3.55**	2.34*	6.02**	6.39**	1.98	0.861	5.27**	5.84**
V-2	1.73	3.10*	2.51*	3.93**	4.68**	3.33*	2.75	4.27**	5.04**
Bl-1	0.14	4.19*	2.41*	4.19**	4.19**	3.21*	1.11	3.21*	3.21*
Bl-2	1.75	3.43*	2.46*	3.43*	3.43*	2.31*	1.15	2.31**	2.31*
SA-1	1.42	5.04**	4.96**	6.42**	6.42**	2.96*	3.22*	4.94**	4.94*
SA-2	2.30*	7.15**	7.14**	7.15**	7.32**	5.44**	6.41**	6.70**	6.85*
SA-3	7.14**	0.00	7.19**	7.46**	7.46**	7.16**	2.51*	5.49**	5.94*
RP-1	7.16**	7.62**	7.56**	7.68**	7.68**	2.26*	1.70	2.79	2.79

Comparison of Grade III and IV across higher grades using Mann Whitney U Test. Given are the |Z| values and the significances are indicated contd….

RP-2	7.35**	7.15**	7.18**	7.28**	7.46**	7.15**	7.18**	7.28**	7.46*
RP-3	0.00	0.00	6.40	7.18**	7.24**	0.00	6.40**	7.18**	7.24*
RP-4	0.00	0.00	0.00	0.00	7.19**	0.00	0.00	7.21**	7.19

*Note:*p<0.05, **p<0.01*

Note: AI: Auditory Identification; AR: Auditory Recall; AD: Auditory Discrimination;VD-1: Visual Discrimination (Level 1); VD-2: Visual Discrimination (Level 2); BC-1: Beginning Consonant (Level 1); EC-1: Ending Consonant (Level 1); CC-1: Consonant Cluster (Level 1);V-1: Vowel Sounds (Level 1); BC-2: Beginning Consonant (Level 2); EC-2: Ending Consonant (Level 2); V-2: Vowel Sounds (Level 2); Bl-1: Blending (Level 1); Bl-2: Blending (Level 2); SA-1: Structural Analysis (Level 1); SA-2: Structural Analysis (Level 2); SA-3: Structural Analysis (Level 3); RP-1: Reading Passage (Level 1); RP-2: Reading Passage (Level 2); RP-3: Reading Passage (Level 3), RP-4: Reading Passage (Level 4).

Table 9.

Comparison of Grade VI, VII and VII across higher grades using Mann Whitney U Test. Given are the |Z| values and the significances are indicated.

	GRADE V			GRADE VI		GRADE VII
	|Z|			|Z|		|Z|
	VI	VII	VIII	VII	VIII	VIII
AI	0.00	0.00	0.00	0.00	0.00	5.14**
AR	0.00	0.00	0.00	0.00	0.00	1.76
VD-1	0.00	0.00	0.00	1.00	1.00	3.00*
VD-2	1.00	0.00	0.00	1.00	1.00	4.19**
BC-1	1.00	0.00	0.00	2.05	2.05*	6.58**
EC-1	0.61	2.56*	2.56*	1.74	4.01**	6.29**
CC-1	1.13	3.05*	5.17**	2.21*	4.17**	6.32**
V-1	2.33*	0.02	2.57*	1.35	3.22*	3.21**

Comparison of Grade VI, VII and VII across higher grades using Mann Whitney U Test. Given are the |Z| values and the significances are indicated contd....

BC-2	1.57	0.16	1.94*	2.55*	2.55*	6.39**
EC-2	1.09	3.42*	3.42*	4.25**	4.93**	4.68**
V-2	0.90	4.10**	4.95**	1.77	3.05*	4.19**
Bl-1	0.68	1.05	2.37*	2.31*	2.31*	3.43*
Bl-2	2.31*	0.00	0.00	1.42	1.42	6.42**
SA-1	1.42	0.00	0.00	2.31*	2.31*	7.32**
SA-2	0.76	3.01*	3.01*	0.34	3.66**	7.46**
SA-3	5.96**	6.72**	6.86**	2.80*	2.96*	7.68**
RP-1	7.19**	7.46**	7.46**	1.42	1.42	7.46**
RP-2	0.60	1.00	1.00	2.55*	4.06**	7.24**
RP-3	3.52**	5.05**	5.86**	2.53*	3.59**	7.19**
RP-4	6.40**	7.18**	7.24**	7.21*	7.19**	5.14**

*Note:*p<0.05, **p<0.01*

Note: AI: Auditory Identification; AR: Auditory Recall; AD: Auditory Discrimination;VD-1: Visual Discrimination (Level 1); VD-2: Visual Discrimination (Level 2); BC-1: Beginning Consonant (Level 1); EC-1: Ending Consonant (Level 1); CC-1: Consonant Cluster (Level 1);V-1: Vowel Sounds (Level 1); BC-2: Beginning Consonant (Level 2); EC-2: Ending Consonant (Level 2); V-2: Vowel Sounds (Level 2); Bl-1: Blending (Level 1); Bl-2: Blending (Level 2); SA-1: Structural Analysis (Level 1); SA-2: Structural Analysis (Level 2); SA-3: Structural Analysis (Level 3); RP-1: Reading Passage (Level 1); RP-2: Reading Passage (Level 2); RP-3: Reading Passage (Level 3), RP-4: Reading Passage (Level 4).

3. Sequence of mastery of reading skills in ERS-M

For the purpose of this study, 'Mastery' of a reading process was defined as the mean percentage score obtained by the participants in a particular grade. The mean score obtained by TDC in each grade (Table 5) was converted into percentage scores. These scores were classified into the four categories: 0 to <25%; 25 to < 50 %;

50 to < 75% and 75 to 100%. The category of mean percentage scores was then colour coded and marked for each grade for each sub-test and diagrammatically represented in Figure 2.

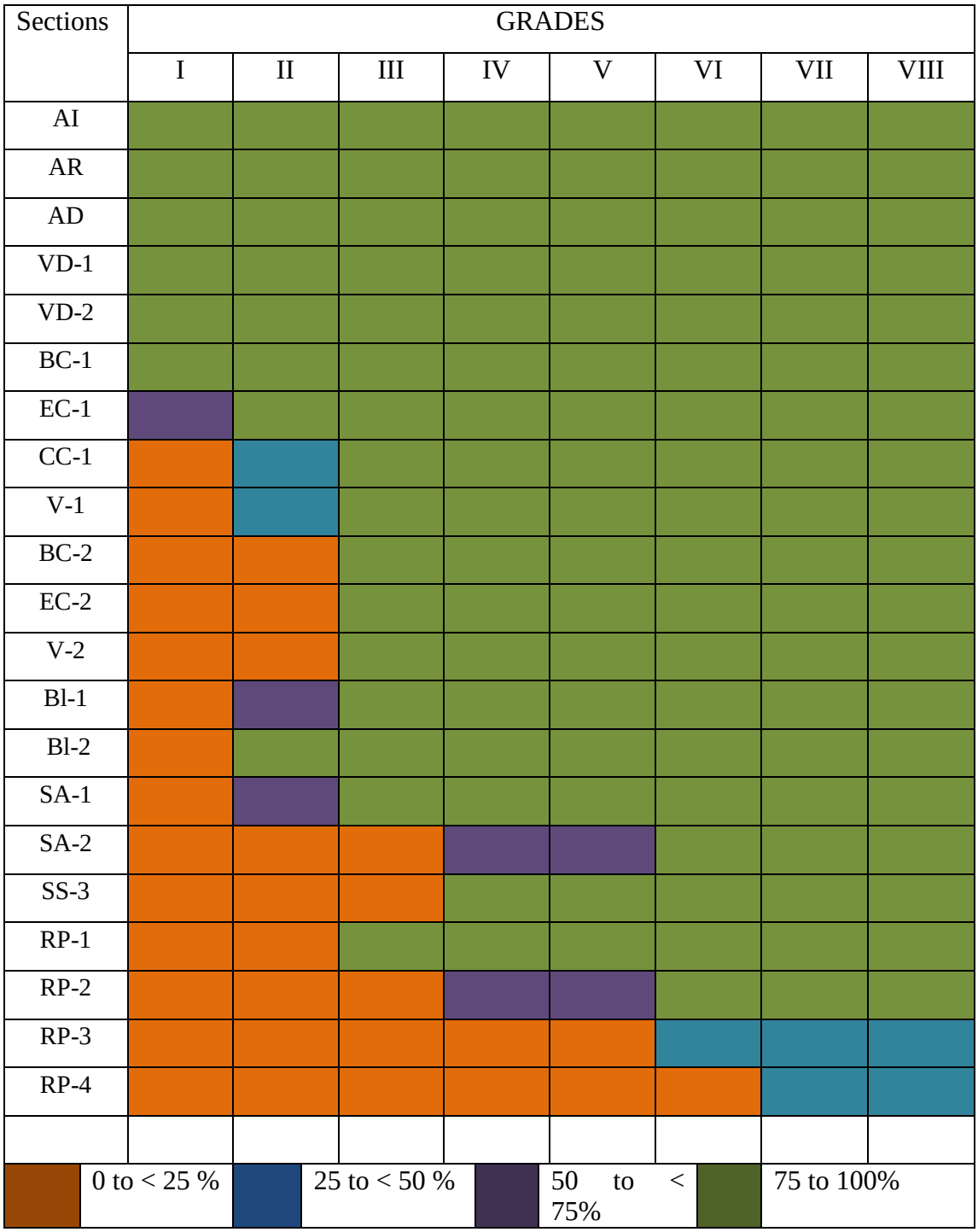


Figure 2. *Mastery of reading skills in ERS-M represented across grades.*

From figure 2, it can be inferred that all sub-sections of auditory perception skills (AI, AR, AD) and visual perceptual skills (VD-1 , VD-2) achieves 75%-100% mastery as early as Grade I and the achieved mastery is consistently maintained till higher grades. Along with the perceptual skills, BC-1 was also mastered from grade I onwards. At Grade II, participants attain mastery over EC-1 and BL-2. Reading developments in grade III include mastery in CC-1, V-1, Bl-1 and SA-1. Reading comprehension also started in Grade III with mastery in RP-1. This suggests that reading comprehension requires not only reading skills but also the linguistic knowledge of syntactical and semantic rules of the language, as assessed in SA-1. Grade III and IV are similar in the reading development processes that improve except for SA-3 that is mastered in Grade IV. The performance improves but does not shift levels of mastery in grade V. At grade VI, comprehension of RP-3 is mastered while other skills of reading are well established and maintained by the participants. Other passages, RP-3 and RP-4 continue towards the fourth level of mastery after grade VIII.

On the whole, it can be summarized that the mastery of reading skills in Malayalam follows a sequence of perceptual skills followed by syllable grapheme correspondence along with blending skills succeeded by structural analysis and oral reading skill development. A clear cut grade of mastery cannot be demarcated for each section as simultaneous acquisition of skills is seen in many sub sections of ERS-M (Eg: SA-1 and RP-1 achieves 75%-100% at grade III but, RP-3 and RP-4 lags behind the mastery grade of SA-3). The figure also gives a thorough depiction of the progression of mastery of each subsection from lower to higher grades.

4. Inter-judge and intra-judge reliability of scores in ERS-M

Inter Rater Reliability

Tests of agreement between two judges were run on ERS-M scores provided independently by two judges on a random 10% of the data. The tabulated results were statistically analyzed using Cronbach's alpha (α). The scores of all sub-sections of ERS-M had good inter-rater reliability ($\alpha > 0.70$) (AI: $\alpha = 0.89$; AR: $\alpha = 0.83$; AD: $\alpha = 0.85$;VD-1: $\alpha = .93$; VD-2: $\alpha = 0.86$; BC-1: $\alpha = .82$; EC-1: $\alpha = .85$ CC-1: $\alpha = 0.98$;V-1: $\alpha = 0.92$;BC-2: $\alpha = 0.91$; EC-2: $\alpha = 0.98$; V-2: $\alpha = 0.86$; Bl-1: $\alpha = 0.99$; Bl-2: $\alpha = 0.99$; SA-1: $\alpha = 0.98$; SA-2: $\alpha = 0.84$; SA-3: $\alpha = 0.89$; RP-1: $\alpha = 0.89$; RP-2: $\alpha = 0.87$; RP-3: $\alpha = 0.79$, RP- 4: $\alpha = 0.80$).This suggested the internal consistency of ERS-M scores across judges/investigators.

Test Retest Reliability

Re-administration of ERS-M on 10% of subjects yielded two sets of scores for the same participant in all sub-tests of ERS-M. Statistical analysis using Cronbach's alpha (α) revealed that the two set of scores were in agreement, suggesting satisfactory test-re-test reliability of ERS-M subtests (AI: $\alpha = 0.79$; AR: $\alpha = 0.85$; AD: $\alpha = 0.83$;VD-1: $\alpha = 0.93$; VD-2: $\alpha = 0.86$; BC-1: $\alpha = 0.82$; EC-1: $\alpha = 0.85$ CC-1: $\alpha = 0.87$;V-1: $\alpha = 0.92$;BC-2: $\alpha = 0.91$; EC-2: $\alpha = 0.93$; V-2: $\alpha = 0.86$; Bl-1: $\alpha = 0.98$; Bl-2: $\alpha = 0.99$; SA-1: $\alpha = 0.89$; SA-2: $\alpha = 0.84$; SA-3: $\alpha = 0.77$; RP-1: $\alpha = 0.89$; RP-2: $\alpha = 82$; RP-3: $\alpha = 0.80$, RP-4: $\alpha = 0.83$).

5. Population and Discriminant validity of ERS-M

Population validity:

The complete test of ERS-M was administered on another set of 24 TDC (Group I; n=3 in each of the 8 grades) apart from the 240 TDC (Group II) considered for estimating the normative of ERS-M. Mean scores obtained by participants in each

grade was compared with the population mean for each sub-section of ERS-M (Figure 3 to Figure 7). This was expected to provide the validity of ERS-M in identification of typical reading acquisition in Malayalam speaking children of 6;0 to 12;11 years. Results of these comparisons in each sub-section and the inferences that could be derived are detailed below:

Perceptual Skills:

Figure 3a-e represents the comparisons of mean scores of group I and II in each sub-test of perceptual skill section. For the purpose of easy visualization and understanding, the scale was modified for each of these figures depending on the range of scores obtained by the two groups. The population mean is represented in box plot and the red line indicates the mean score of Group I participants in each grade. These comparisons revealed that the mean scores of Group II were well within the population mean derived for ERS-M (Figure 3a- e). Therefore, the perceptual skill section of ERS-M is sensitive in identifying typical perceptual skills for reading in the target population

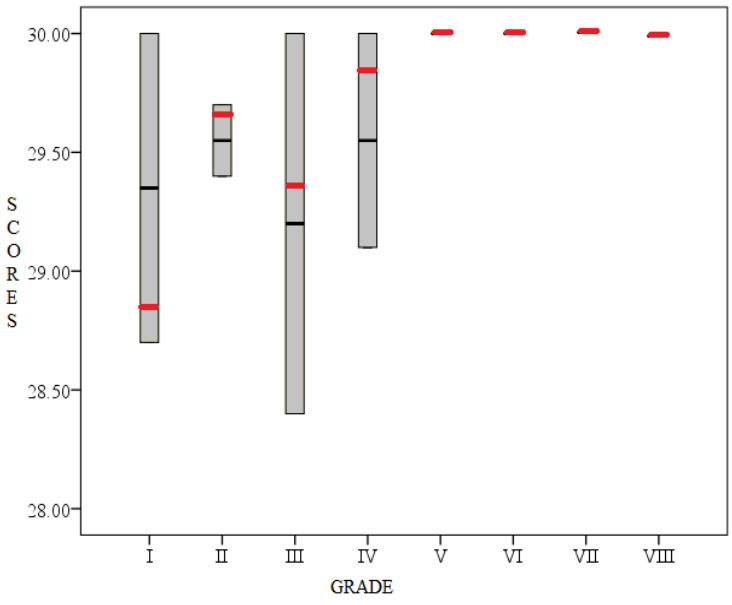


Figure 3(a). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in Auditory Identification sub-test across grades.

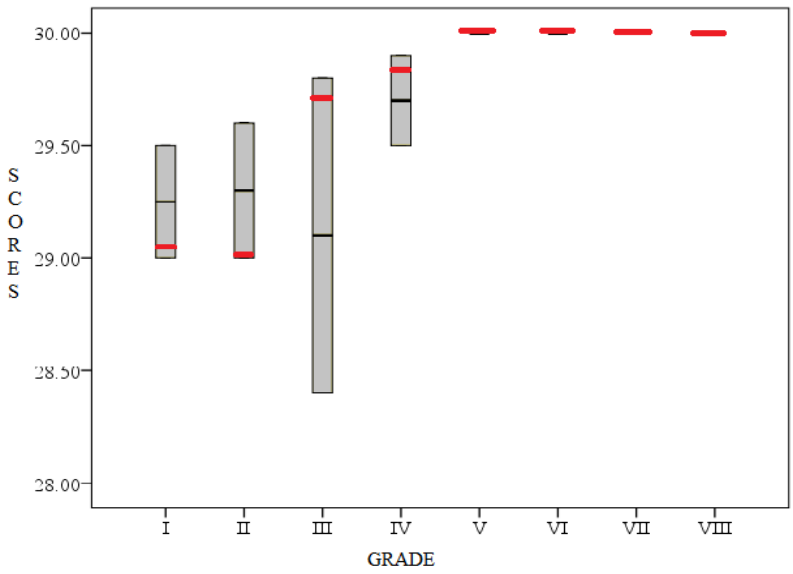


Figure 3(b). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in Auditory Recall sub-test across grades.

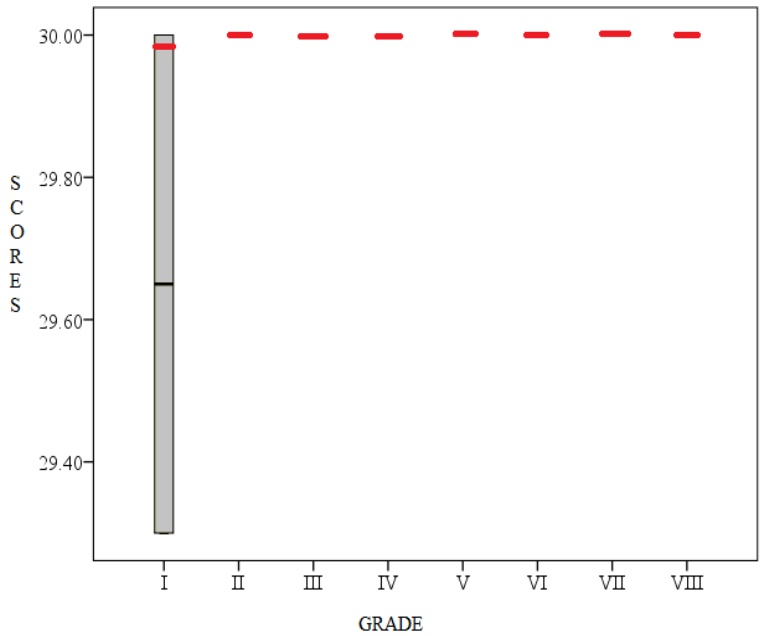


Figure 3(c). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in Auditory Discrimination sub-test across grades.

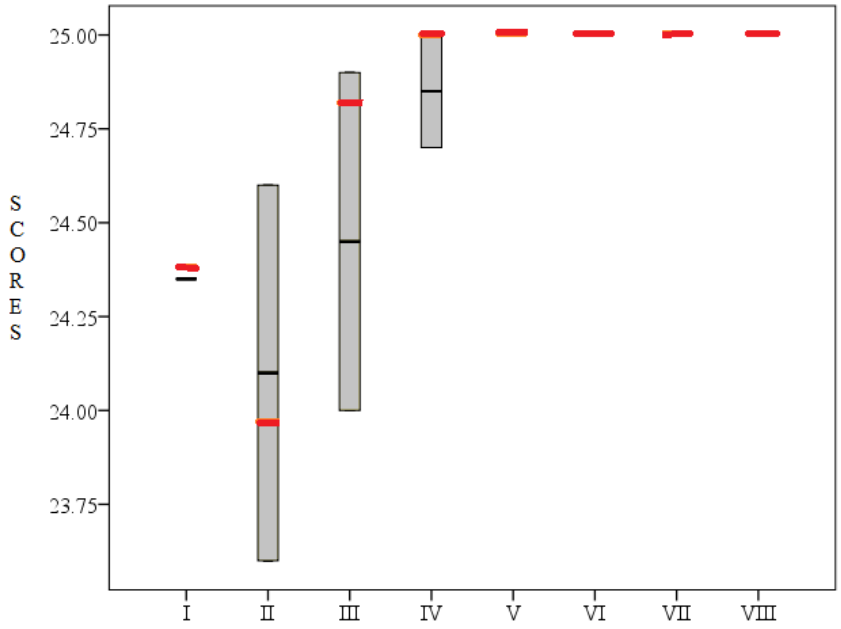


Figure 3(d). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in Visual Discrimination (Level 1) sub-test across grades.

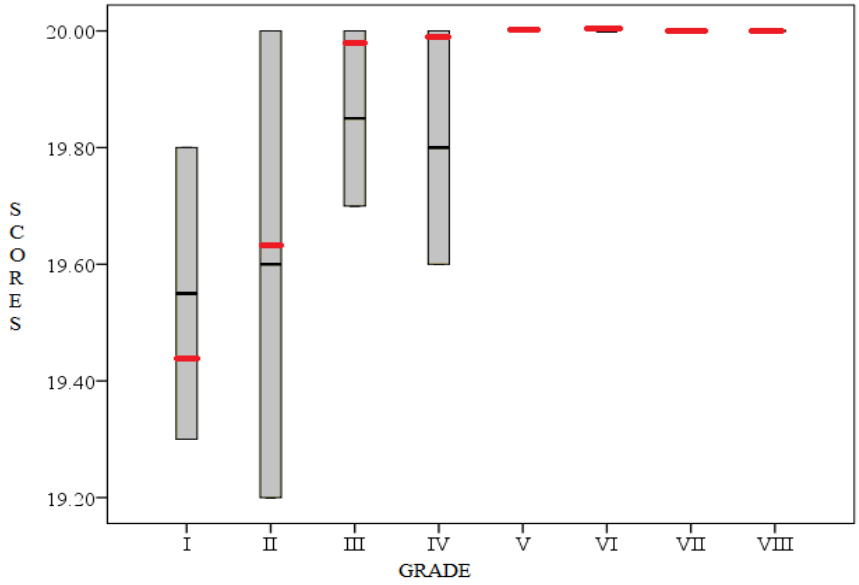


Figure 3(e). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in Visual Discrimination (Level 2) sub-test across grades.

Syllable- Grapheme Correspondence Skills:

Figure 4a-g represents the comparisons of mean scores of group I and II in each sub-test of syllable- grapheme correspondence section. For the purpose of easy visualization and understanding, the scale was modified for each of these figures depending on the range of scores obtained by the two groups. The population mean is represented in box plot and the red line indicates the mean score of Group I participants in each grade. These comparisons revealed that the mean scores of Group II were well within the population mean derived for ERS-M (Figure 4a- g). This finding was true for all sub-test in Level 1 and Level 2 of this section. Therefore, the syllable-grapheme correspondence section of ERS-M is sensitive in identifying typical syllable-sound association skills for reading in the target population.

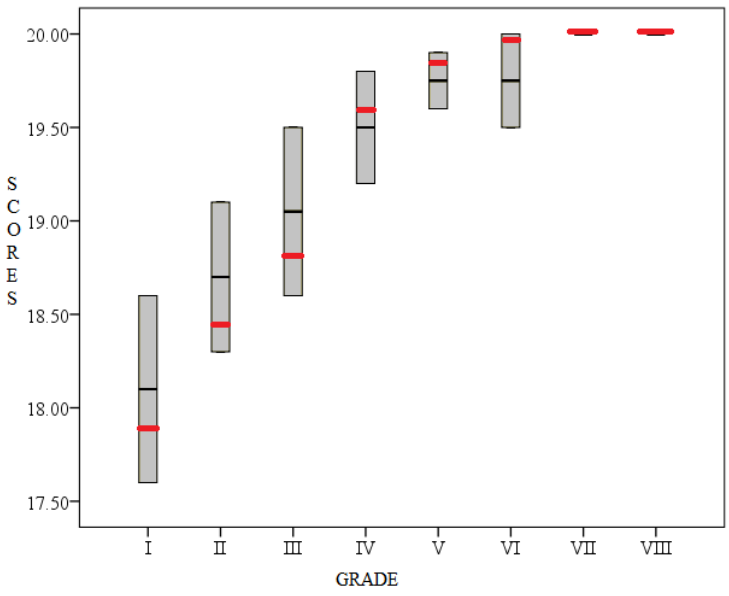


Figure 4(a). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in Syllable-Grapheme Correspondence: Beginning Consonant (Level 1) sub-test across grades.

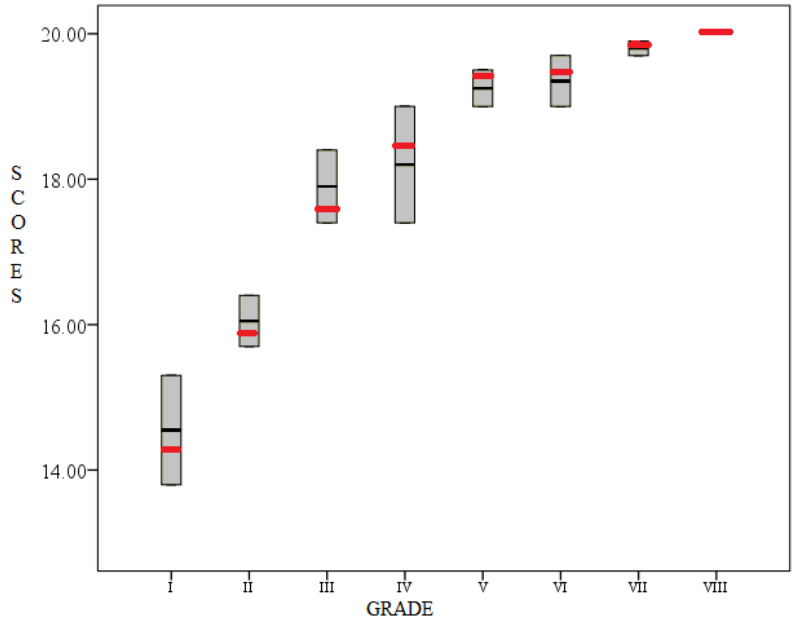


Figure 4(b). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in Syllable-Grapheme Correspondence: Ending Consonant (Level 1) sub-test across grades.

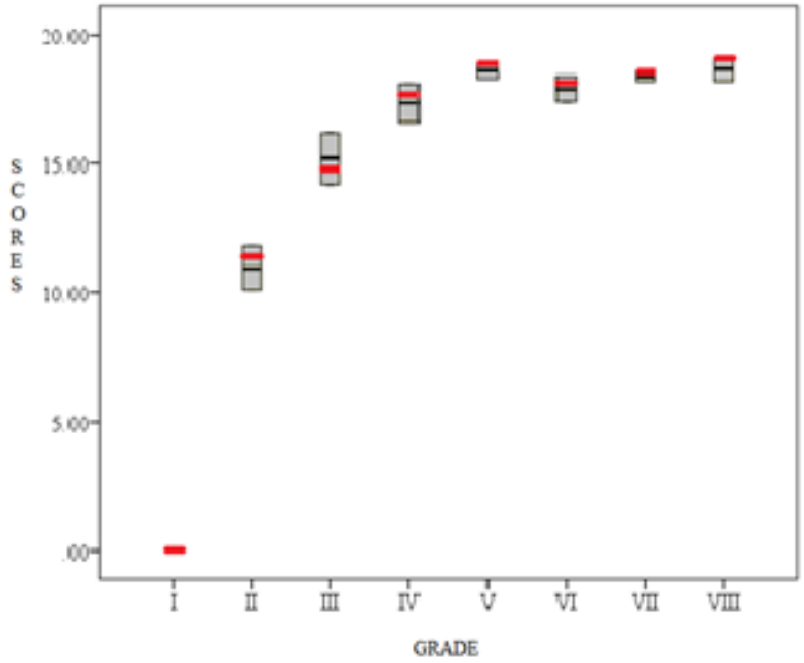


Figure 4(c). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in Syllable-Grapheme Correspondence: Consonant Cluster (Level 1) sub-test across grades.

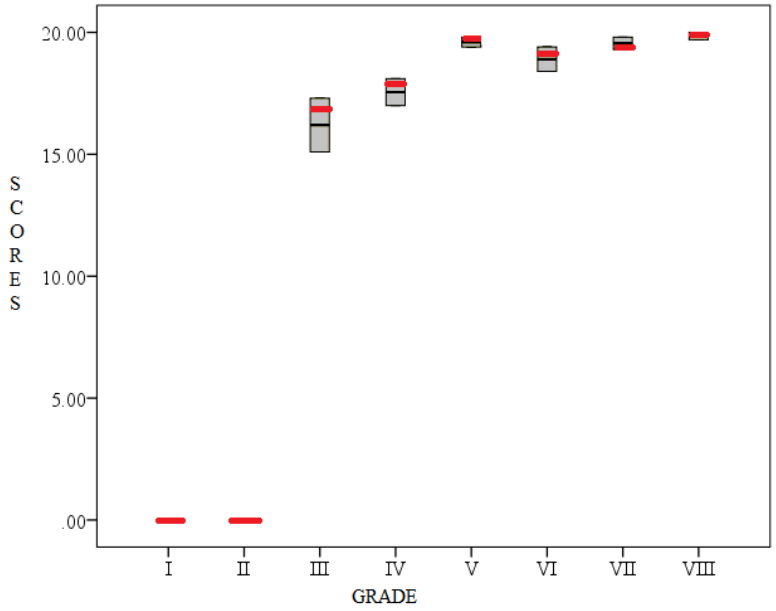


Figure 4(d). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in Syllable-Grapheme Correspondence: Vowel Sounds (Level 1) sub-test across grades.

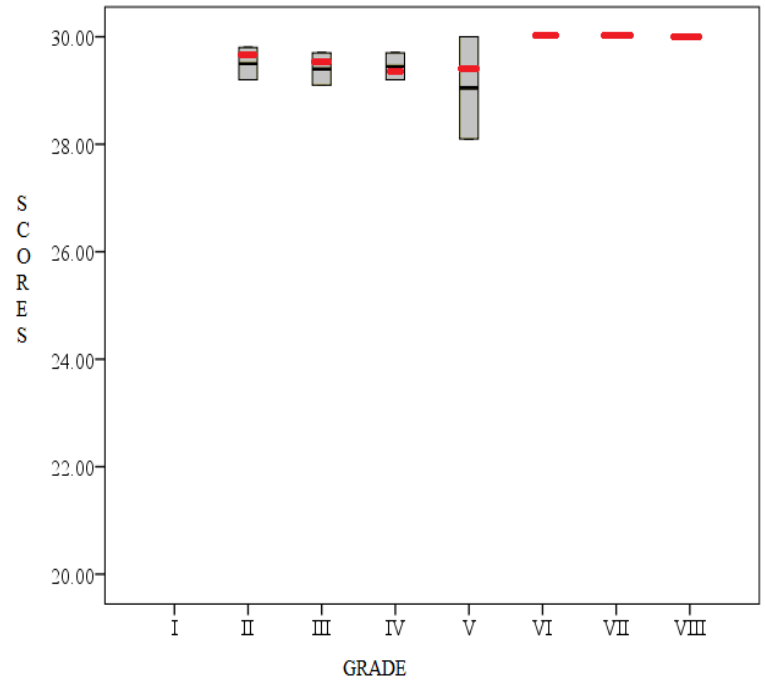


Figure 4(e). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in Syllable-Grapheme Correspondence: Beginning Consonant (Level 2) sub-test across grades.

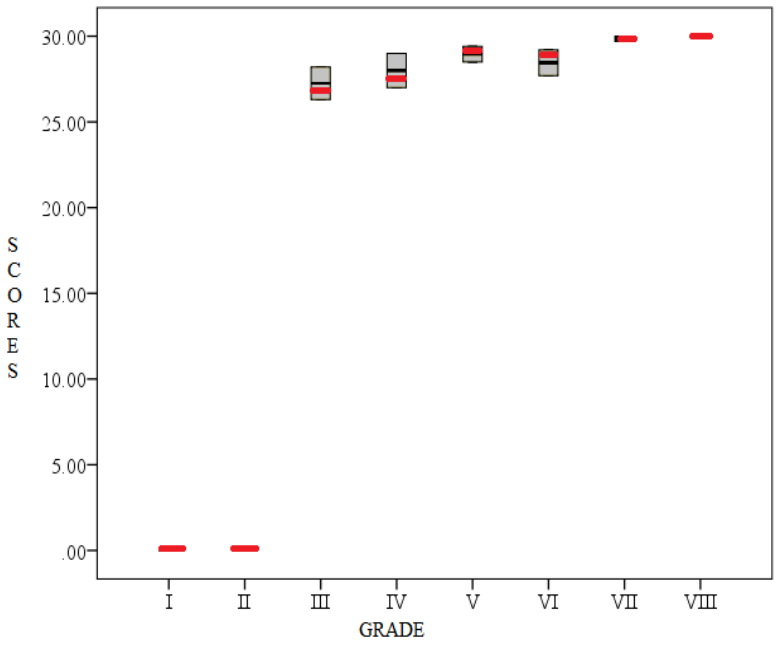


Figure 4(f). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in Syllable-Grapheme Correspondence: Ending Consonant (Level 2) sub-test across grades.

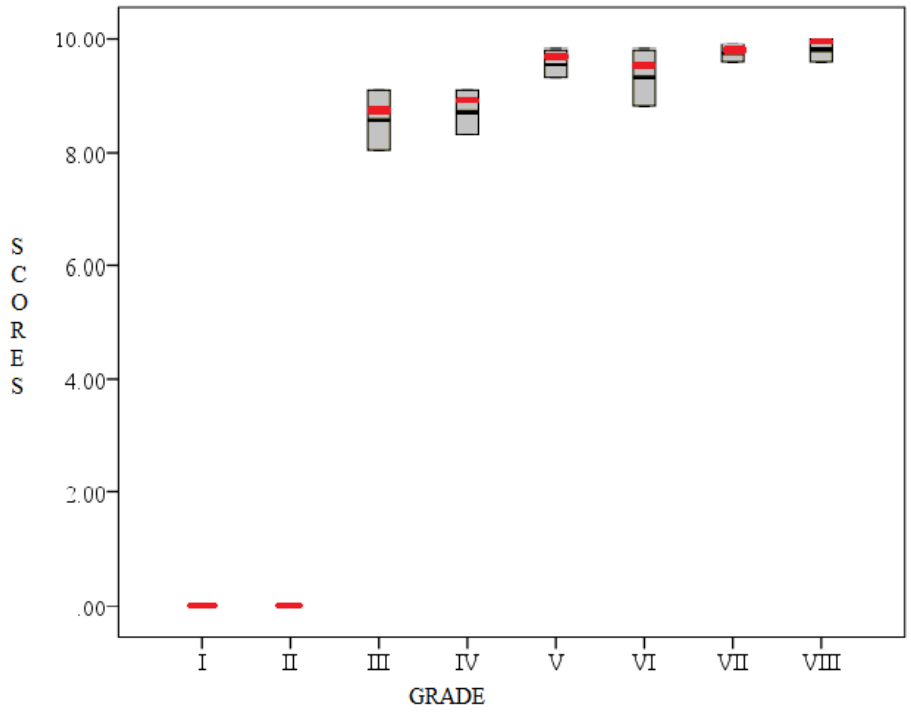


Figure 4(g). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in Syllable-Grapheme Correspondence: Vowel Sounds (Level 2) sub-test across grades.

Blending Skills:

Figure 5a-b represents the comparisons of mean scores of group I and II in each sub-test of blending section. For the purpose of easy visualization and understanding, the scale was modified for each of these figures depending on the range of scores obtained by the two groups. The population mean is represented in box plot and the red line indicates the mean score of Group I participants in each grade. These comparisons revealed that the mean scores of Group II were well within the population mean derived for ERS-M (Figure 5a, b). This finding was true for both level 1 and level 2 of blending tasks. Therefore, the blending skills sub-section of ERS-M is sensitive in identifying typical syllable/phoneme manipulation skills for reading in the target population.

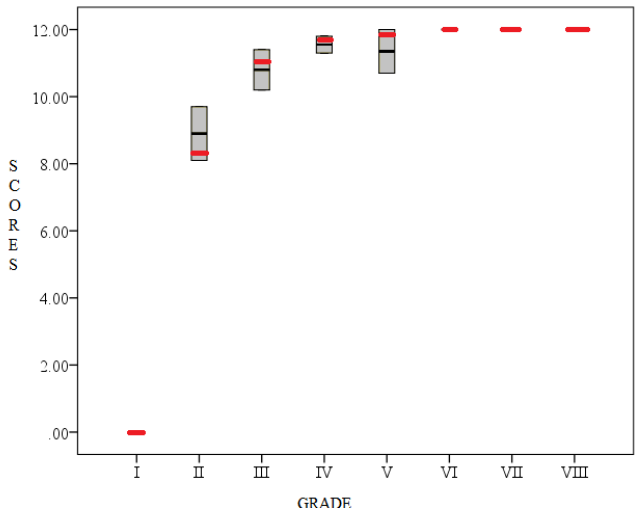


Figure 5(a). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in blending skills (Level 1) sub-test across grades.

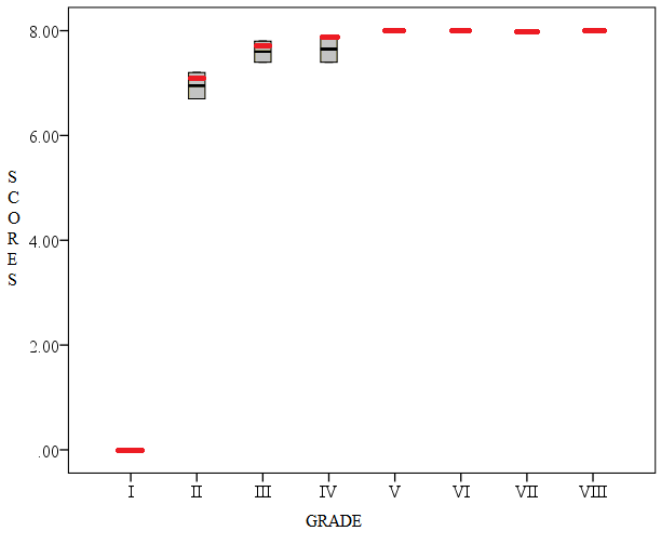


Figure 5(b). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in blending skills (Level 2) sub-test across grades.

Structural Analysis:

Figure 6a-c represents the comparisons of mean scores of group I and II in each sub-test of structural analysis section. For the purpose of easy visualization and understanding, the scale was modified for each of these figures depending on the range of scores obtained by the two groups. The population mean is represented in box plot and the red line indicates the mean score of Group I participants in each grade. These comparisons revealed that the mean scores of Group II were well within the population mean derived for ERS-M (Figure 6a-c). This finding was true for all the three levels of this section. Therefore, the structural analysis sub-section of ERS-M is sensitive in identifying typical acquisition of word and morphemic boundaries as well as various basic syntactical units for reading in the target population.

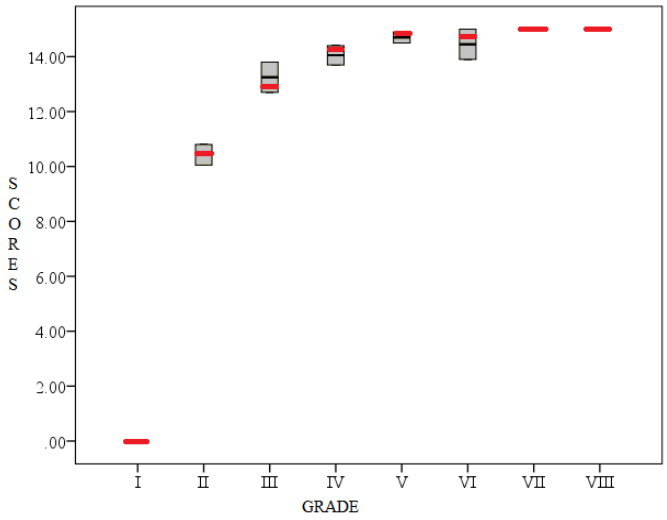


Figure 6(a). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in structural analysis (Level 1) sub-test across grades.

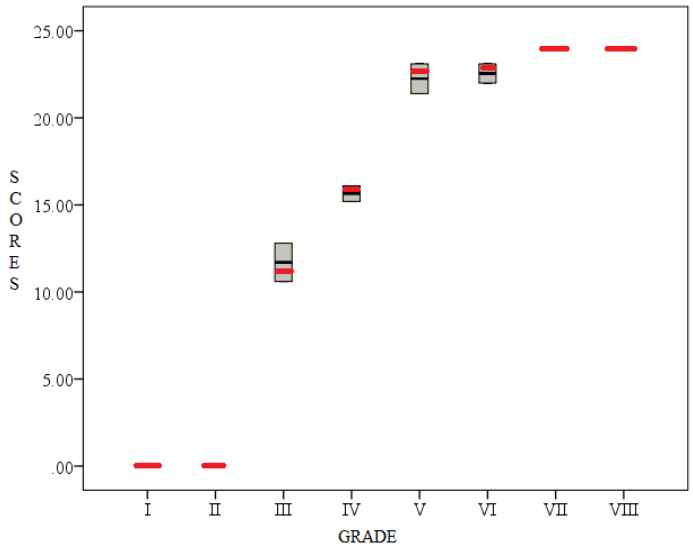


Figure 6(b). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in structural analysis (Level 2) sub-test across grades.

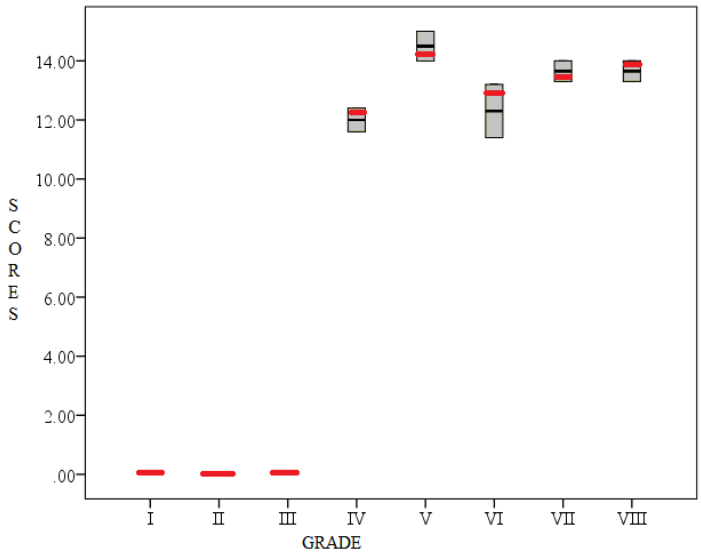


Figure 6(c). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in structural analysis (Level 3) sub-test across grades.

Oral Reading Skills:

Figure 7a-d represents the comparisons of mean scores of group I and II in each sub-test of oral reading skills section. For the purpose of easy visualization and understanding, the scale was modified for each of these figures depending on the range of scores obtained by the two groups. The population mean is represented in box plot and the red line indicates the mean score of Group I participants in each grade. These comparisons revealed that the mean scores of Group II were well within the population mean derived for ERS-M (Figure 7a-d). This finding was true for all the three levels of reading passage complexity. Therefore, the oral reading skills of ERS-M is sensitive in identifying the typical acquisition of oral reading skills such as reading fluency and reading comprehension in the target population.

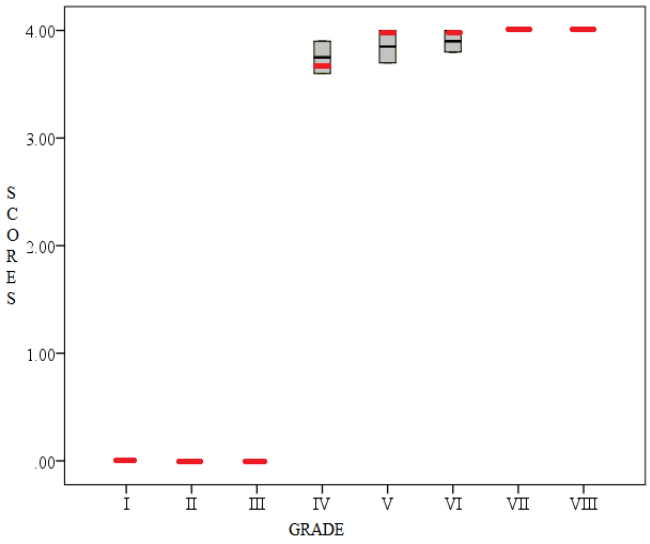


Figure 7(a). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in oral reading (Level 1) sub-test across grades.

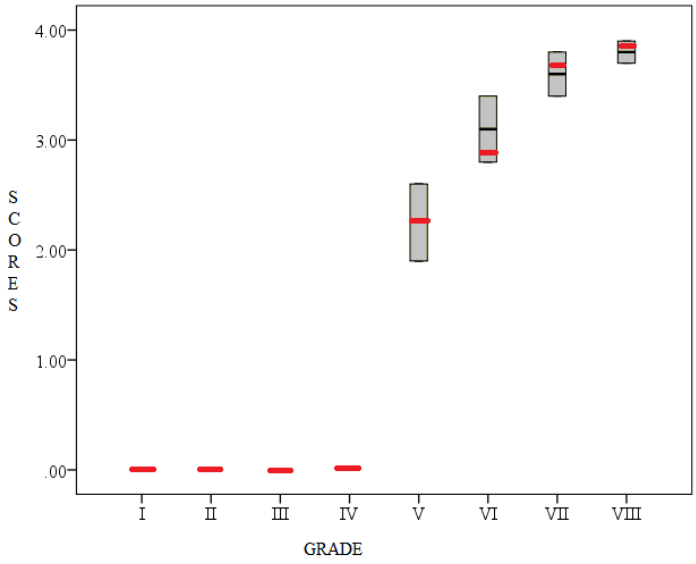


Figure 7(b). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in oral reading (Level 2) sub-test across grades.

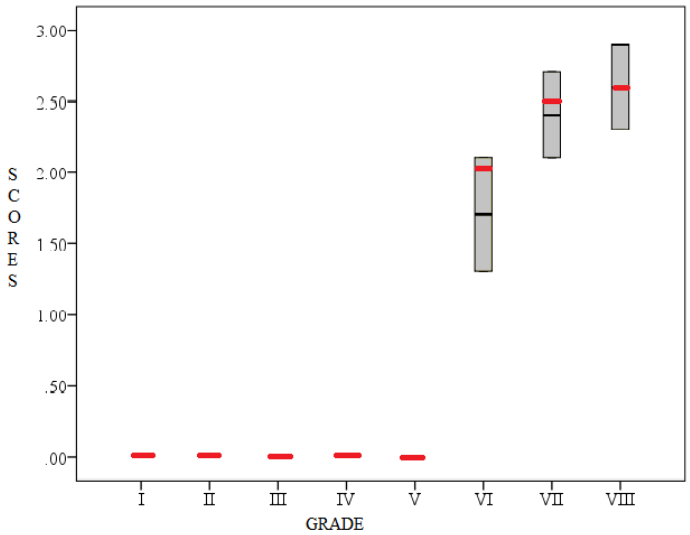


Figure 7(c). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in oral reading (Level 3) sub-test across grades.

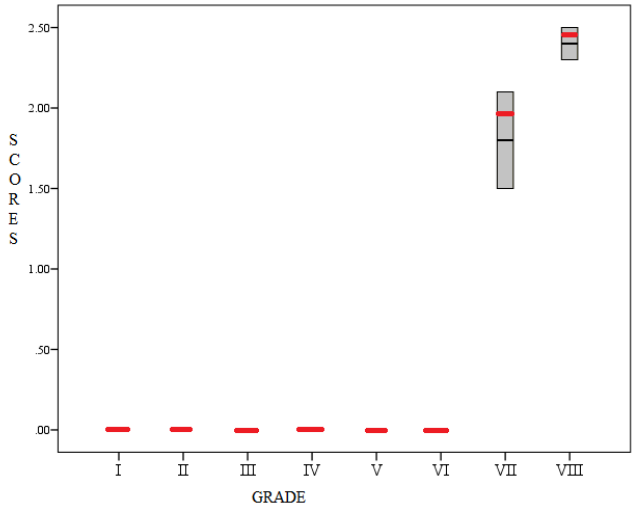


Figure 7(d). Comparison of mean scores obtained by group I (Red line) to the population statistic (Box plot) in oral reading (Level 4) sub-test across grades.

Overall, the comparisons showed that the mean sub-test scores of ERS-M (Table 5) were logically generalizable to the population learning to read and write Malayalam orthography. Thus, ERS-M can be used for studying the typical patterns of acquisition of various reading related processes in children aged 6;0 to 12;11 years learning to read and write Malayalam orthographic system through formal instruction.

Discriminant validity:

The test material was administered on 10 children diagnosed with reading/ learning disability and the scores obtained were compared with the population norms derived for ERS-M. It was hypothesized that the performance of children with learning difficulty (LD) is not within the population mean of ERS-M. Table 10 provides the distribution of participants in the LD group across grades. Figure 8 to 12 depicts the comparison of mean score obtained by participants in LD group (Red line) with the population mean (Box plot). The results of comparison and inferences made are detailed under each section below.

Table 10.

Distribution of children diagnosed with reading/ learning difficulties across grades

Grade	**Number of participants**	**Number of Male and Female participants**
I	1	Male
II	2	Females
III	2	1Male; 1 Female
IV	1	Female
V	1	Male
VI	1	Male
VII	1	Male
VII	1	Male
Total	**10**	6 Males; 4 Females

Perceptual Skills:

Figure 8a-e represents the comparisons of mean scores of LD group to the population mean of ERS-M in each sub-test of perceptual skill section. For the purpose of easy visualization and understanding, the scale was modified for each of

these figures depending on the range of scores obtained by the two groups. The population mean is represented in box plot (if the upper and lower bound could be represented effectively) and the red line indicates the mean score of LD Group participants in each grade. For grades that attained maximum score of the sub-test, mean is represented as single horizontal line and box plot was not feasible for this data.

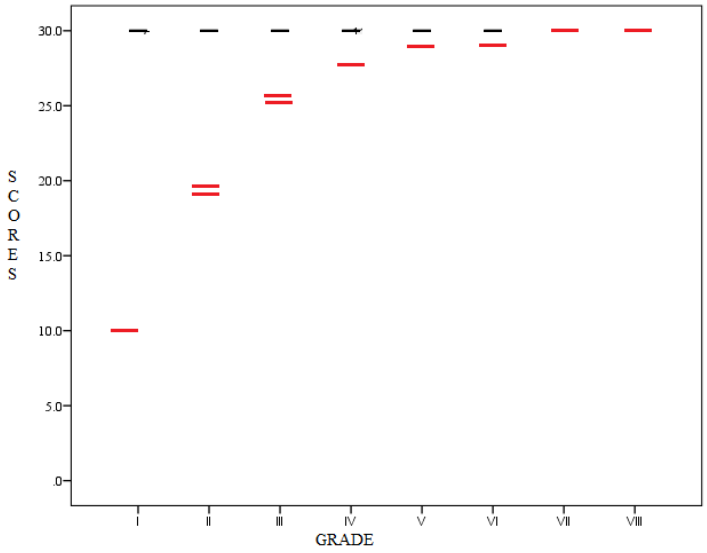


Figure 8(a). Comparison of mean scores obtained by children with reading/ learning difficulty (Red line) to the population statistic in auditory identification sub-test across grades.

The comparisons revealed that the performance of children with LD were much below the expected level of performance for their grades. The gap between the actual and expected performance was larger in the initial grades and gradually narrowed towards the higher grades, suggesting skill improvement over a period of time. Also, it could be observed that children with LD approached expected performance earlier in sub-tests that did not include orthographic input, such as auditory discrimination and visual discrimination (Level 1) sub-test compared to other sub-tests that included an orthographic input. However, performance in all sub-tests

of perceptual section was lower than the expected, indicating an auditory and perceptual deficit in children with LD learning to read and write Malayalam orthography.

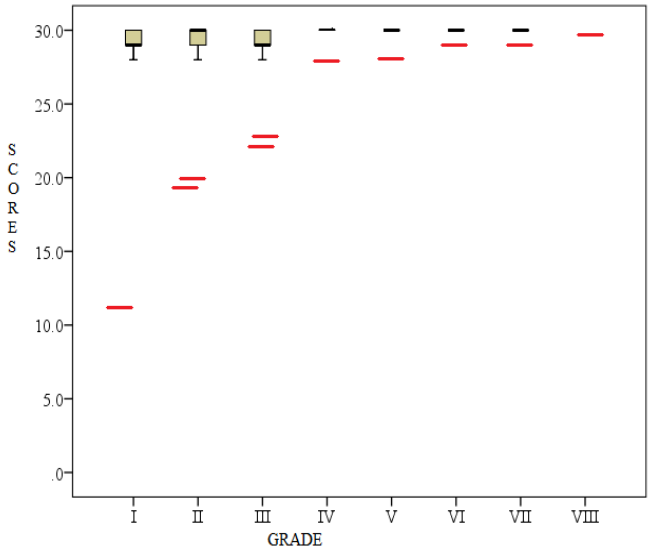


Figure 8(b). Comparison of mean scores obtained by children with reading/ learning difficulty (Red line) to the population statistic in auditory recall sub-test across grades.

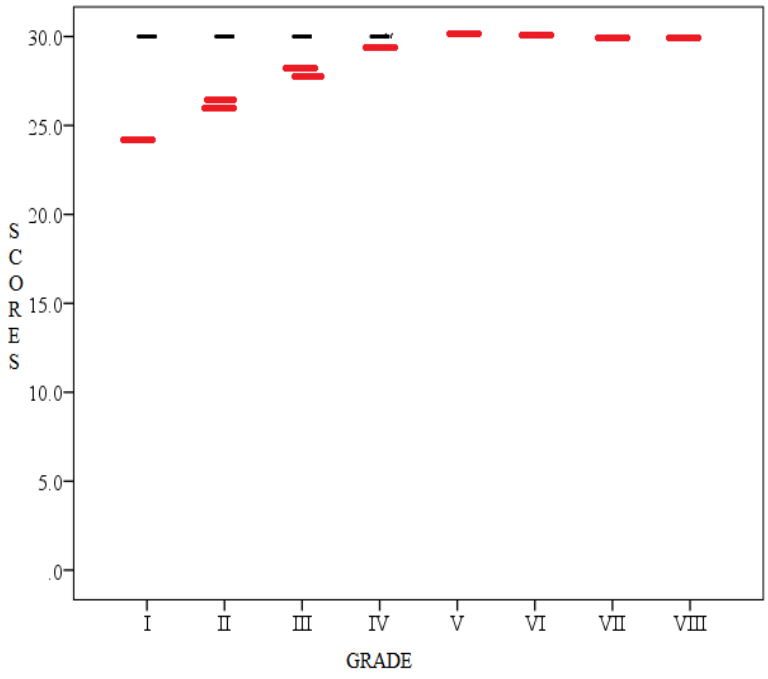


Figure 8(c). Comparison of mean scores obtained by children with reading/ learning difficulty (Red line) to the population statistic in auditory discrimination sub-test across grades.

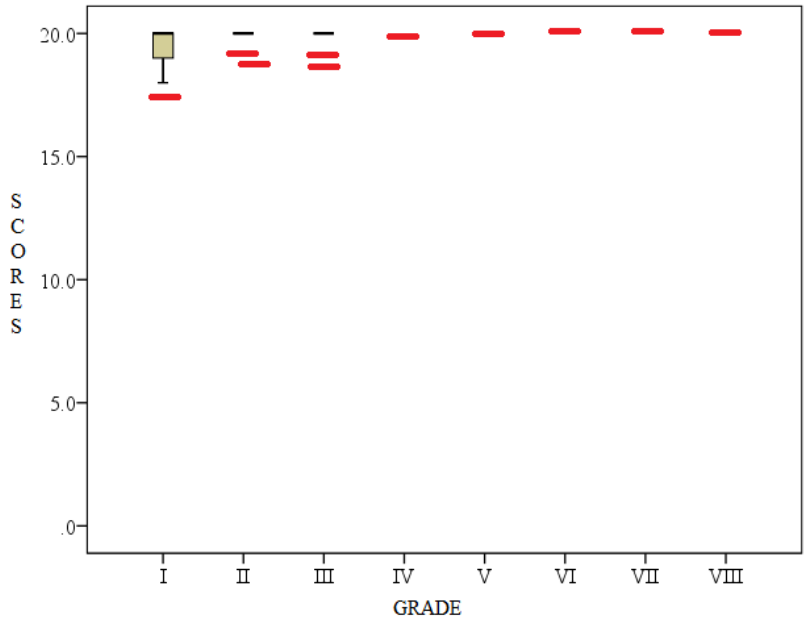


Figure 8(d). Comparison of mean scores obtained by children with reading/ learning difficulty (Red line) to the population statistic in visual discrimination (Level 1) sub-test across grades.

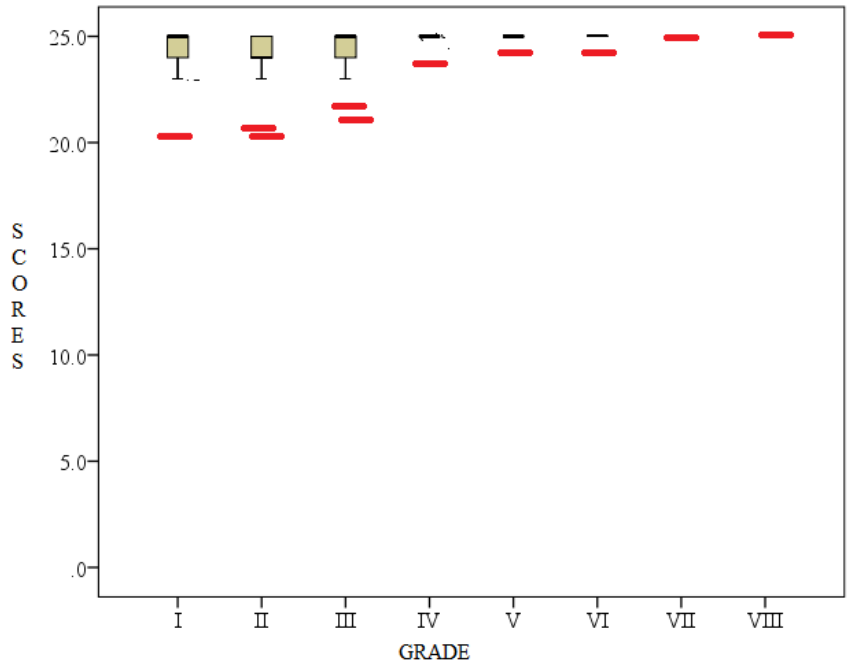


Figure 8(e). Comparison of mean scores obtained by children with reading/ learning difficulty (Red line) to the population statistic in visual discrimination (Level 2) sub-test across grades.

Syllable- Grapheme Correspondence:

Figure 9a-g represents the comparisons of mean scores of LD group to the population mean of ERS-M in each sub-test of syllable-grapheme correspondence section. For the purpose of easy visualization and understanding, the scale was modified for each of these figures depending on the range of scores obtained by the two groups. The population mean is represented in box plot (if the upper and lower bound could be represented) and the red line indicates the mean score of LD Group participants in each grade. For grades that attained maximum score of the sub-test, mean is represented as single horizontal line and box plot was not feasible for this data.

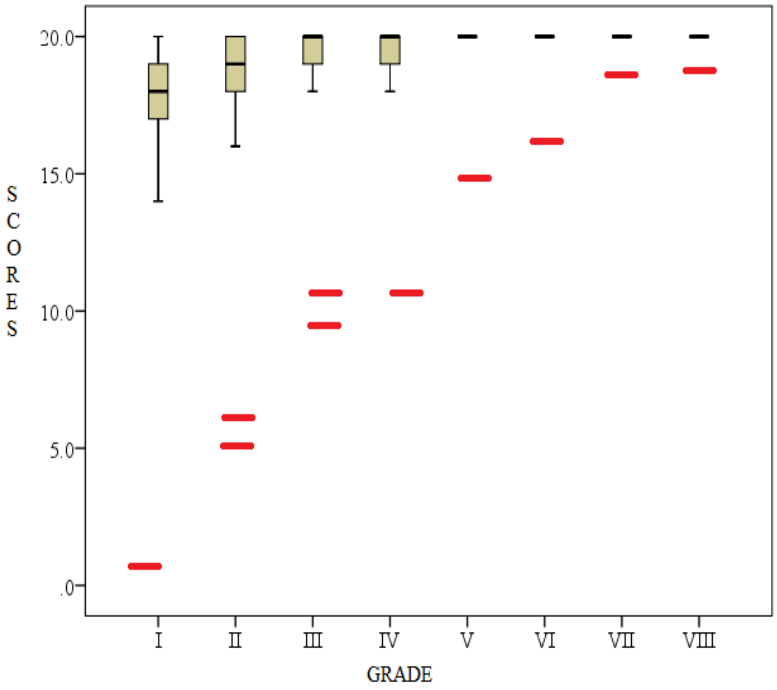


Figure 9(a). Comparison of mean scores obtained by children with reading/ learning difficulty (Red line) to the population statistic in syllable grapheme correspondence: Beginning consonants (Level 1) sub-test across grades.

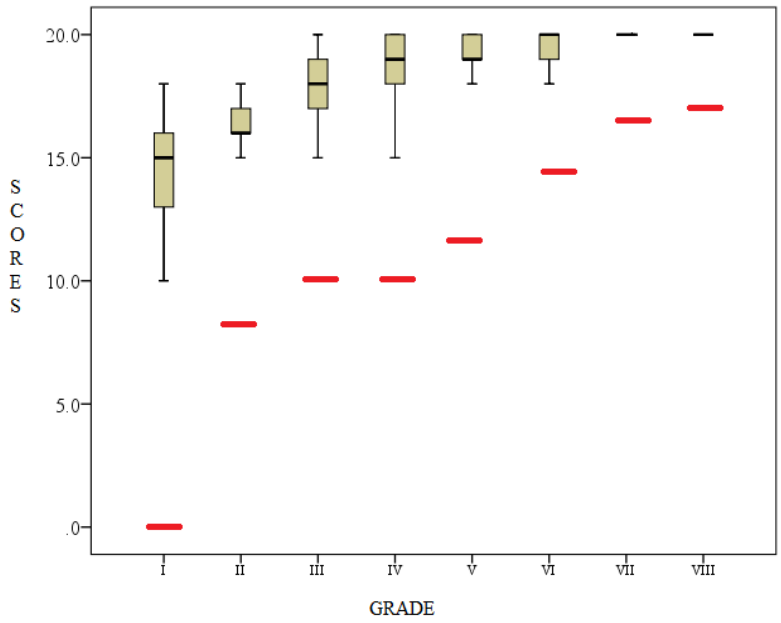


Figure 9(b). Comparison of mean scores obtained by children with reading/ learning difficulty (Red line) to the population statistic in syllable grapheme correspondence: Ending consonants (Level 1) sub-test across grades.

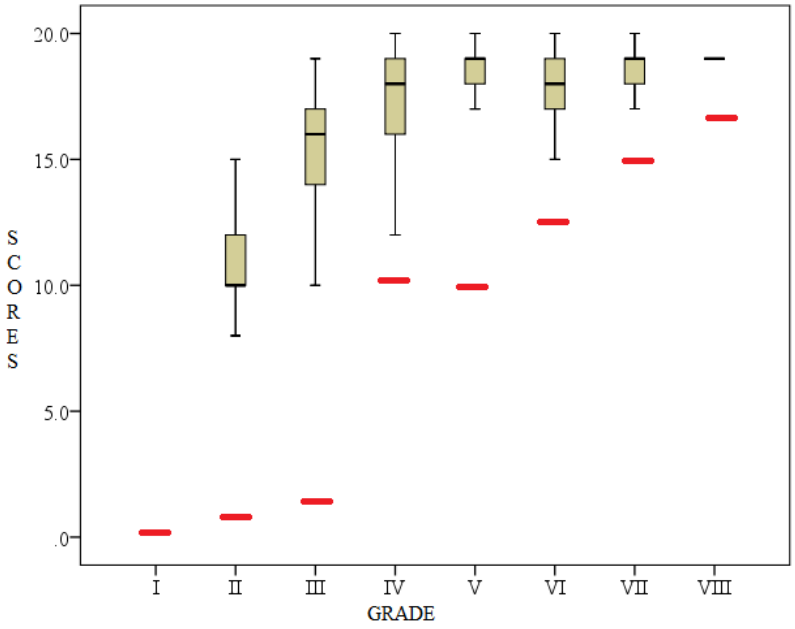


Figure 9(c). Comparison of mean scores obtained by children with reading/ learning difficulty (Red line) to the population statistic in syllable grapheme correspondence: Consonant cluster (Level 1) sub-test across grades.

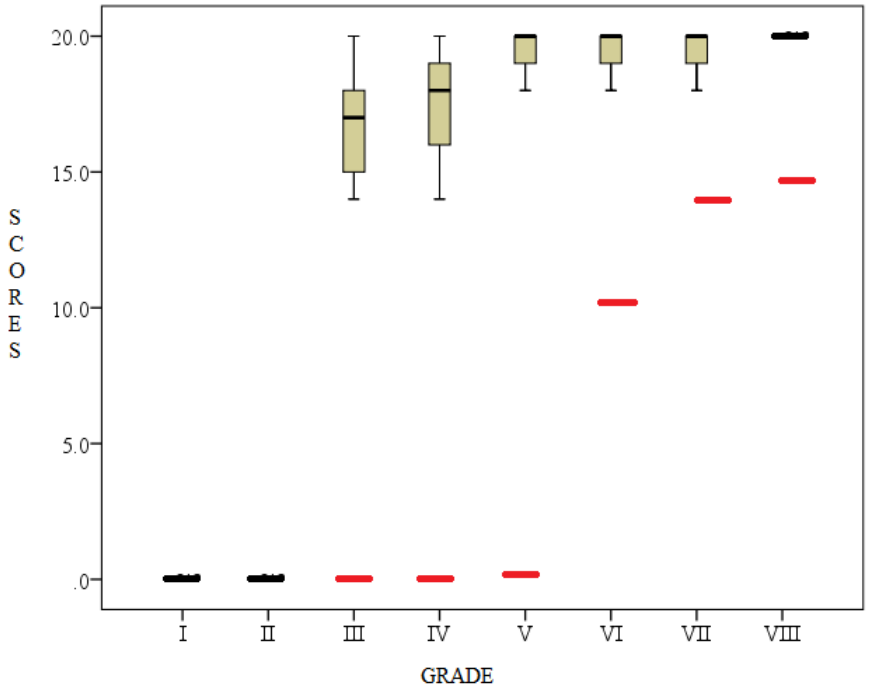


Figure 9(d). Comparison of mean scores obtained by children with reading/ learning difficulty (Red line) to the population statistic in syllable grapheme correspondence: Vowel sounds (Level 1) sub-test across grades.

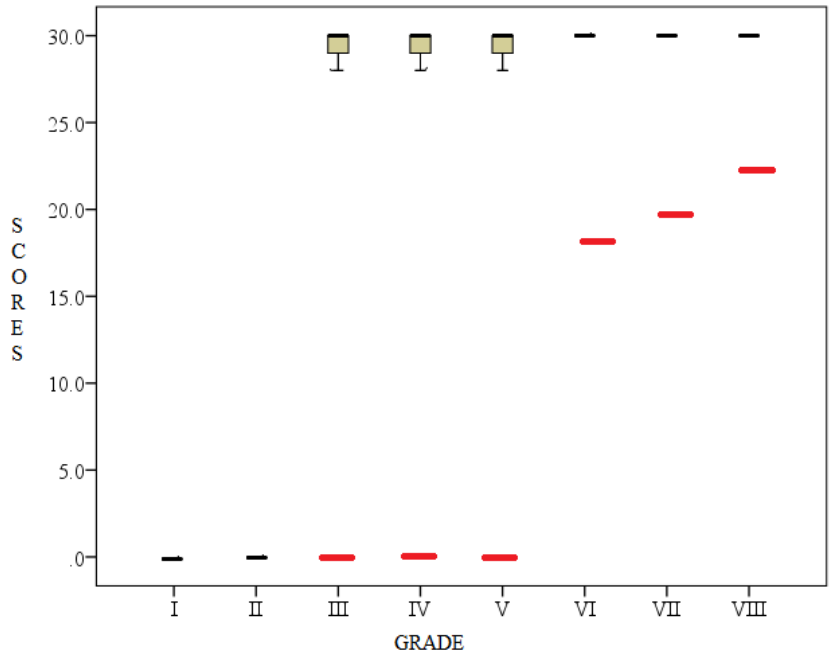


Figure 9(e). Comparison of mean scores obtained by children with reading/ learning difficulty (Red line) to the population statistic in syllable grapheme correspondence: Beginning consonants (Level 2) sub-test across grades.

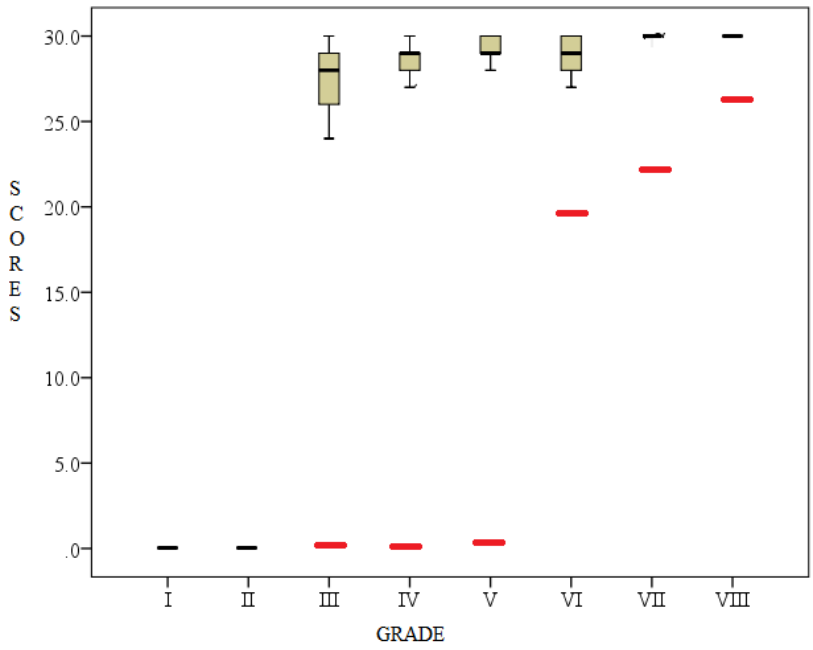


Figure 9(f). Comparison of mean scores obtained by children with reading/ learning difficulty (Red line) to the population statistic in syllable grapheme correspondence: Ending consonants (Level 2) sub-test across grades.

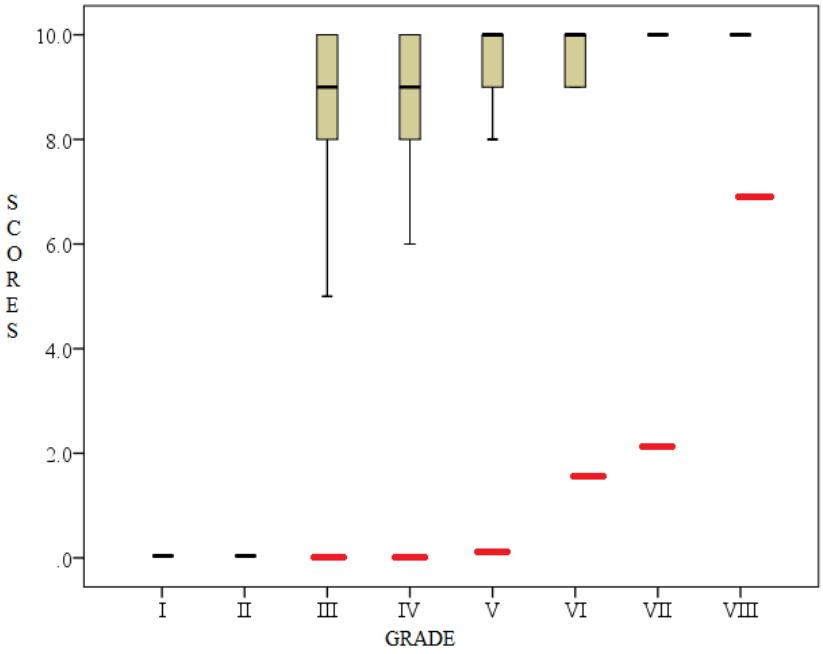


Figure 9(g). Comparison of mean scores obtained by children with reading/ learning difficulty (Red line) to the population statistic in syllable grapheme correspondence: Vowel sounds (Level 2) sub-test across grades.

The comparisons revealed that the performance of children with LD were much below the expected level of performance for their grades. The gap between the actual and expected performance was larger in the initial grades and gradually narrowed towards the higher grades, suggesting skill improvement over a period of time. But unlike in the perceptual skills section, the scores failed to reach the near expected performance scores till grade VIII suggesting an unresolved sound-grapheme association deficit in these children. This deficit is identifiable with ERS-M in all grades from I to VIII. Children with LD, studying in lower grades, could not make an attempt to complete the level 2 tasks even when they could perform level 1 task. This consents the hierarchy of task complexity in ERS-M and also suggests that syllable-grapheme associations are made earlier than grapheme- syllable associations. However, performance in all sub-tests of syllable-grapheme correspondence section was lower than the expected, indicating a higher degree of deficit in sound-symbol associations in children with LD learning to read and write Malayalam orthography.

Blending skills:

Figure 10a and Figure 10b represents the comparisons of mean scores of LD group to the population mean of ERS-M in each sub-test of blending section. For the purpose of easy visualization and understanding, the scale was modified for each of these figures depending on the range of scores obtained by the two groups. The population mean is represented in box plot (if the upper and lower bound could be represented) and the red line indicates the mean score of LD Group participants in each grade. For grades that attained maximum score of the sub-test, mean is represented as single horizontal line and box plot was not feasible for this data.

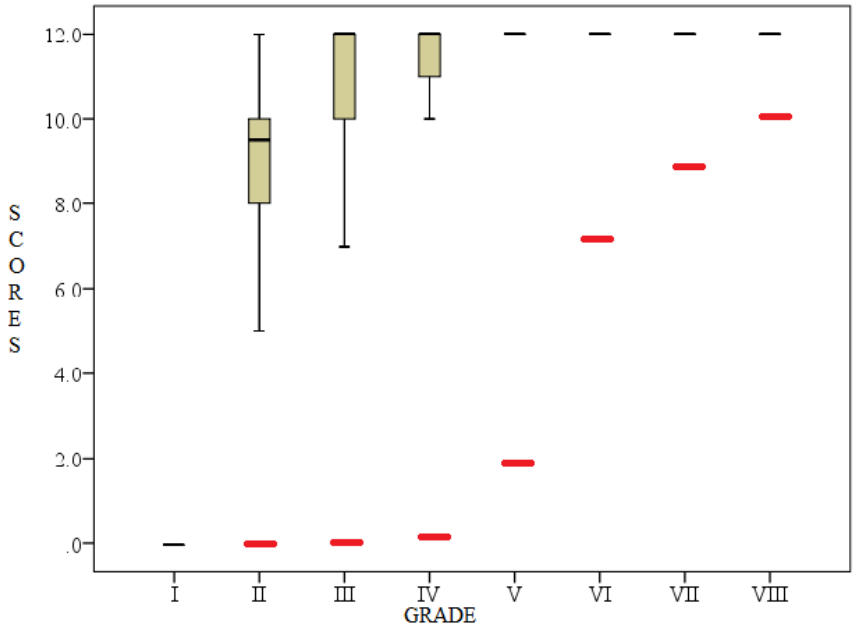


Figure 10(a). Comparison of mean scores obtained by children with reading/ learning difficulty (Red line) to the population statistic in blending section: Level 1 sub-test across grades.

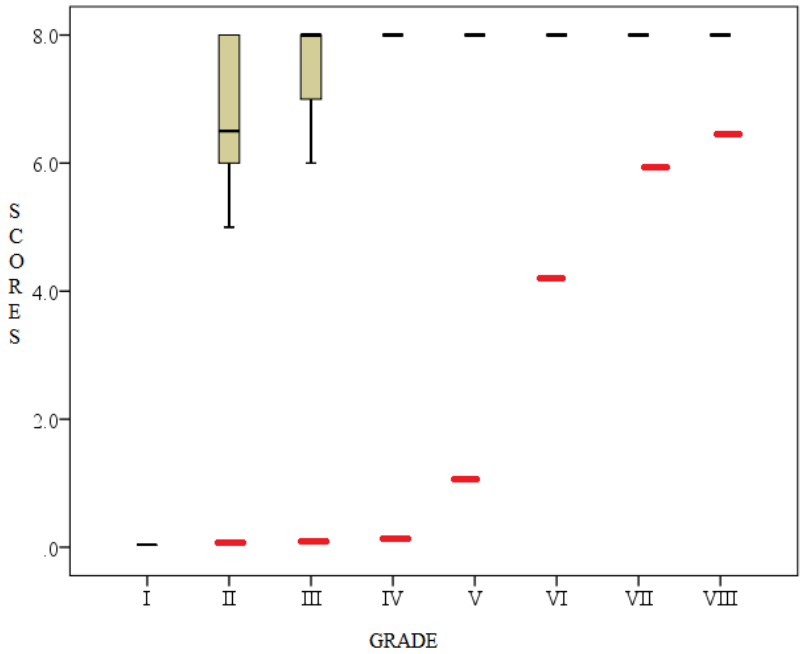


Figure 10(b). Comparison of mean scores obtained by children with reading/ learning difficulty (Red line) to the population statistic in blending section: Level 2 sub-test across grades.

The comparisons revealed that the performance of children with LD were much below the expected level of performance for their grades. The gap between the actual and expected performance was larger in the initial grades and gradually narrowed towards the higher grades, suggesting skill improvement over a period of time. But unlike in the perceptual skills section and similar to syllable-grapheme correspondence section, the scores did not reach the near expected performance scores till grade VIII suggesting an unresolved phonetic manipulation deficit in these children. Another observation that could be made from these comparisons was the inability of children with LD, studying in the lower grades, to attempt the task when the typical counterpart could master the skill to varying levels. A wide lag in the development of phonetic manipulation was observed in all grades from I to VIII even when these children are enrolled for professional training and instructions for overcoming their reading/ learning disability. The results, overall, indicate the excellent sensitivity of ERS-M in identification of blending deficits in children with LD learning to read and write Malayalam orthography.

Structural Analysis:

Figure 11a-c represents the comparisons of mean scores of LD group to the population mean of ERS-M in each sub-test of structural analysis section. For the purpose of easy visualization and understanding, the scale was modified for each of these figures depending on the range of scores obtained by the two groups. The population mean is represented in box plot (if the upper and lower bound could be represented) and the red line indicates the mean score of LD Group participants in each grade. For grades that attained maximum score of the sub-test, mean is represented as single horizontal line and box plot was not feasible for this data.

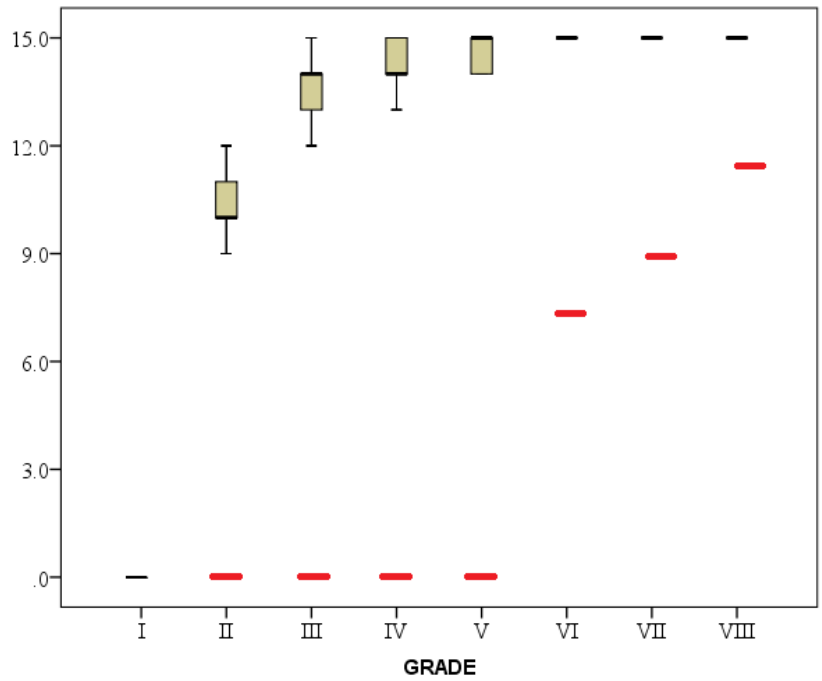


Figure 11(a). Comparison of mean scores obtained by children with reading/ learning difficulty (Red line) to the population statistic in structural analysis section (Level 1) sub-test across grades.

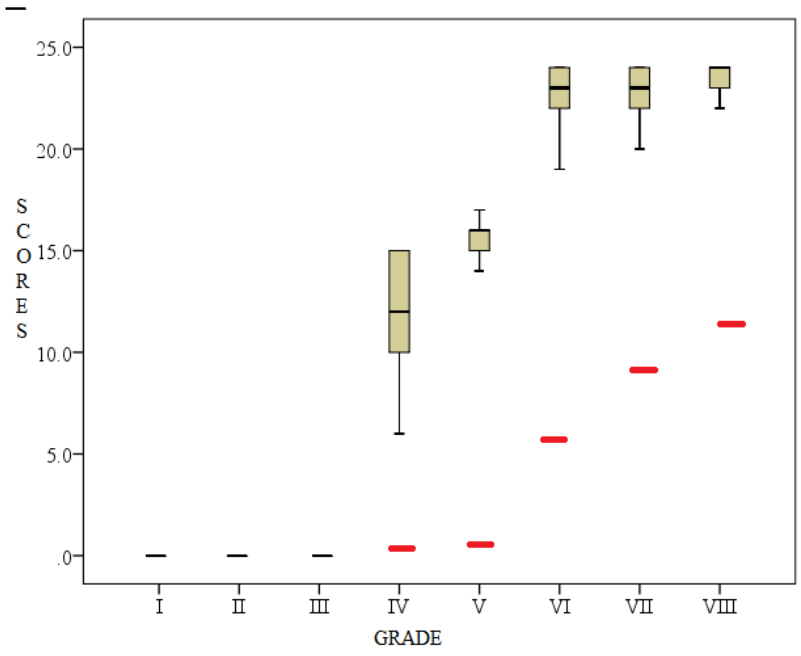


Figure 11(b). Comparison of mean scores obtained by children with reading/ learning difficulty (Red line) to the population statistic in structural analysis section (Level 2) sub-test across grades.

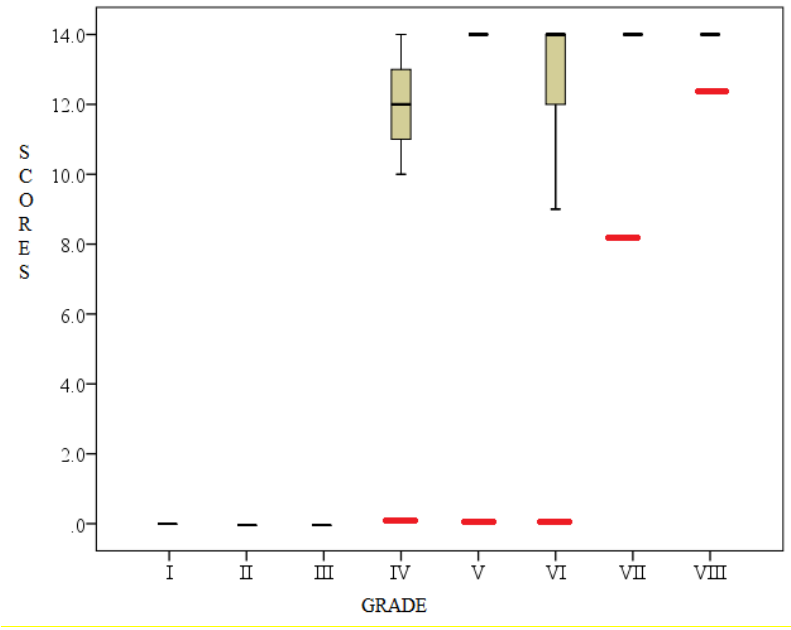


Figure 11(c). Comparison of mean scores obtained by children with reading/ learning difficulty (Red line) to the population statistic in structural analysis section (Level 1) sub-test across grades.

The comparisons revealed that the performance of children with LD were much below the expected level of performance for their grades. The gap between the actual and expected performance was larger in the initial grades and gradually narrowed towards the higher grades, suggesting skill improvement over a period of time. But unlike in the perceptual skills section and similar to syllable-grapheme correspondence and blending section, the scores did not reach the near expected performance scores till grade VIII suggesting a continued deficit in identification of word, morpheme boundaries and linguistic knowledge in children with LD. The task could not be attempted by younger children with LD, probably as an indication of associated language delay. The results, overall, indicate a high sensitivity of ERS-M in identification of delay or inadequate knowledge of linguistic units in children with LD learning to read and write Malayalam orthography.

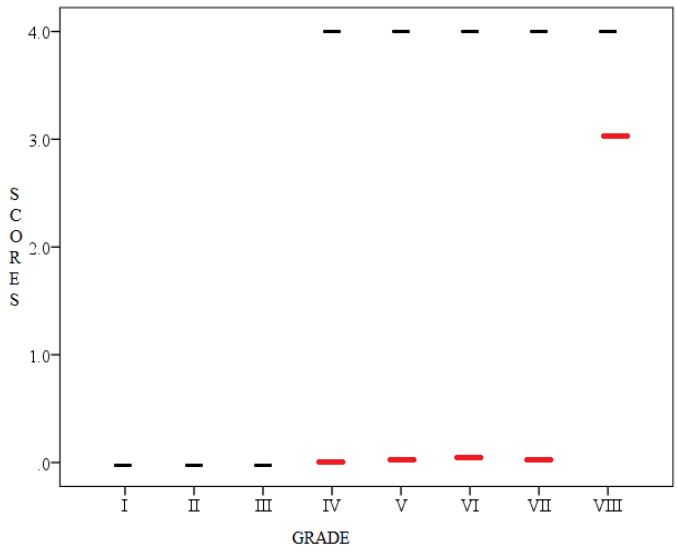


Figure 12(a). Comparison of score obtained by a child with reading/ learning difficulty (Red line) to the population statistic in oral reading skill (Level 1) sub-test.

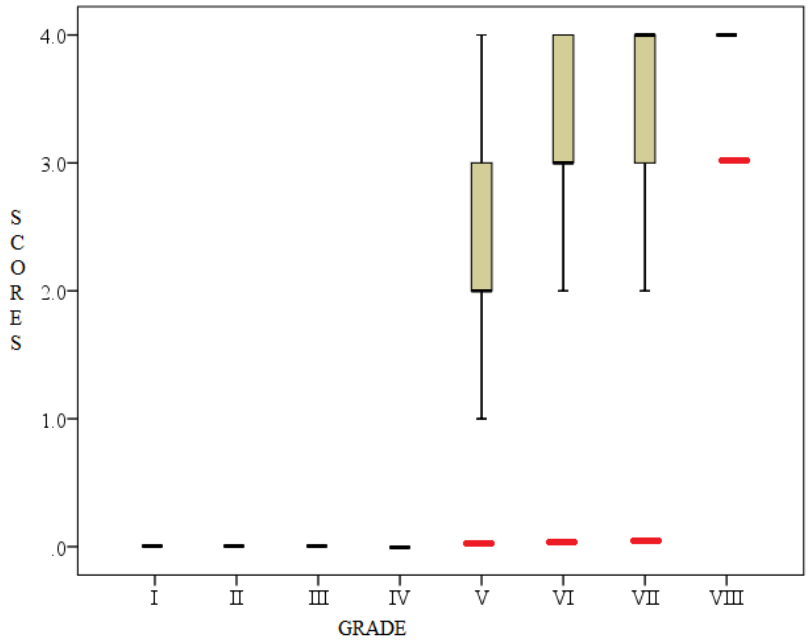


Figure 12(b). Comparison of score obtained by a child with reading/ learning difficulty (Red line) to the population statistic in oral reading skill (Level 2) sub-test.

Oral Reading Skills:

Among the 10 participants with LD, this section could be attempted only by one participant from Grade VIII. This participant could complete only till level 2 of

reading material. Figure 12 a & b represents the comparison of score of this participant with the population mean derived for ERS-M. For the purpose of easy visualization and understanding, the scale was modified for each of these figures depending on the range of scores obtained by the two groups. The population mean is represented in box plot (if the upper and lower bound could be represented) and the red line indicates the mean score of LD Group participants in each grade. For grades that attained maximum score of the sub-test, mean is represented as single horizontal line and box plot was not feasible for this data.

Comparing the scores obtained by the participant to the population mean in level 1 (Figure 12a) and level 2 (Figure 12b), the performance of this participant with LD was much lower than the expected level of performance for grade VIII. This suggest a severe lag in development of reading comprehension skills in children diagnosed with LD that remains unresolved even with training and instructions to overcome reading/learning difficulty. This continued difficulty may be the result of many other associated deficits as revealed in previous sections of ERS-M. Overall, the results suggest that ERS-M is sensitive to oral reading deficits in children with LD

The attempt to establish discriminant validity of ERS-M was completed with all the sections of ERS-M adequately distinguishing the typical and atypical acquisition of reading of Malayalam orthography in children of 6;0 to 12;11 years. The results also indicated that children with learning/reading difficulties have a delay in acquiring the typical reading related processes even when training is provided in this regard. All the reading related skills assessed in ERS-M seemed to improve across grades though most of the section scores did not reach the target level of performance. This improvement may be attributed to natural skill maturation or as a

result of the training instructions provided by professionals for overcoming reading difficulties in these children.

During the course of data acquisition and analysis of the data from TDC, certain qualitative observations could be made regarding the performance of children in ERS-M. These are observations, being specific to Malayalam orthography, is mentioned here as a window to future research in dyslexia.

Syllable - Grapheme correspondence

1. Many TDC had difficulty in identification of consonants in various word positions when the target *akshara* was an aspirate (|$b^{h,}$|,| p^{h}| etc). This difficulty continued from primary to secondary grades in TDC and was present in level 1 and level 2 tasks of Syllable-Grapheme correspondence section. (/b^{h}araɳi/, / p^{h}alam/)
2. Ending consonants were mostly confused with *anuswara* which is a symbol that represents a nasal half consonant |m| in Malayalam.
3. Geminates (example: |kk|) were identified easier than consonant clusters with two different *aksharas* (example: |kʃ|).
4. Children had difficulty comprehending instructions for vowel identification probably because graphemes in Malayalam include the inherent vowel /a/, unless indicated by a diacritic marker.
5. The errors in vowel identification emerged from difficulty in segregating the diacritic markers in the word and identifying the single orthographic representation of the target vowel. This was evident in TDC as most of the youngest participants could clearly verbalize the vowel occurring in the word but failed to correctly identify its written grapheme.(eg: എ /e/ from പേ /pe:/)
6. Differentiating the distinct diacritics for long and short vowels was difficult till Grade VIII in TDC. (eg: പേ /pe:/ - പെ /pe/)

7. The vowel that was most inaccurate was |a| because of its inherent nature in Malayalam orthographical system.
8. Consonant diacritic markers that are used in words to represent half consonants were a source of constant error in word final position.

Oral Reading

1. Syllabic reading was common in Grade I and Grade II participants in the oral reading sub-test.
2. Children often approximated the difficult/ novel word to already known words or omitted the word as a whole during oral reading.
3. Though reading comprehension was mastered to level 4 in TDC from grade VIII, reading fluency was observed to improve across grades.

CHAPTER V

DISCUSSION

The present study was conducted with the objective of developing a reliable and validated test for assessment of reading skills in Malayalam speaking children acquiring Malayalam orthography through formal instructions. Based on the detailed review, the test of Early Reading Skills developed by Rae and Potter (1971;1981) and its adaptation to Hindi (Priyadarshi & Goswami, 2012) was found to have the most applicability in reading assessment of Malayalam speaking children in the present scenario. The adapted Early Reading Skills in Malayalam (ERS-M) was subjected to various measures of reliability and validity and the normative scores in typically developing children (TDC) from Malayalam speaking society were established. This data was studied for deriving patterns of typical acquisition of Malayalam reading skills. The findings of various objective based analysis and the inferences derived from these are discussed under the following sections:

1. Role of gender in acquisition of Malayalam reading skills.
2. Sequential acquisition of Malayalam reading skills.
3. Mastering of Malayalam reading skills
4. Application of ERS-M in differentiating typical and atypical reading acquisition.

Role of Gender in Acquisition of Malayalam Reading Skills

Differences in reading performances across gender are commonly encountered in literature. The International Association for the Evaluation of Educational Achievement (IEA) report on the progress of international Reading Literacy Study (PIRLS, 2006) across 40 European countries found country dependent influence of student gender in literacy acquisition. In countries like Hungary, females outperformed male students but in Netherlands, the opposite relationship was found. Many European countries failed to show a

statistically significant gender difference in reading achievement. Another study across 35 high-income economic countries across the world including United States, Canada, Australia, Japan, South America, among many others, also suggested that differences across gender were present in some, but not all countries. These differences were often attributed to the research established differences in language acquisition (Ehrman, Leaver & Oxford, 2003; Halpern & Wright, 1996; Kansaku & Kitazawa, 2001; Liu, 2004; Maccoby & Jacklin, 1974; Philips, Steele & Tanz, 1987; Sommer, Aleman, Bouma, & Kahn, 2004), neural plasticity (Alexander, Altemus, Peterson & Wexler, 2002; Fernández, et.al., 2003; Sommer, Aleman, Somers, Boks, & Kahn, 2008; Weis, Hausmann, Stoffers, Vohn, Kellermann, & Sturm, 2008) , cognitive development (Geary, Saults, Liu, & Hoard, 2000; Shafritz & Hyde, 2016; Laws, Irvine, & Gale, 2016; Mansouri, Fehring, Gaillard, Jaberzadeh, & Parkington, 2016; Stoet, 2017) and attitude towards learning (Chiu, & McBride-Chang, 2006; Coles, & Hall, 2002; Logan, & Johnston, 2009; Logan, & Johnston, 2010; Marinak, & Gambrell, 2010; McGeown, Goodwin, Henderson, & Wright, 2012) are probably the most accused reasons for better reading abilities reported in female children compared to that of boys (Chan, Ho, Tsang, Lee & Chung,2007; Dee, 2007; Department for Children, Schools and Families [DCSF], 2007a, 2007b; Mullis, Martin, Gonzalez & Kennedy, 2003; Mullis, Martin, Kennedy & Foy, 2007). These differences in reading abilities and attitudes sustained over the early schooling years (Dee, 2007; Kush & Watkins, 1996; McKenna, Kear, & Ellsworth, 1995; Sainsbury & Schagen, 2004; Smith, 1990), and the gap widened as the age increased (McKenna, Kear, & Ellsworth, 1995). The positive attitude towards reading, reported in females (Sainsbury & Schagen, 2004), may be the outcome of these bio-behavioural material differences. Another factor accounted for the gender differences in reading achievement is the gender of the teacher (PIRL, 2006; OECD, 2010) because boys and girls may get treated differently based

on the gender of the teacher. Overall, the gender effect seems to depend on various other internal and external factors and varied with the population studied.

The results of this study presented with the finding that the performance of typically developing children acquiring reading skills in Malayalam orthography in specific reading related tasks did not differ across gender in each grade of formal instruction. Hence, children acquire the skills assessed by ERS-M, i.e., auditory-visual perception, syllable-grapheme correspondence, phonetic manipulation skills, linguistic skills, reading fluency and reading comprehension in Malayalam with similar pace and comparable mastery level. This study goes in consensus with other reports of reading acquisition in Indian (Priyadarshi & Goswami, 2012) as well as foreign languages (Rucklidge & Tannock, 2002). The report of Priyadarshi and Goswami (2012) reported that gender was insignificant in the performance of typically developing Hindi speaking children in reading acquisition.

The absence of gender difference may be reasoned as a combined effect of many possible internal and external factors such as orthographical transparency, education system, and a systematic instruction method followed in schools. Malayalam orthography is said to be alpha-syllabary and lies between the two other extremes of orthographic types: the logographic and alphabetic. The cognitive load on decoding script is lesser in Malayalam orthography compared to English as it constitutes of finite number of symbols that are combined under regular rules. Reading Malayalam orthography, hence, may not be as much a cognitive load as reported in reading acquisition studies in English script. Therefore, the debated differences in cognitive-linguistic capacities of male and females do not seem significant in literacy acquisition in transparent scripts of Indian orthographic system, irrespective of the reading process. The present study concluded that male and female children acquiring reading of Malayalam language, do so with similar pace and pattern from Grade I to Grade VIII. This also suggested that the newly adapted test material of ERS-M is

applicable to children, irrespective of their gender. This simplified all further analysis and agreed that the results obtained and inferences made in the study was true for all children, male or female.

Sequential Acquisition of Malayalam Reading Skills

Reading is an acquired, human invented skill unlike walking or talking. Learning a new skill, as complex and delicate as reading, should logically go through some developmental changes before mastery is acquired irrespective of spoken language or orthography (Caravolas, Hulme, & Snowling, 2001; Chiappe, Siegel, & Wade-Woolley, 2002; Karanth, 2002; Lonigan, Burgess, & Anthony, 2000; Lyytinen, Aro, Holopainen, Leiwo, Lyytinen, & Tolvanen, 2006; Muter, Hulme, Snowling, & Stevenson, 2004; Nag, 2007; Padakannaya, 2003;Verhoeven, & Van Leeuwe, 2008; Ziegler, & Goswami, 2005). Various theories and models prevail that explain reading acquisition (Ellis, 1985; McClelland, Rumelhart, & Hinton, 1986; Orton, 1925; Rumelhart, Hinton & McClelland, 1986) and they unanimously approve the presence of stages and hierarchy of acquisition (Karanth & Prakash, 1996; Tiwari, Krishnan, Chengappa & Rajasekhar, 2011; Prema & Jayaram, 2002; Prema, 1997). However, the specific findings of reading development like age of acquisition, duration of each phase of development and/or hierarchy of acquisition vary with orthography (Durgunoğlu, Nagy, & Hancin-Bhatt, 1993; Geva, & Siegel, 2000; Geva, Wade-Woolley, & Shany, 1993; Gholamain, & Geva, 1999; Rousselle, & Noël, 2007), spoken language (Da Fontoura, & Siegel, 1995; Geva, Wade-Woolley, & Shany, 1997), cognitive abilities (Da Fontoura, & Siegel, 1995; Geva, & Siegel, 2000) and instruction method (Kuespert, & Schneider, 1998; Schneider, Ennemoser, Roth, & Küspert, 1999; Schneider, Roth, & Ennemoser, 2000).

The present study in reading acquisition of Malayalam orthography also found similar results with significant difference in reading scores across grades in all sections of ERS-M. There exist stages or phases of reading acquisition in Malayalam speaking TDC learning to read Malayalam orthography through formal instruction. A similar finding was reported by Prema and Jayaram (2002) in Malayalam-English biliterates but concluded with no clear pattern of Malayalam reading acquisition. The present study using ERS-M revealed many interesting observations that shine light into the development and mastery of reading skills from grade I to grade VIII. The results of analysis of sequential acquisition of reading related processes across grades revealed the presence of specific age range during which a reading skills is learned.

Perceptual skills

Visual and auditory perception skill includes all sensory-cognitive-linguistic processes that make a written or spoken symbol meaningful. Adequate visual perception is necessary to generate and store the memory of an orthographic symbol which together with auditory perception establishes rules of literacy in the language (sound-symbol associations). Auditory perception also plays a key role in linguistic development (Boothroyd, & Boothroyd-Turner, 2002; Kuhl, Conboy, Padden, Nelson, & Pruitt, 2005; Kuhl, Stevens, Hayashi, Deguchi, Kiritani, & Iverson, 2006; Tsao, Liu, & Kuhl, 2004), that forms the basis for reading comprehension. Literature exposes a handful of publications that ascertain the role of auditory and visual perception in reading acquisition (Dougherty, Ben-Shachar, Deutsch, Hernandez, Fox, & Wandell, 2007; Facoetti, Corradi, Ruffino, Gori, & Zorzi, 2010; Franceschini, Gori, Ruffino, Pedrolli, & Facoetti, 2012; Klingberg et.al., 2000; Vidyasagar, & Pammer, 2010). These studies provide neuro-anatomical evidences for the role of temporal and visual perception in reading by documenting and differentiating the neural processing of

auditory and visual stimuli in typical and atypical reading. Among the many neuro-imaging studies in dyslexia and skilled readers, Dougherty, Ben-Shachar, Deutsch, Hernandez, Fox, and Wandell (2007) found increased inter-hemispheric connectivity between right and left temporal lobes is reported to differentiate good and poor readers. The auditory perception helps in perception of speech and mapping the constituents to its visual representation. Along with auditory perception, visual attention (Vidyasagar, 2005), visual pattern recognition (Boussaoud et al., 1991), visuo-spatial sequencing (Pammer et. al., 2004, Pammer & Vidyasagar, 2005), and visual motion for letter scanning (Eden et al., 1996) facilitates reading skills. Reading skill acquisition in children may involve maturation and practice of these neuro-cognitive processes for efficient reading (Vidyasagar & Pammer, 2010). Evidences for role of auditory-visual perception in reading skill acquisition can also be derived from the dyslexia remediation studies that focus on perception training (Gori & Facoetti, 2014). Combined deficit in visual and auditory perception skills places individuals at risk for dyslexia (Facoetti, Corradi, Ruffino, Gori & Zorzi, 2010).

This background literature suggests that auditory-visual perception is one of the first and most basic foundations for reading development. The findings of the present study agreed to this literature background. Among the three auditory perceptual skills studied for acquisition in this study, auditory discrimination skill failed to show a statistically significant difference across grades indicating a lack of development pattern from Grade I to VIII. Further observation of performance scores reveal that this skill is mastered throughout the grades studied. This indicated that auditory discrimination was a pre-requisite for reading acquisition and is mastered before introducing orthography to young children in grade I. Probably this mastery is demanded for language acquisition in early years of typically developing children (Bond & Dykstra, 1967; Boothroyd, & Boothroyd-Turner, 2002; Kuhl, Conboy, Padden, Nelson, & Pruitt, 2005; Kuhl, Stevens, Hayashi, Deguchi, Kiritani, &

Iverson, 2006; Tsao, Liu, & Kuhl, 2004). This is acceptable considering the need to differentiate between closely related auditory symbols that convey different meaning in a language. This mastery in auditory discrimination seems to preclude the reading development in beginner readers. These findings are in line with the findings reported by Priyadarshi and Goswami (2012) in acquisition of Hindi orthography, wherein auditory identification and recall scores were lowest in the primary grades and improved greatly by Grade III. The present study found that these skills follow similar pattern till grade III but is stabilized by grade V, indicating that Malayalam orthography takes a little longer for accurate auditory perception.

Interestingly, absence of development pattern could also be observed in visual discrimination skills for non-orthographic symbols (Visual Discrimination-Level 1) with no significant difference across grades (Table 6 to Table 9). Visual discrimination plays an important role in relating the spoken word to its meaning, such as object-word or object-picture association. Considering the importance of this process in language acquisition in early years, mastery of this skills before grade I seemed logical in typically developing children. It is to be noted that this differentiation was mastered only for non-orthographic picture stimuli, further indicating that fine discrimination of sequence of orthographic symbols include higher load on perceptual skills. As understood from the neuro-anatomical studies, reading requires activation of visuo-spatial pathways that spot-lights visual attention, visual motion systems, pattern recognition, visual sequencing and acquisition of reading is the mastery of these operations, Orthography, is a series of cluttered patterns of visual symbols that demands for high efficiency of visual processing that has auditory symbols mapped on to it which needs decoding with the help of language system. The longer duration for development of Visual discrimination for orthographical symbols (VD-2) is therefore explained.

Interestingly, simultaneous acquisition in both auditory and verbal discrimination suggests that these two skills developed parallel. Typically, orthographic units, *aksharas*, are introduced in kindergarten and hence, the findings of this section is in consensus with the proposition of King, Wood, and Faulkner (2008) who stated that visual discrimination developed simultaneous with alphabet (akshara, in the present study). When two symbols are analyzed and found to be different from each other, each symbol receives its unique auditory and visual identity. Identification of visual and auditory symbols with its sound association improved to cent percent till grade III after which the scores remained unchanged till grade VIII. Hence, typically developing children acquiring Malayalam orthography master the sound - symbol identity (*aksharamaala)* by Grade III. This observation was similar to that of ERS- H. This findings of ERS-M was in contradiction to the findings of ERS-H (Priyadarshi & Goswami, 2012) that auditory discrimination along with recall preceded auditory identification.

Developing and storing the identity of auditory and visual symbol through multiple exposures was followed by creation of long-term memory of this relationship. The auditory recall sub-test of ERS-M demanded recall of this associated sound from a visual symbol cue. A minimum lag of one grade is evident in acquisition of auditory recall skills (Grade IV) compared to auditory identification (Grade III) suggesting the need for multiple and long term exposure to these associations for a strong memory coding and recall (Karpicke, & Roediger, 2008; Gupta, 2003). Overall, no difference in pattern of acquisition of auditory and visual identification, discrimination or recall was found across Malayalam and Hindi. However, the results indicated that the section on perceptual skills in ERS-M may not be sensitive to identification of reading difficulty beyond primary grades.

Syllable-Grapheme Correspondence

The relationship established by the visual grapheme representation and the sounds represented by this grapheme is assessed in the second section of ERS-M. Unlike alphabetic languages (Example: English), the graphemes of Malayalam orthography is not recalled by names that have no relation with the sound represented (For example: 'A' is identified as /ye/ but represents a range of sounds like /e/, /ae/, /a/, etc depending on the word position and alphabet(s) surrounding). In logographic transparent orthography, like that of Malayalam, the grapheme is identified by the one spoken symbol which is closely associated with the sound represented by the grapheme. Therefore, the tasks of this section differed from the previous section (Perceptual Skills) of ERS-M, with additional segmentation process of a word or non-word and identification of the sound/grapheme at specific word locations. Hence, logically, the appropriate perceptual skills can be seen as a pre-requisite for performance in syllable grapheme correspondence (SGC). This proposition is supported by various research reports from typical and atypical reading skills that conclude that auditory-visual perceptual deficits predict phonological awareness in children (Cassco, Tressoldi & Dellantonio, 1998; Facoetti et. al., 2010; Facoetti, Corradi, Ruffino, Gori, & Zorzi, 2010; Hari & Renvall, 2001; Roach & Hogben, 2007; Vidyasagar & Pammer, 2010). But, in Indian and other alpha-syllabary orthography decoding, phonological awareness is not found to have a significant role as the sound representation of *aksharas* as mapped at the level of syllables and not phonemes (Liow & Lee, 2004; Nag-Arulmani, 2003; Prakash, Rekha, Nigam & Karanth, 1993).

The comparisons revealed that in Malayalam orthography, SGC at the beginning and final word position followed the development pattern of auditory-visual identification (Table 6 to Table 9). This confirmed the logical hypotheses stated previously, that auditory-visual perception is a pre-requisite for SGC (Cassco, Tressoldi & Dellantonio, 1998; Facoetti et. al., 2010; Facoetti, Corradi, Ruffino, Gori, & Zorzi, 2010; Hari & Renvall, 2001; Roach &

Hogben, 2007; Vidyasagar & Pammer, 2010). The performance scores of SGC at the word beginning and end position (BC-2, EC-1 and EC-2) showed significant differences at grade III. A similar improvement is scores were seen in Hindi (Priyadarshi & Goswami, 2012) and Kannada Orthography (Nag, 2007). Supporting this observation is the finding of Kaminski and Good (1996) and Vandervelden and Siegel (1997) that segmentation skills emerge in the kindergarten and early first grade of schooling in typical reading acquisition. This segmentation skill aids in separating the given spoken stimuli into its basic constituents before a syllable at the indicated word position is identified for the SGC section of ERS-M. Hence, practice and mastery of segmentation skill from Grade I to grade III results in improvement in performance score of this sub-section.

Beyond grade III, the performance scores of SGC at word final position (EC-1 and EC-2) showed periods of improvement with plateau between these grades of improvement (Table 6 to Table 9). Both EC-1 and EC-2 showed the first significant improvement in scores at Grade III followed by a period of no significant change till grade V for EC-1 and grade VII for EC-2. This observation can be explained with the qualitative observation of typical responses mentioned in the previous section. The investigators observed that typically developing children learn to segment the word into its components and identify the final consonant by grade III. However, they continued to have errors in words with the *anusvaram* feature of Malayalam orthography. This feature indicated a half /m/ sound following the final consonant and was indicated with a diacritic. Discriminating the diacritic from the word and identifying the whole consonant instead of the diacritic may have increased the cognitive load on participants beyond Grade III. By the next grade of improvement (grade V or grade VII) this demand is fulfilled and the overall performance scores improve significantly.

Working memory is found to have strong association with early literacy acquisition in English language but this association weakened and almost were independent in higher

grades (Alloway, Gathercole, Adams, Willis, Eaglen, & Lamont, 2005; Gathercole, Brown & Pickering, 2003; Gathercole, Pickering, Knight & Stegmann, 2004; Jarvis & Gathercole, 2003). The association was found to be stronger for complex span tasks of reading supporting the observations made in this study across Level 1 and 2 of SGC. The level 2 task in this section (EC-2) attained the concept of *anusvaram* later (grade VIII) compared to level 1 (EC-1) approving the higher complexity of SGC processes in level hierarchy. Level-2 tasks required the participant to hold the three spoken word tokens in working memory scheme while running the SGC protocol on all these tokens successfully. Presence of *anusvaram* could have complicated SGC level 2 further resulting in improved scores only by Grade VII even when SGC for individual tokens could be mastered by Grade V (EC-1). Hence, the difference in the grade point of second period of significant improvement initiation in the SGC sub-test (EC-1 and EC-2) may be explained as a consequence of increased cognitive load for the task (Anthony & Francis, 2005).

Similar differences can also be found in the consonant cluster sub-test of SGC (CC-1) with a significant improvement in scores from grade I till grade III followed by a plateau in performance till grade VII after which the score again improved till grade VIII (Table 6 to Table 9). The qualitative observation made in typically developing children explained this pattern as well. Children acquire SGC for geminates from grade I to grade III when they could identify the multiple combination of the same consonant sounds (example: /kk/, /pp/ etc) in a given spoken word token. Identification of dissimilar consonant cluster (For example: /kS/, /kt/, /pl/ etc) is achieved by grade VII and continue till grade VIII before being mastered. Further, Malayalam orthography includes diacritic representation for many common consonant combinations and hence separating these diacritic forms to its whole consonant components for expected response in ERS-M may account for this delay in acquisition of SGC for these consonant combinations.

In spoken language acquisition, vowel sounds are among the first to be mastered (Baker & Trofimovich, 2006; Godson, 2004; Roeder, 2010; Selby, Robb & Gilbert, 2000; Stokes, & Wong, 2002; Warner-Czyz, Davis, & Morrison, 2005). Following the same trend, vowels are introduced prior to consonant sounds in reading-writing acquisition. The most followed instruction method of Indian scripts starts with introduction of vowel graphemes followed by consonant symbols, as is evident from the age old arrangement of graphemes in Indian languages called the *aksharamaala*. In the many Indo-dravidian and Indo-aryanorthography system, vowels are represented as whole orthographical symbols only if in the word beginning position. In other word positions, vowels are indicated with pre-determined diacritic markers at various locations around the pre-vocalic consonant. This is true for Malayalam orthography as well and may be the reason for prolonged age of acquisition in sub-test score (Vowel-Level 1 & Vowel-Level 2) till grade VIII. Contrary to the acquisition pattern of English (Caravolas, Kessler, Hulme, & Snowling, 2005; Kessler & Treiman, 2001; Treiman, Kessler & Bick, 2002), vowels are among the last to achieve SGC performance scores in Malayalam orthography. Difficulty in discriminating the diacritic markers for short and long vowels in Hindi was reported in typically developing children (Gupta, 2003; Priyadarshi & Goswami, 2012). The investigators believe that this difficulty is the result of a demand for conversion of diacritic representation into whole grapheme representation for the vowel sound. Support for this conclusion could be derived from the observation that many typically developing children could provide correct verbal responses but made errors in graphic response.

The interactive model of reading proposed by Rumelhart (1977) emphasize on the knowledge of logographic system of a language and the sound-grapheme associations that can help in deciphering the written text. This association mediates the process of adding on the possible pronunciation of a visual symbol combination to produce derive the word. This

deciphered word is then searched for its meaning in the lexical knowledge system to derive at the meaning intended. The same sound-grapheme correspondence helps a beginner reader in reading novel or unfamiliar words. Hence, more irregular the sound-symbol associations, more delay in acquiring the rules and more the number of reading errors. The same principle applies in writing. Children learning to write need to segment the spoken word into its basic units and identify the grapheme that is used to represent the phoneme based on the orthographic rules. Malayalam orthography is transparent with one-to-one mapping of sounds and symbols with each grapheme mapped into syllables, if not truncated with special diacritics. The results of the present study indicate that SGC for beginning and final word position is achieved by Grade III while vowels are mastered the last, thanks to the complex diacritic markers.

Blending

Blending is the ability to merge the features of phonemes at the point of juncture to provide meaningful responses. This sub-test was included in ERS-M to assess the participant's control and flexibility on orthographical repertoire of the language. Helfgott (1976) studied phonemic segmentation and blending in children of kindergarten and stated that it serves as a predictor of early reading acquisition. This process is considered as a form of phonemic awareness. The blending section of ERS-M included blending of written symbol(s) with picture to derive meaningful word (Bl-1) and also assessed segmentation of meaningful compound words with word boundaries (Bl-2).

Sequential acquisition of orthographical and non-orthographical blending skills continued till grade VIII in the current study with alternating grades of response plateaus. No clear patterns were evident in this sub-test. The basic concept of merging and manipulating the phonetic features at the point of juncture to produce meaningful words emerged by Grade

III (BL-1) and gradually improved over time till grade VIII. The continued acquisition blending skills in school going children makes it a sensitive skill in course of reading acquisition. The reverse of this process, segmentation, was tested in the second level of this sub-test, wherein, the participant identified the most appropriate point of dissection of a meaningful word. The acquisition pattern followed for segmentation (Bl-2) was similar to that of blending (Bl-1) with continuous improvement in scores till grade VIII. The pattern of reading acquisition described by Catts, Adlof, Hogan and Weismer (2005) which described a decline in rate of acquisition of reading skills in the Fourth grade was evident in this section. Improved performance in these tasks across grades suggest a developmental pattern and this is in line with the findings of other orthographical systems (Høien, et al., 1995; Stanovich, Cunningham & Cramer, 1984; Wagner, Torgesen & Rashotte, 1994; Yopp, 1988)

Observations made from the study till this point (Table 6 to Table 9) suggests that the basic skills of Malayalam reading acquisition are achieved by Grade III (auditory-visual perception, letter knowledge, Segmentation, Syllable-Grapheme Correspondence, phonetic manipulation, and word boundary identification). Typically developing children may be experiencing a stage transition in reading acquisition from "learning to read" towards "reading to learn". In the second phase of reading acquisition, the linguistic knowledge of the reader and read text material may start to interact for knowledge gain.

Segmentation skills predict for early reading skills in children (Kaminski & Good, 1996; Muter, Hulme, Snowling, & Taylor, 1997; O'Connor & Jenkins, 1999; Spector,1992; Wagner et. al.,1997; Yopp, 1988). Both blending and segmentation skills are also reported to be pre-requisites for reading acquisition (Ball & Blachman, 1988, 1991; Davidson & Jenkins, 1994; Fox & Routh, 1984; O'Connor, Jenkins, & Slocum, 1995; Torgesen, Morgan, & Davis, 1992). Generally, segmentation skill is seen as more complex than blending considering the word boundaries that needs to be identified based on higher level linguistic processing

(Oudeans, 2003). But the results of the present study refute this literature and suggest that the acquisition of these two processes were similar in their pattern. Malayalam orthography supports blending and segmentation to same extend, probably with its peculiar orthographical features. This pattern differed from that of Hindi language wherein the identification of word boundaries and segmenting the components at word level were more difficult in children compared to blending words/graphemes to form meaningful words (Priyadarshi & Goswami, 2012).

Structural Analysis

The whole purpose of orthographic encoding is to document, communicate and preserve ideas, messages and details for later reference, thus reducing the cognitive load on human brain. Attaining this comprehension requires the reader to have the strong lexical knowledge of words, morphemes and syntactical structure of the written language and its relation to spoken language. This knowledge also helps skilled readers to predict, identify and decode a novel string of graphemes. Support for this notion can be derived from the interactive model of reading proposed by Rumelhart (1977). The structural analysis sub-test of ERS-M included sub-tests that assessed the lexical knowledge of young children who needs to apply linguistic knowledge for word identification using contextual, syntactic (SA-1) and morphemic (SA-2). It also included the test for identifying pseudo-words that required differentiation of words that have similar grapheme-syllable combinations but were semantically distinct (SA-3). These higher level processing skills were expected to develop parallel to spoken language proficiency after children have acquired the basic decoding procedure of reading.

Vocabulary growth and decoding abilities are reported to have moderate correlation (Metsala, 1999; Walley, Metsala, & Garlock, 2003). The efficiency of reading

comprehension depends on speedy and accurate word recognition. Quicker word recognition is known to predict in reading comprehension (Bowey, 1986; Perfetti, 1985). From table 6 to table 9, it could be observed that SA-1 and SA-2 follow similar pattern of acquisition that continue to improve till Grade VIII with relative stable scores in Grade III to grade VI. The scores further improve from Grade VI to grade VII. This may be related to the simultaneous acquisition of reading and oral vocabulary in the early years that assists in improved word recognition. This finding is against the proposition Adam (1990) that relationship between morphemic units and word recognition is not strong in the early reading years. Young readers are sensitive to the morphemic structure of written words (Casalis, Dusautoir, & Cole, 2009). Duncan, Cassalis and Cole(2009) revealed that children's morphological judgement ability develops over time and relates to other factors such as vocabulary and years of instruction children receive.

The present study revealed that the early schooling years (Grade I to Grade III) involve continued improvement in recognition of morphemic words. Recent studies on adult reading skills also suggest that skilled readers rely on morphemes for word recognition (Schreuder & Baayan, 1995; Schreuder, Grendel, Poulisse, Roelofs, & van de Voort, 1990; Taft, 2003; Taft & Zhu, 1995) and that the speed of recognition depends of exposure to the morphemes in multiple word contexts (Reichle & Perfetti, 2003). Hence, the decelerated improvement in performance scores of SA-1 and SA-2 beyond grade III may indicate the longer exposure to morphemes that is required for reading mastery in the higher grades. It may be assumed that from grade VI, children acquire more complex morpho-linguistic forms that improve their word identification accuracy in ERS-M. Similar pattern was reported by Tyler and Nagy (1989) who found that knowledge of the syntactic properties and meanings of suffixes was limited among fourth graders but adequate by eighth grade. The investigators observed that children were able to judge the appropriate morpheme to complete a

meaningful sentence in early grades and to identify inflectional morphemes by middle grades.. Several studies suggest that children in primary grades vary significantly in their ability to manipulate morphologically complex words and these differences are often linked to the difficulty of the task (Mahoney, Singson & Mann, 2000; Nagy, Beringer & Abbott, 2006).

Identification of morphemes and improved vocabulary seemed to be the basic requirement for identification of pseudo-words (SA-3). Task of identification of root word follows a critical structural analysis of morphologically complex words by decomposition and derivation of its constituents. Relational knowledge about the morpheme is not only sufficient in completing it but also helps in understanding of the grammatical role of its morphemic constituents. This is evident from the data analysis that revealed improvement in scores of SA-3 from Grade IV after stabilization of vocabulary (SA-1) and morpheme growth (SA-2) in Grade III. Identification of pseudo-words required the participant to separate any morphemes (affixes or pre-fixes) from the root word and analyze the semantically independent existence of the components. This decision depends on having deep vocabulary knowledge of the root word and also on the morpheme associated, if any.

The results of the current study indicated a significant contribution of vocabulary as well as morpheme in word identification in early reading years. This acquisition is followed by ability to analyze the word structure and to make decisions on pseudo and derived words by Grade IV. Children take a minimum of three years of exposure, practice and learning to master these skills before they move up in the hierarchy of reading acquisition. The role of morphology is established to be crucial in reading across languages. The knowledge of morphological structures and constituents are very much significant in the reading comprehension. Morphological awareness is in fact related to children's reading comprehension especially in elementary grades (Carlisle & Fleming, 2003). Morphological

awareness contributes to reading comprehension and this contribution increases with age as children are exposed to increasingly higher-level texts comprising unfamiliar words (Kuo & Anderson, 2006). Hence the outcomes of structural analysis section can be considered to be predictor of performances in oral reading section of ERS- M (Cain & Oakhill, 2007; Carlisle & Stone, 2005; Saiegh-Haddad, &Geva, 2008).

Oral Reading Passage

The ultimate aim of reading a text is its comprehension. Reading comprehension is a complex cognitive-linguistic process that involves linguistic, inferential and reading skills for online processing of information and derives meaning from personal experiences as well as acquired knowledge (Dewitz, Jones, & Leahy, 2009; Elbro & Buch-Iversen, 2013; McKeown, Beck & Blake, 2009; Murphy, Wilkinson, Soter, Hennessey & Alexander, 2009). Reading comprehension demands the reader to interact with the text in a meaningful way. It is a bridge from passive word reading to active reading i.e., from letters and words to characters and contexts (Gafoor & Remia, 2013). Analysis of reading comprehension of passages revealed that this shift in reading activity started in Grade IV and the performance improved to higher level of complexity with increase in grades, and indirectly reading skills (Chall, 1983; Kendeou, Van den Broek, White, & Lynch, 2009; Nakamoto, Lindsey & Manis, 2007; Oakhill & Cain, 2012). The scores of each task complexity progressed relatively slow in the higher grades suggesting stability in performance in reading comprehension task with increasing grade. Similar observation was also reported by Willson and Rupley (1997) later by Rupley, Willson and Nichols (1998). Similar improvement in reading comprehension was also reported by Gafoor and Kaleeludeen (2008) who found that children from upper primary grades (Grade I to III) have difficulty in decoding a simple passage but improved over the next two years (Gafoor, 2011).

During the early years of reading acquisition, the cognitive resources may be focused on attaining the rules and relationship of orthography with spoken language (Tilstra, McMaster, Van den Broek, Kendeou & Rapp, 2009). By grade IV, the basic processes (from auditory-visual perception till phonetic manipulation) show significant improvement suggesting reading efficiency in typical children acquiring this skill. As discussed earlier, grade IV seems to mark a shift from "learning to read" to "reading to learn" when they are demanded to interact semantically with the text for reading comprehension. This is evident from the results of the present study which found that the children could start performing the task only by the grade IV. As the word recognition and word reading proficiency improved over the grades, reading comprehension scores improved, more and more complex ideas could be comprehended. This was inferred from the performance scores of RP-1 and RP-2 that improved from grade IV till grade VII. At this point of reading proficiency, higher level of reading passages (RP-3 and RP-4) could be performed. Interestingly, at higher level of reading comprehension complexity, scores improve gradually from Grade VI to grade VIII.

Reading this result along with the results of previous section, it may be inferred that children should learn the basic word recognition and semantic constituent analysis for upgrading their comprehension skills from simple sentence to multiple connected sentences. In typical readers, positive correlation between mastery of word recognition and reading comprehension was found by de Jong and van der Leij (2002). This is also supported by the qualitative observation made by the investigators on oral reading performance. In participants from Grade I and Grade II, letter-by-letter reading, slower word recognition skills, and immature language system made reading comprehension of connected sentences a herculean task. As they approach Grade III, the reading skills of perception, syllable grapheme correspondence, blending, morpho-syntax-semantic system matures which was evident in the results of previous section score comparisons.

Though reading comprehension improved, single word responses to questions were common in young children, though correct content word indicated reading comprehension. Priyadarshi and Goswami (2012) reported that young readers performed well on reading comprehension that relied more on word decoding and had quite simple linguistic contents. Also, the authors reported that literal content were scored more accurately that inferential content at this phase. Higher grades (Grade IV, V,& VI) showed trend of evolving into fluent readers with less omissions, appropriate pauses and better reading speed and intonation contours. Older children of grades VII and VIII attempted reading comprehension tasks with more confidence, fluency and accuracy. Hence it can be assumed that like any other complex skill reading comprehension also develop gradual in phases.

It was earlier discussed that morphological awareness contributes to reading comprehension (Carlisle & Fleming, 2003) and this contribution increases with age (Kuo & Anderson, 2006). Analysis and comprehension of simple morpehemic structures were significantly better by Grade III that resulted in more accurate judgment of word identification to complete a sentence is achieved. This would have brought in the ease to derive meanings out of simple sentences in lowest level of reading passages. Older children identified more complex linguistic units and structures in the middle grades and an equivalent progress in the level of reading comprehension was reflected in the scores of oral reading section. A similar pattern in reading comprehension was reported by Keiffer and Lesaux (2008) who found that morphology was related to reading comprehension in fourth and fifth grades. Hence, comparing the results of structural analysis section and oral reading it can be easily understood that the course of mastery of both skills are parallel. Gafoor and Remia (2013) reported that it is logical to improve phonological awareness and morphological awareness in order to develop reading comprehension. This can have a significant impact on reading skill (Berninger et al., 2003).

Overall, the results of sequential acquisition of reading skills, as assessed with ERS-M indicated a clear pattern of acquisition of varying reading related skills, based on the TDC scores. Perceptual skills (Auditory and Visual) are achieved before the early schooling years (Grade I). Typically, children are introduced to the sound-grapheme system and simple multi-syllabic exposures improve the knowledge of word boundaries and syllable-grapheme correspondence at varying word positions (Grade II and Grade III). When simple word boundaries are identified, they master the manipulation of word constituents for meaning (Grade III- Grade IV). The development of these skills facilitate reading comprehension of simple connected sentences by Grade IV and the level of comprehended message continues till beyond Grade VIII. Continued development of Malayalam vowel identification and grapheme correspondence may be masked by skilled reading and word identification through morphemic analysis that is developed in the early years of schooling.

Mastering of Malayalam reading skills

Colour coded representation of level of mastery of various reading processes assessed with ERS-M (Figure 2) provided few interesting observations about the level of performance in typically developing children across grades. For the purpose of interpretation and understanding, the fourth level of mastery (>75%) is discussed here.

1. All reading related processes assessed in ERS-M went through a series of developmental stages from Grade I to grade VIII except discrimination skills. All these processes were mastered by Grade VIII except the higher levels of reading comprehension that required inferential and logical processing of the read material.
2. Many processes were acquired simultaneously, some related and some unrelated processes. Though a cause-effect relationship is not possible with this data, logical reasoning is plausible for these simultaneous acquisitions. Though SGC for word

initial position is mastered from Grade I itself, mastery of SGC in both the beginning and final word position (BC-1 and EC-1) is required for defining the word boundaries. Mastery of performance in these two sub-tests helped in identification of appropriate segmentation of meaningful spoken words at appropriate position (Bl-2). The mastery of SGC at least in the beginning and ending word position may be a requisite for mastery of word boundary identification in compound words.

3. Mastery of SGC, Blending and SA-1 sections initiated the first level of reading comprehension in children. This is in consensus with the role of each of these processes in reading acquisition. Reading comprehension require the reader to accurately identify and efficiently decode the string of graphemes using the SGC rules of the language, manipulate the constituents by merging the features and retrieving the semantic representation of blended constituents to derive the meaning of the read text. These processes are mastered by Grade III.
4. Grade IV and Grade V is generally a period of developmental crash wherein no improvement in mastery level is observed in reading related processes. This may be explained as time duration for children to perfect their literacy skills and may possibly be a period of acquisition of other skills related to literacy such as higher language or cognitive skills. No identifiable pattern was evident in this period of development, except for progress in mastery of structural analysis and reading comprehension sub-tests.
5. Grade VI marked the mastery of more complex reading-language interactions with highest level of mastery in morphemic decoding (SA-2) for word identification associated with progression to the next level of reading comprehension complexity (RP-2).

6. By grade VII and grade VIII children mastered all reading related processes except reading comprehension at higher levels. Reading comprehension skills continue to develop even after grade VIII.

Application of ERS-M in differentiating typical and atypical reading acquisition:

Reliability of ERS-M

Reliability of a test indicated if the measures obtained from the test were consistent across time and measures the intended construct without any bias. Cronbach's alpha (Cronbach, 1951) is currently the most used psychometric measure for multi-scale reliability (McCrae, Kurtz, Yamagata & Terracciano, 2011). A value of > 0.7 is considered to indicate good internal consistency of the measure under scrutiny. Analysis for establishing test-re-test and inter-judge reliability revealed that all the sub-tests of ERS-M satisfied the cronbach's criteria for internal consistency ($\alpha > 0.7$). This suggested that all sub-tests of ERS-M reliably measure the reading skill assessed in the target population across time and tester/judges. The aim of this project to develop a reliable tool for assessment of reading skills in Malayalam was thus attained with quantitative significance.

Validity of ERS-M

Validity is a type of external validity that gives a measure of generalizability of the measure to the population, settings, measures and other variables considered. Validity measures were established for all sub-tests of ERS-M that measured various constructs of reading skills. In the methodology of the current study, two types of validity were established for this newly developed test material: Population Validity and Discriminant validity. The results of each of these measures established are discussed below:

Population validity

This study aimed at developing a test material for assessment of reading skills in children acquiring Malayalam literacy from Grade I to Grade VIII. Hence, the population in this study was defined as school going children acquiring Malayalam orthography though formal instructions. Establishing population validity in this study expected to reveal the applicability of ERS-M in assessment of reading skills in this group of children. The comparison of performance data collected from a separate group of TDC in each grade (from I to VIII) with the normative scores established for ERS-M revealed the generalizability of ERS-M in typically developing children.

The comparisons revealed that the mean performance scores of children in each grade were within the normative range of scores established for ERS-M (Figure 3 to Figure 7), indicating the generalizability of mean scores established for typically developing school going children acquiring Malayalam literacy skills. This concludes that any child from Grade I to VIII, acquiring Malayalam through formal instruction, will show a performance score and pattern similar to the one derived in this study. The newly developed test, ERS-M, is thus a reliable and validated material for ensuring typical reading acquisition of Malayalam orthography from Grade I to Grade VIII .

Discriminant validity

The whole purpose of development of this material was to create a tool for detection and diagnosis of dyslexia/ reading disorders in school going children. The tool developed should then be able to differentiate typical and atypical reading development from its outcome measures. The comparison of performance scores of 10 children diagnosed with LD with the normative scores of ERS-M revealed significant differences (Figure 8 to 12) in the sub-tests of ERS-M. The results of comparison in each sub-test are discussed below:

Perceptual skills:

Evidences for Auditory-Visual perceptual deficits in dyslexia have been mounting in literature since three decades (Amitay, Ahissar & Nelken, 2002; Amitay, Ben-Yehudah, Banai, & Ahissar 2002; Breier, Gray, Fletcher, Diehl, Klaas, Foorman, & Molis, 2001; Chiappe, Stringer, Siegel & Stanovich, 2002; De Martino, Espesser, Rey & Habib, 2001; France et.al., 2002; Heiervang, Stevenson & Hugdahl, 2002; Rey, De Martino, Espesser, & Habib, 2002; Rosen & Manganari, 2001; Share, Jorm, MacLean & Matthews, 2002; Tallal, 1980). One one side of dyslexia research are the theorists who propose auditory and visual deficits as the fundamental cause of reading retardation (Tallal, 1980; Lovegrove Bowling, Badcock & Blackwood, 1980; Stein, 2001) and on the other side are the findings that not all dyslexics have auditory-visual perception deficits (Amitay, Ahissar, & Nelken, 2002; Breier et.al., 2001; France et.al., 2002; Heiervang, Stevenson & Hugdahl, 2002; Heim, Freeman, Eulitz & Elbert, 2001; Marshall, Snowling & Bailey, 2001; Rosen & Manganari, 2001; van Ingelghem, van Wieringen, Wouters, Vandenbussche, Onghena, & Ghesquière, 2001; Witton, Stein, Stoodley, Rosner & Talcott, 2002). The differences in these findings may be attributed to the group population studied, tasks included, and the outcome measures considered. But anatomical differences in the visuo-tempero-parietal structures (Eden et.al., 1996; Galaburda & Kemper, 1979;) and hemispheric lateralization (Demonet, Wise & Frackowiack, 1993; Galaburda, Lemay, Kemper & Geschwind, 1978) in children with dyslexia suggest strong possibilities of an inherent perceptual deficit that interfere with the ability of beginner reading in identification and discrimination auditory symbols of spoken language and the visual symbols of written language. The magnocellular theory of Stein (2001) strongly justifies the possibility of magnocellular deficits of the auditory and/or visual system as the cause of developmental dyslexia.

The present study is in support of presence of auditory and visual perceptual deficits in children diagnosed with reading/ learning difficulty. The participants with LD performed much below the expected level of performance in auditory (Identification, recall and Discrimination) as well as visual (orthographic and non-orthographic discrimination) perceptual sub-section scores. It could be observed that the differences in performance of these two groups decreased with grades indicating that the deficit in perceptual function may be overcome with additional training. All participants with dyslexia were selected for specialized training centres for this group. Hence, the training effects on performance cannot be overlooked. However, it is noteworthy that, even with focused training for correction of reading difficulties, children continue to have perceptual deficits, at least in the early years. This observation also supports the use of perceptual training in children with reading/learning difficulties for remediation purposes such as that of Gori and Facoetti (2014). Also, various reports of improved reading skills following auditory-visual perception training can be found in the literature such as that of Kujala et.al.(2001) and Hayes, Warrier, Nicol, Zecker, and Kraus (2003).

Children with LD approximated near normal performance in non-orthographic stimuli (Auditory and Visual Discrimination-Level 1) earlier compared to discrimination of orthographic sequences. This is in support of the magnocellular theory of dyslexia (Stein, 2001) that explained reading difficulties in dyslexia as a deficit in the functioning of magnocells of dyslexic brain that otherwise help in visual stability, focus, binocular vision, and localization. Various researchers have found and also suggested difficulty in fine and rapid discrimination of visual and auditory stimuli in this population (Eden, Stein, Wood & Wood, 1994; Everatt, Steffert, & Smythe, 1999; Fowler & Stein, 1979, 1980; Garzia & Sesma, 1993; Iles, Walsh & Richardson, 2000; Stein & Fowler,1993; Stein & Walsh, 1997; Stein & Fowler, 1981; Stein, Riddell & Fowler, 1988; Talcott et al ., 2000a).

Deficits in auditory recall can be elucidated with similar findings of Torgesen, Wagner and Rashotte (1994) who reported that children with dyslexia showcased poor memory towards phonological stimuli.

Syllable- Grapheme Correspondence:

One of the first deficits identified in children with dyslexia was their inability to relate a visual symbol to that of auditory symbol, a process called the phoneme grapheme correspondence (PGC). This process was assumed to have a crucial role in reading novel grapheme sequences like that encountered in the initial years of reading acquisition. With repeated exposure over the years, a visual image of the sequence and its semantic representations are developed in the cognitive-linguistic system. Hence, skilled readers bypass the SGC and recognize the words even when they are spelled with errors. Similarly, PGC helps is spelling out novel words during writing function. Poor PGC functions in this population is repeatedly explored and tagged as the core deficit (Catts & Kamhi, 1999; Lundberg & Hoien, 2001; Snowling, 2000; Snowling & Stackhouse, 2013; Stanovich & Siegel, 1994) with phonological dyslexia identified as a common sub-group (Castles & Coltheart, 1993). Among the three most prevalent theories of dyslexia, phonological theory emphasizes the role of adequate sound-grapheme association in development of reading and writing skills and many works supporting this proposition are available for reference (Bradley & Bryant, 1978; Fowler, Brady & Shankweiler, 1991; Snowling, 1981; Vellutino, 1979) but not without conflicts. Reading and writing irregular languages like English requires strong PGC function for mapping the regular and irregular rules English orthography and its exceptions (Snowling, 2000). The same is not considerably applicable to comparably transparent orthographies such as Indian, Chinese, Portugese and other languages across the world (Caravolas & Volín, 2001; Elbeheri & Everatt, 2007; Goswami, 2002; Goulandris,

2003; Katz & Frost, 1992; Landerl, 2003; Landerl, Wimmer, & Frith, 1997; Leong & Joshi, 1997; Smythe, Everatt, & Salter, 2005). Hence, sound-symbol associations express itself with variable boundaries in different languages (Miles, 2000; Smythe, Everatt, & Salter, 2005).

Malayalam orthography map the graphemes to the level of syllables and not phonemes, hence the process assessed here is the syllable-grapheme correspondence (SGC) rather than phoneme. Performance of children in the sub-tests of this section of ERS-M revealed significant underperformance of participants with dyslexia when compared to the normative scores across grade I to grade VIII. Hence, the sub-test of SGC in ERS-M is valid for dyslexia identification in all target grades. Though the performance did improve across grades, it did not approach the expected performance of the grade matched peers. It is noteworthy that this underperformance was in a group of children with dyslexia who were in the process of undergoing intensive remediation programs by experts. Therefore, the difference in performance between dyslexic and typical can be anticipated to be wider than that seen in this study. However, the improvement is scores prompt dyslexia correction programs targeting SGC skill, as the scores did improve with grade when additional remediation was provided (Ehri, Nunes, Willows, Schuster, Yaghoub-Zadeh, & Shanahan, 2001; Goswami & Bryant, 1990; Penolazzi, Spironelli, Vio & Angrilli, 2010; Richards et.al., 2000; Tijms & Hoeks, 2005). This development may also be a matter of experience and experimentation (Ehri, 1989).

The current study also found a difference in the performance in the two way association of sound-symbol association in children with LD. The two levels of tasks used in this study for SGC differed in the mental representations accessed by the participant. Level 1 task accessed grapheme representation and level 2 accessed syllable representation from the mental lexicon. The comparisons made in this section of results found that Level 1 was performed better than level 2 by children with reading difficulty in all grades indicating that

syllable-grapheme associations are made earlier than grapheme- syllable associations. This observation is in support of the proposition by Ramus and Szenkovits (2008) in children and Boets et.al. (2013) in adults that dyslexics may have adequate phonological representation but inefficient phonological access mechanisms. Similar conclusions were also derived in the studies of Ahissar (2007), Ramus and Ahissar (2012) and Ramus, Szenkovits, Pugh and McCardle (2009). These studies explained how multiple processes in phonological processing may show deficits when phonological access is impaired.

Blending:

The task of merging and segmenting phoneme/sound sequences is an extension of phonemic awareness skills in beginning readers. Hence, the performance in Syllable-Grapheme correspondence and Blending section may be a continuum, not to direct a cause-effect relationship. Merging of phonological features of two different phoneme sequences at various word positions places additional demands on the phonemic processes in a blending task. This process may be easier in spoken language because of the natural biological inclination towards spoken language, similar to co-articulation. However, reading being an unnatural and acquired skill, merging and segmenting the visual symbols to produce a meaningful output requires conscious processing. But including this section in ERS-M was thought to underpin the widely reported deficit in dyslexics- the working memory. de Jong (1998) reported a general difficulty of children with dyslexia to store and manipulate units of information. The difficulty in phonemic manipulation increased with complexity of the demand placed (Swanson, 1993; Swanson, 2003; Swanson, Ashbaker & Lee, 1996). The cognitive theory of dyslexia and its supporting evidences (Daneman & Carpenter, 1980; Gathercole, Alloway, Willis, & Adams, 2006; Leather & Henry, 1994; McLean & Hitch, 1999) also emphasizes the role of this cognitive process in reading acquisition.

The comparisons made in the current study across typical and children with LD revealed wide difference in the performance of these two groups across grades, wider than the differences in Syllable-grapheme correspondence. Probably, differences in cognitive load of blending and segmentation tasks could explain this difference (Swanson, 1993; Swanson, 2003; Swanson, Ashbaker & Lee, 1996). The pattern of difference in merging and segmentation was similar across grades indicating an overlap in the processes involved for these tasks. Children with and without reading difficulties show a developmental trend in working memory similar to the notion of Siegel and Ryan (1989). A delay in growth of working memory capacity may possibly be the factor that led to wide difference in the performance score across typical and atypical readers in each grade.

However, the difference narrowed towards the higher grades (Swanson, 2003), suggesting the positive impact of training and correction measure applied. This supports the applicability of recent methods that focus on working memory training in children with reading or learning difficulties (Dahlin, 2011; Holmes & Gathercole, 2014; Loosli, Buschkuehl, Perrig, & Jaeggi, 2012). It is striking that children continued to have deficits in this skill even at the highest grades considered here when their grade matched peers could attain highest level of mastery in the skills assessed. Structured programs that target specific higher level cognitive-linguistic interactions may need to be developed for dyslexia remediation.

Structural analysis

According to Schreuder and Baayen (1997), morphological processing may involve three stages. The first stage "concerns the mapping of the speech input onto written representations of full as well as bound morphemes. The second stage, involves checking whether representations can be integrated on the basis of their subcategorization properties (eg:

plurals, superlatives, tenses etc.). The third stage, combination, deals with the computation of the lexical representation of the complex word from the lexical (syntactic and semantic) representation of its constituents. (Schreuder & Baayen, 1997). This morphological processing requires a firm base of awareness of phoneme and syllable-sized units. Developmental studies indicate that morphological awareness is strongly correlated with phonological awareness. Given the importance of morphological awareness in learning to read it is an inevitable part of reading assessment. In dyslexia, the phonological deficiencies may prevent them from developing normal morphological abilities, or morphological awareness could develop independently in the context of learning to read and the semantic units conveyed in oral language (Casalis, Cole and Sopo, 2004).

In the current study the gap between the actual and expected performance was larger in the initial grades and gradually narrowed towards the higher grades, suggesting skill improvement over a period of time. But unlike in the perceptual skills section and similar to syllable-grapheme correspondence and blending section, the scores did not reach the near expected performance scores till grade VIII suggesting a continued deficit in identification of word, morpheme boundaries and linguistic knowledge in children with LD. The patterns observed in the results clearly ascertain the requirement of a stronger baseline of skills that yield the acquisition of morphological awareness which the LD group clearly lacked.

Studies report that, if a child has difficulty in manipulating phonemes, it could be harder to remove or blend a morpheme, which is not only a meaning unit but also a phonological unit (Carlisle, 1995, 2000; Casalis & Louis-Alexandre, 2000). Supporting the results of the current section is in continuum with deficits found in syllable grapheme correspondence. Contrastively, Casalis, Cole and Sopo (2004) argue that the morphological skills of dyslexic children develop, at least in part, independently of their phonological skills.

Consequently, they may have built compensatory strategies to bypass the impediments caused by their poor phonological skills (Elbro & Arnbak, 1996).

Oral reading

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 (Gafoor & Remia, 2013). Phonological processing, naming speed, vocabulary, and listening comprehension act as contributing factors to reading comprehension.(ransby&Swanson,2003). With the obtained results of poor performance in perceptual sills, syllable grapheme correspondence and morphological knowledge it is clear that reading comprehension also will exhibit similar deficits.

The performance of this participant with LD, which was much lower than the expected level of performance for grade VIII prove the assumption true. This suggest a severe lag in development of reading comprehension skills in children diagnosed with LD that remains unresolved even with training and instructions to overcome reading/learning difficulty.

The present results also supports that comprehension depends not only on the readers' general background knowledge regarding the topic at hand, but also on their familiarity with the terminology and vocabulary used in the text (Anderson & Pearson, 1984; Bos & Anders, 1990). Students with learning disabilities typically bring less of this knowledge to the reading task than do those without disabilities, and their comprehension suffers accordingly (Gerston, Fuchs, Williams and Baker, 2001). Additionally the results of oral reading section in the sample of LD showed poorer scores especially when required inferencing and it was also observed that recalling of contents were difficult. The reading comprehension deficits can be manifestation of the underlying attributes including reading speed and accuracy (Shaywitz,

1996), difficulty integrating information when it is distally placed in the text (Bonitatibus & Beal,1996), working memory deficts (Mcnamara, Kintsch, Songer & Kinstch, 1996) and metacognitive skills (camahalan,2006).

Lonigan and Shanahan (2009) mentioned that to read well, children generally require strong receptive and expressive language, well developed phonological and print awareness, knowledge of letter–sound relationships (decoding), large vocabularies, ability to read naturally and effortlessly with fluency, and ability to comprehend what they read. The performance of children with learning disability in ERS-M brings out their deficits present in the skills (Lonigan & Shanahan, 2009) that are inevitable to accomplish skilled reading. Hence it affirms the validity of ERS-M as an assessment tool in identifying presence of reading disability in school going children.

CHAPTER VI

SUMMARY AND CONCLUSION

There is limited number of reliable tools for identification and diagnosis of reading disability in Malayalam Language. The purpose of this study was two levelled: (i) to describe the process of adaptation of Early Reading Skill (ERS) test published in American English (Rae & Potter, 1973; 1981) to Malayalam language without interfering with its application in diagnosis of reading difficulty in children of Grade I to Grade VIII. (ii) to study the sequential acquisition of the reading skills in sequential acquisition of reading skills in children with Malayalam as their native language in the grade range of I to VIII.

The adaptation of the test was accomplished in three phases: (i) Development of the test material (ii) Administering the test on typically developing children. (iii) Checking reliability and validity of the test.

(i) **Development of the test material:** Extensive review of linguistic features of Malayalam language, its orthographical features and typical acquisition was conducted by referring various books, articles and published reports. A list of language specific features that are to be included in the stimulus material of ERS-M was prepared. List of Malayalam syllable/ word stimuli that included the language specific characteristics was prepared. This list was used for preparation stimuli for each section and sub-section of ERS (Rae & Potter, 1973). Stimuli that required associated pictures were prepared considering the possibility of iconic picture representation without interfering with cultural appropriateness, familiarity and dialectal uniformity. The adapted syllable/ word/ picture stimuli were then subjected to content validity and familiarity rating by three experienced SLPs. Revisions proposed by the judges were discussed and scrutinized and the finalized

stimuli was digitised to proceed to pilot study. A pilot study was conducted on 16 typically developing Malayalam speaking children from grade I to grade VIII (n=2 in each grade; 8 Males and 8 Females) as a preliminary try out of the administration of ERS-M. The stimuli were reorganized, modified, corrected and finalized for preparation of the final stimulus of ERS-M

(ii) Administering the test on typically developing children: The final version of the ERS- M was administered on: A total of 240 Malayalam speaking TDC from grade I to VIII (N= 30 in each grade, 15 males and 15 females) participated in the study. These participants were selected based on the following inclusion criteria so as to rule out the presence of subtle language learning disorders in participants. A complete administration of ERS-M lasted for a minimum of 45 minutes. The materials used included Final ERS- M stimulus booklet, response sheet and scoring sheet. Table 11 shows the summary of sections and sub sections in ERS-M.

Table 11.

Summary of sections and sub sections in ERS-M.

Section No:	**Section Name**	**Subsections**	**Levels in Subsection**
I	Perceptual Discrimination	Auditory Identification	1
		Auditory Recall	1
		Auditory Discrimination	1
		Visual Discrimination	1 & 2

II	Syllable Grapheme Correspondence	Beginning Consonant	1 & 2
		Ending Consonant	
		Consonant Clusters	1 &2
		Vowel sounds	
			1
			1 & 2
III	Blending	-	1 & 2
IV	Structural Analysis	-	1 & 2& 3
V	Oral reading	-	1 & 2& 3 &4

(iii) Checking reliability and validity of the test: The audio-video recorded samples of data were used for the same. Out of the total data collected, 10 percent of the data was retested by a competent Malayalam speaker. The test run on TDC was run on 10 number of children diagnosed with learning disability.

The performance was scored independently by two investigators and the data was subjected to descriptive analysis using Statistical Package for Social Sciences (SPSS, version 20). The mean and standard deviation scores of eight grades across the reading tasks were established. The scores showed a sequence in the development of reading skills across grades. Additionally, the gender effect on the scores of reading tasks were tested on research interest and the results showed that male and female TDCs show similar acquisition of reading process in Malayalam language. Further Statistical analysis (Kruskal Wallis Test) administered on the data revealed that grade had significant impact on the reading skills of children and there is gradual progression in the reading skills withthe improvement in grades.

For the purpose of interpretation and understanding the mastery of reading skills in Malayalam , the four levels of mastery in the skills was established based on mean score percentiles. The criteria of mastery levels are as mentioned 0-25%- level I, 25%-50%- level II, 50-75%- level III and >75% -level IV. Following statements are summarised based on level IV mastery.

1. All reading related processes assessed in ERS-M went through a series of developmental stages from Grade I to grade VIII except discrimination skills. All these processes were mastered by Grade VIII except the higher levels of reading comprehension that required inferential and logical processing of the read material.
2. Many processes were acquired simultaneously, some related and some unrelated processes. Though a cause-effect relationship is not possible with this data, logical reasoning is plausible for these simultaneous acquisitions. Though SGC for word initial position is mastered from Grade I itself, mastery of SGC in both the beginning and final word position (BC-1 and EC-1) is required for defining the word boundaries. Mastery of performance in these two sub-tests helped in identification of appropriate segmentation of meaningful spoken words at appropriate position (Bl-2). The mastery of SGC at least in the beginning and ending word position may be a requisite for mastery of word boundary identification in compound words.
3. Mastery of SGC, Blending and SA-1 sections initiated the first level of reading comprehension in children. This is in consensus with the role of each of these processes in reading acquisition. Reading comprehension require the reader to accurately identify and efficiently decode the string of graphemes using the SGC rules of the language, manipulate the constituents by merging the features and

retrieving the semantic representation of blended constituents to derive the meaning of the read text. These processes are mastered by Grade III.

4. Grade IV and Grade V is generally a period of developmental crash wherein no improvement in mastery level is observed in reading related processes. This may be explained as time duration for children to perfect their literacy skills and may possibly be a period of acquisition of other skills related to literacy such as higher language or cognitive skills. No identifiable pattern was evident in this period of development, except for progress in mastery of structural analysis and reading comprehension sub-tests.
5. Grade VI marked the mastery of more complex reading-language interactions with highest level of mastery in morphemic decoding (SA-2) for word identification associated with progression to the next level of reading comprehension complexity (RP-2).
6. By grade VII and grade VIII children mastered all reading related processes except reading comprehension at higher levels. Reading comprehension skills continue to develop even after grade VIII.

Analysis for establishing test-re-test and inter-judge reliability revealed that all the sub-tests of ERS-M satisfied the cronbach's criteria for internal consistency ($\alpha > 0.7$). This suggested that all sub-tests of ERS-M reliably measure the reading skill assessed in the target population across time and tester/judges. The comparison of performance data collected from a separate group of TDC in each grade (from I to VIII) with the normative scores established for ERS-M that the newly developed test, ERS-M, is thus a reliable and validated material for ensuring typical reading acquisition of Malayalam orthography from Grade I to Grade VIII .

The whole purpose of development of this material was to create a tool for detection and diagnosis of dyslexia/ reading disorders in school going children. The comparison of performance scores of 10 children diagnosed with LD with the normative scores of ERS-M revealed significant differences in all the sections of ERS-M affirming the validity of ERS-M as an assessment tool in identifying presence of reading disability in school going children

Limitations of the study

The present study was carried out among the children from grade I to Grade VIII from schools in the southern part of kerala. Hence the ideal representation of Malayalam speakers of various dialects is not considered in the study. The study also have not considered any effect to control factors like literacy experiences, instructional differences Socio-economic Status, Parental Education etc the which might have a potential impact on the academic skill of the child enrolled for the study. Also the current study design tapped only the performance of the children at one point in their reading acquisition which may be subjected to variation.

Implications of the study

ERS- M can be used a manual by Speech Language Pathologist, Psychologists , Special educators etc to assess reading deficits in Malayalam speaking children ranging from Grade I to Grade VIII. ERS- M also provides a reference for planning appropriate management strategies for reading deficits in Malayalam language. The findings of the study also strengthen the need and importance of reading assessment in school aged children identified with difficulty in scholastic skills. In an instance or setting with time and man power constrain ERS- M can also serve as a screening tool to find reading deficits. The results of the study also hammer the fact of early identification of reading and writing deficits and thereby reducing the incidence of impaired scholastic performance.

Future Directions

The adaptation of early reading skills leaves behind enormous scope of expanding the research in the area of reading, reading acquisition orthography etc. The study attempted to fill one among the numerous lacunae that still persist in the reading related research in the language of Malayalam and hence directing attention to other areas including reading skills in Malayalam, role instruction in reading and orthography, role of teachers, parental involvement, and exposure to reading materials etc. Also, it provide insight to expand the quest to study pre reading skills in Malayalam Language, early identification and remediation of reaing related problems, Socio cultural problems impacting reading related skills.

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APPENDIX

Perceptual Discrimination

Auditory Identification

നിർദ്ദേശം :
താഴെ കൊടുത്തിരിക്കുന്ന ഓരോ വരിയിലേയും അക്ഷരങ്ങൾ ശ്രദ്ധിച്ച് വായിക്കുക. അതിനു ശേഷം ഞാൻ പറയുന്ന അക്ഷരം കണ്ടുപിടിച്ച് ചുറ്റും വട്ടം വരയ്ക്കുക

/nirddeʃam/: / ṭa:ẓe koduṯṯirikkunna o:ro varijile:jum akṣaraŋaḷ ʃraddʰiʧʧ va:jikkuka. aṯinu ʃeṣam ɲa:n parajunna akʃaram kandupiṭich ʧuṯṯam vaṯṯam varajkkuka /

ഉദാഹരണം :
/uda:haraɳam/:

ക -	ഛ	ത	ബ	(ക)	ഷ	ഊ	ല
/k/	/ʧʰ/	/ ṯ/	/b/	/k/	/ʂ/	/u:/	/l/
ല -	വ	പ	ഘ	ഗ	(ല)	മ	ധ
/l/	/v/	/p/	/gʰ/	/g/	/l/	/m/	/dʰ/

1.	**ങ -**	അ	ആ	ന്ദ	ഒ	ഞ	ങ	ത്ത
	/ŋ/	/a/	/a:/	/nd/	/o/	/ɲ/	/ŋ/	/ṯṯ/
2.	**ള-**	ഒ	ള	ഉ	ഔ	ഓ	ഊ	ഇ
	/ɭ/	/o/	/ɭ/	/u/	/au/	/o:/	/u:/	/i:/
3.	**ഴ -**	ഥ	മ	ധ	ഴ	ഫ	വ	ട്ട
	/ẓ/	/tʰ/	/m/	/dʰ/	/ẓ/	/pʰ/	/v/	/ṛ/
4.	**ൽ -**	ൻ	ർ	ൽ	ൺ	ന	ണ	ത
	/l/	/n/	/r/	/l/	/ ɳ/	/n/	/ɳ/	/ṯ/
5.	**ഠ -**	ൽ	ക	ത	ച	ഠ	പ	യ

	/ʈʰ/	/ഌ/	/k/	/ʈ̺/	/ɡ̊/	**/ʈʰ/**	/p/	/j̊/
6.	**യ -**	യ	ല	വ	സ	ഹ	ഴ	ള
	/j̊/	/j̊/	/ഌ/	/v/	/s̺/	/h/	/ɻ̺/	/ɭ̊/
7.	**ഹ -**	ന	ഇ	ഘ	ജ	ഊ	ര	ഹ
	/h/	/n/	/i/	/gʰ/	/ɟ/	/u:/	/r/	/h/
8.	**ബ -**	ഇ	ര	ഴ	ഝ	ക	ദ	ബ
	/b/	/i/	/r/	/ɻ̺/	/ɟʰ/	/k/	/d/	/b/
9.	**ഛ -**	ഛ	ല	ശ	ബ	ത	ക	ഊ
	/ɡʰ/	/ɡʰ/	/ഌ/	/ʃ/	/b/	/ʈ̺/	/k/	/u:/
10.	**ഊ -**	ശ	ബ	ത	ഊ	ഛ	ക	ല
	/u:/	/ʃ/	/b/	/t/	/u:/	/ɡʰ/	/k/	/ഌ/
11.	**ഗ -**	ഏ	ഛ	അ	ഠ	ഗ	ധ	ജ
	/g/	/e/	/ɡʰ/	/a/	/ʈʰ/	/g/	/dʰ/	/ɟ/
12.	**ര -**	ക	ര	വ	ഗ	ഖ	ല	ച
	/r/	/k/	/r/	/v/	/g/	/kʰ/	/ഌ/	/ɡ̊/
13.	**ദ -**	ദ	ഞ	പ	ഓ	ഠ	ച	യ
	/d/	/d/	/ɲ/	/p/	/o:/	/ʈʰ/	/ɡ̊/	/j̊/
14.	**ഭ -**	ഉ	ഛ	ഊ	ട	ക	ഭ	വ
	/bʰ/	/u/	/ɡʰ/	/u:/	/ʈ̺/	/k/	/bʰ/	/v/
15.	**ഫ -**	ഢ	ഏ	ഫ	റ	സ	ഘ	ധ
	/pʰ/	/ɖʰ/	/e/	/pʰ/	/r/	/s̺/	/gʰ/	/dʰ/
16.	**ജ -**	ത	ക്ഷ	ഠ	വ	ഭ	ജ	ഹ

	/ɟ/	/ʈ/	/kʃ/	/ʈʰ/	/v/	/bʰ/	/ɟ/	/h/
17.	**ല -**	ഝ	ബ	ല	ഏ	ച	ഠ	s
	/l/	/ɟʰ/	/b/	/l/	/e/	/ɡ/	/ʈʰ/	/ʈ/
18.	**മ -**	ള	ഛ	ണ	ക	മ	ള	വ
	/m/	/u/	/ɡʰ/	/ɳ/	/k/	/m/	/ɭ/	/v/
19.	**ത -**	ജ	ക	ഹ	ഫ	ള	ത	ഷ
	/ʈ/	/ɟ/	/k/	/h/	/pʰ/	/ɭ/	/ʈ/	/ʂ/
20.	**ഷ -**	ഗ	യ	ത	ഷ	പ	ഛ	ഞ
	/ʂ/	/g/	/ɟ/	/ʈ/	/ʂ/	/p/	/ɡʰ/	/ɲ/
21.	**റ -**	ബ	ച	റ	ണ	s	ഴ	ഖ
	/r/	/b/	/ɡ/	**/r/**	ɳ	ʈ	ʐ	kʰ
22.	**ശ -**	ശ	മ	ഗ	വ	ഫ	ജ	പ
	/ʃ/	/ʃ/	/m/	/g/	/v/	/pʰ/	/ɟ/	/p/
23.	**ണ -**	ഭ	ഠ	ഥ	ച	ണ	അ	ജ
	/ɳ/	/bʰ/	/ʈʰ/	/tʰ/	/ɡ/	/ɳ/	/a/	/ɟ/
24.	**സ -**	റ	ഒ	s	സ	ള	ഉ	അ
	/s̪/	/r/	/o/	/ʈ/	/s̪/	/ɭ/	/u/	/a/
25.	**ച -**	ആ	s	ഏ	യ	ണ	സ´	ച
	/ɡ/	/a:/	/ʈ/	/e/	/ɟ/	/ɳ/	/s̪/	/ɡ/
26.	**ഒ -**	ഡ	ന	ണ	s	അ	ഒ	മ
	/o/	/ɖ/	/n/	/ɳ/	/ʈ/	/a/	/o/	/m/

27.	**ക്ഷ -**	മ	ഈ	ത	ള	ഗ	ക്ഷ	ഝ
	/kʧ/	/m/	/i:/	/t̪/	/ɭ/	/g/	/kʧ/	/ʰ/
28.	**ധ -**	ധ	ഖ	യ	ജ	ഹ	ഡ	ള
	/dʰ/	**/dʰ/**	/kʰ/	/ʄ/	/ʰ/	/h/	/ɖ/	/ɭ/
29.	**ൻ -**	ഞ	ൺ	മ	ന	ണ	ങ	ൻ
	/n/	/ɲ/	/ɳ/	/m/	/n/	/ɳ/	/ŋ ɳ/	/n/
30.	**ൺ -**	ൺ	ഞ്ഞ	ങ്ക	ണ	ഞ	ള	ന
	/ɳ/	/ɳ/	/ɲ ɲ/	/ŋk/	/ɳ/	/ɲ/	/ɭ/	/n/

Auditory Recall

നിർദ്ദേശം:

താഴെ കൊടുത്തിരിക്കുന്ന ഓരോ വരിയിലേയും അക്ഷരങ്ങൾ ശ്രദ്ധിച്ചു വായിക്കുക. അതിനു ശേഷം അവയിൽ അടിവരയിട്ടിട്ടുള്ള അക്ഷരം ഏതാണെന്ന് പറയുക.

/nirddeʃam/:

/ t̪a:ɾe koduṯṯirikkunna o:ro variʲile:ʲum akʂaraŋaḷ ʃraddʰiʧʧ va:ʲikkuka. aṯinu ʃeʂam avaʲil aṯivaraʲiṯṯiṯṯuḷḷa akʂaram eṯa:nenn paraʲuka /

ഉദാഹരണം :

/uda:haranam/

ല യ ര ത

/ l/	/j/	/r/	/ʈ/
സ	പ	ഗ	മ
/s̪/	/p/	/g/	/m/

1.	ക	സ	ത	ര
	/k/	/s̪/	/ʈ/	/r/
2.	വ	ഖ	ഘ	ജ
	/v/	/kʰ/	/gʰ/	/ɟ/
3.	ശ	ഷ	ഗ	ര
	/ʃ/	/ʂ/	/g/	/r/
4.	ങ്ങ	ഞ്ഞ	ജ	ക്ക
	/ŋ ŋ/	/ɲ ɲ/	/ɟ/	/ŋk/

5.	ല	ച	ഘ	പ
	/l/	/ʧ/	/gʰ/	/p/
6.	s	സ	പ	ച
	/ʈ/	/s̪/	/p/	///
7.	മ	ല	യ	ഛ
	/m/	/l/	/ j /	/ʧʰ/
8.	ജ	സ	ഞ	o
	/ɟ/	/s̪/	/ɲ/	/ʈʰ/

9.	മ	ത	ഝ	യ
	/m/	/t̪/	/ɟʰ/	/j/
10.	ഞ	സ	ങ	അ
	/ɲ/	/s̪/	/ŋ ŋ/	/a/
11.	ന	അ	ത	ൻ
	/n/	/a/	/t̪ /̪	/n/
12.	ഴ	ഥ	ഭ	ദ
	/ɻ/	/tʰ/	/bʰ/	/d/
13.	മ	ൻ	ത	ന
	/m/	/n/	/t̪ /̪	/n/
14.	ദ	ധ	ല	പ
	/d/	/dʰ/	/l/	/p/
15.	ൽ	ത	ൻ	ധ
	/l/	/t̪ /̪	/n/	/dʰ/
16.	സ	ദ	s	ഉ
	/s̪/	/d/	/t̪/	/u/
17.	ഏ	ഠ	ഊ	റ
	/e/	/ʈʰ/	/u:/	/r/
18.	സ	ഖ	ഗ	റ
	/s̪/	/kʰ/	/g/	/r/
19.	അ	ഋ	ല	ഏ

	/a/	/r/	/l/	/e:/
20.	വ	മ	ഖ	ജ
	/v/	/m/	/k^h/	/ʒ/
21.	ഓ	സ	ഔ	ഈ
	/o:/	/s̪/	/au/	/i:/
22.	ഭ	വ	ബ	ല
	/b^h/	/v/	/b/	/l/
23.	ഹ	ഘ	ല	ഛ
	/h/	/g^h/	/l/	/ʧ^h/
24.	ഴ	ഥ	ഫ	ഴ
	/r/	/t^h/	/p^h/	/ɻ/
25.	റ	ര	ഠ	ർ
	/r/	/r/	/ʈh/	/r/
26.	മ	വ	ൾ	യ
	/m/	/v/	/ɭ/	/j/
27.	ഛ	ഹ	ച	ഫ
	/ʧ^h/	/h/	/ʧ/	/p^h/
28.	പ	ഘ	ല	ഫ
	/p/	/g^h/	/l/	/p^h/
29.	ഞ	ണ	ന	ൺ
	/ɲ/	/ɳ/	/n/	/ ɲ/
30.	ആ	ഈ	ഏ	ഉ

/a:/ /i:/ /e/ /u/

Auditory Discrimination

നിർദ്ദേശം:

ഞാൻ രണ്ടു വാക്കുകൾ പറയും. അവ ശ്രദ്ധിച്ചു കേട്ടതിനു ശേഷം, രണ്ടു വാക്കുകളും ഒന്നാണോ വേറെയാണോ എന്ന് പറയുക.

/nirddeʃam/: / ɲa:n randɻ va:kkukaɻ paraʝum ava ʃradd^{h}iʧʧu ke:ʈaṯinu ʃe:ṣam randɻ va:kkukaɻum onna:ɳo ve:reʝa:ɳo enn paraʝuka/

ഉദാഹരണം:

പത- പശ - വേറെ

/paṯa/-/paʃa/- /ve:re/

പശ- പശ - ഒരുപോലെ

/paʃa/-/paʃa/-/orupo:le/

/

1. മീൻ- മാൻ /mi:n/ - /ma:n/
2. നാല് - നാല് /na:l/-/na:l/
3. കയർ - വയർ /kayar/-/vayar/
4. പച്ച - പച്ച /paʧʧa/ - /paʧʧa/
5. തൊട്ടിൽ- കട്ടിൽ /c oʈʈil/-/ kaʈʈil/
6. കയർ- കയർ /kayar/-/kayar/
7. മണൽ -തണൽ /ma ɳal/- /ʈa ɳal/
8. കടൽ -കടൽ /kaʈal/ - /kaʈal/
9. കാല്- പാല് /ka:l/- /pa:l/
10. മണ്ണ് - കണ്ണ് /ma ɳ ɳ/ - /ka ɳ ɳ/
11. പേന- പേന /pe:na/-/pe:na/
12. പത്രം - പാത്രം /paʈram/- /pa:ʈram/
13. മൂന്ന്- മൂന്ന് /mu:nn/ -/mu:nn/
14. മാല - മല /ma:la/- /mala/
15. മാങ്ങ - തേങ്ങ /ma: ŋ ŋa/ -/te: ŋ ŋa/
16. മല- മല /mala/ -/mala/
17. കാല്- കാശ് /Ka:l/- ka:ʃ/
18. പുല്ല്- പല്ല് /pull/ -/pall/
19. കാക്ക- കൊക്ക് /ka:kka/- /kokk/
20. തവള - തവള /ʈavaɻa/- /ʈavaɻa/
21. നൂല് - കാല് /nu:l/-/Ka:l/
22. വെള്ളം- വള്ളം / veɻɻam/ - /vaɻɻam/
23. പായ - വായ /pa:ʝa/ -/va: ʝa/
24. പൂട്ട് - പൂട്ട് /puʈʈ/ -/ pu: ʈʈ/

25. കുടൽ -കുടിൽ /kuṭal/- /kuṭil/
26. നൂല്- നാല് /nu:l/-/na:l/
27. കല്ല് - പല്ല് /kall/ -/pall/
28. ആന - ആമ /a:na/ -/a:ma/
29. മൂക്ക് - ചാക്ക് /mu:kk/ -/ʧa:kk/
30. കട- വട /kaṭa/ - /vaṭa/

Visual Discrimination (Level I)

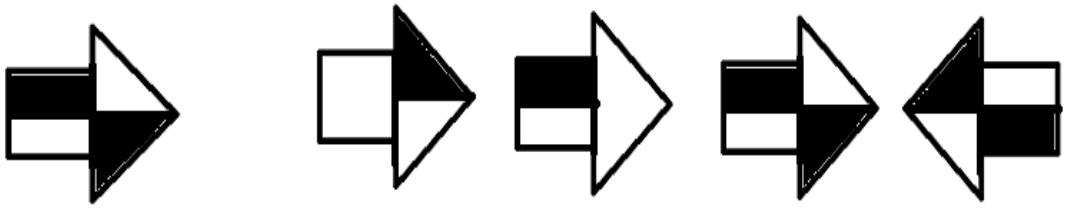
നിർദ്ദേശം:

താഴെ കൊടുത്തിരിക്കുന്ന ഓരോ വരിയും ശ്രദ്ധിച്ചു നോക്കുക. അവയിൽ ഇടതുഭാഗത്ത് തന്നിരിക്കുന്ന അക്ഷരം/ ചിത്രം വലതുഭാഗത്ത് തന്നിരിക്കുന്ന അക്ഷരങ്ങളിൽ / ചിത്രങ്ങളിൽ നിന്നും കണ്ടു പിടിക്കുക.

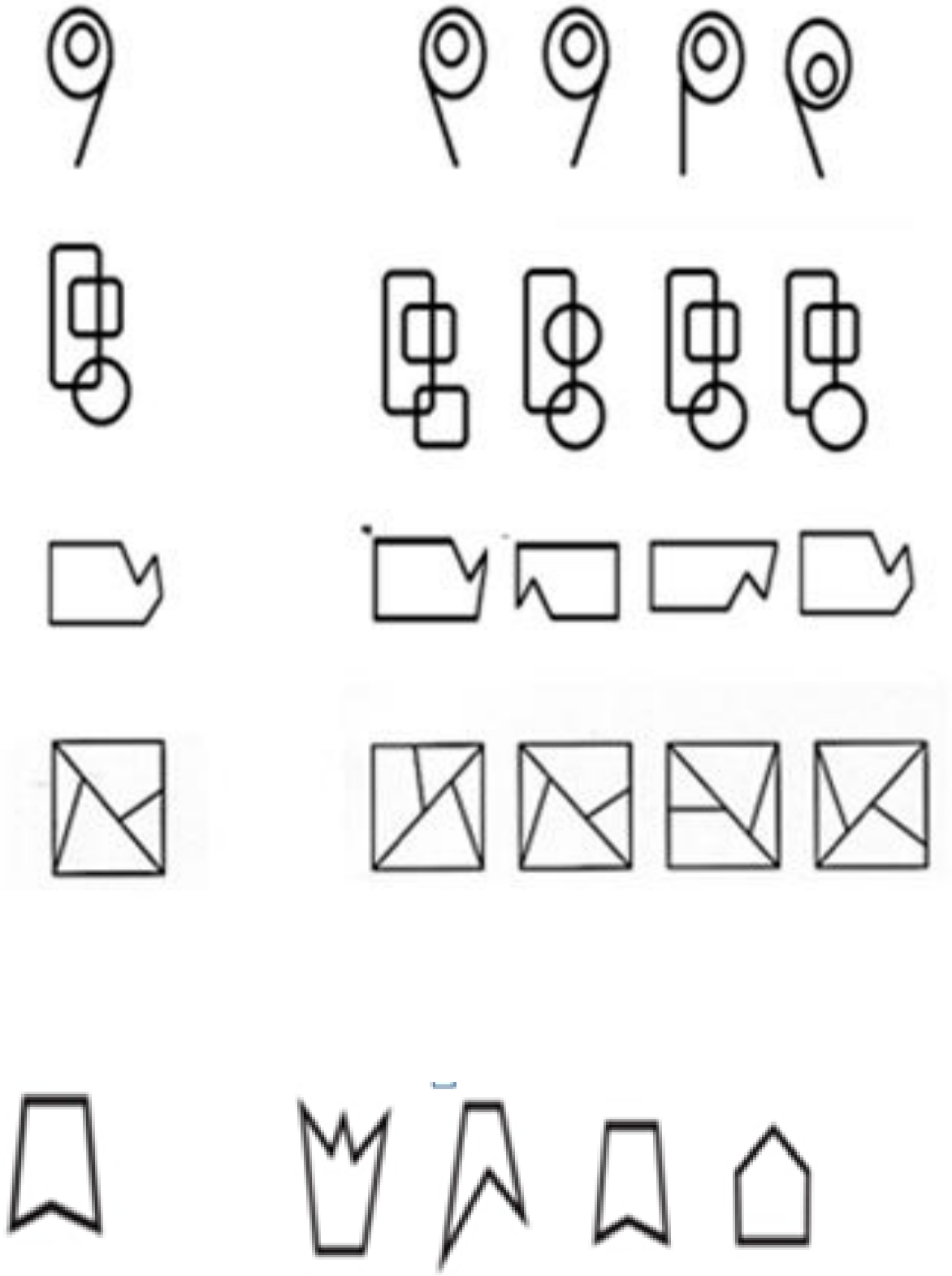
/nirddeʃam/: / ṭa:ẓe koduṯṯirikkunna o:ro variյum ʃradd^{h}iʧʧ no:kkuka avaյil idaṯub^{h}a:gaṯṯu ṯannirikkunna akṣaram allengil ʧiṯram valaṯub^{h}a:gaṯṯu ṯannirikkunna akṣarangal allengil ʧiṯrangalil ninnum kanḍupiṭikkuka /

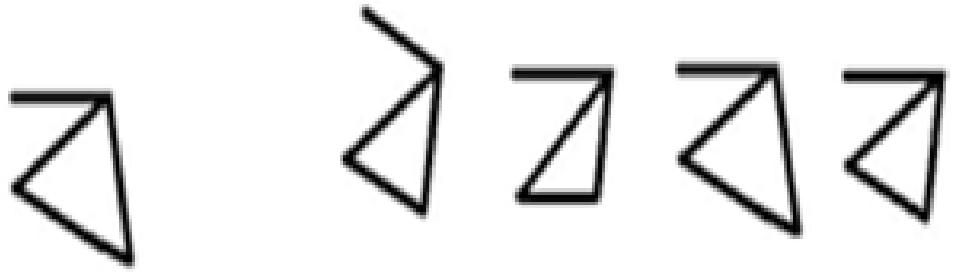
ഉദാഹരണം:

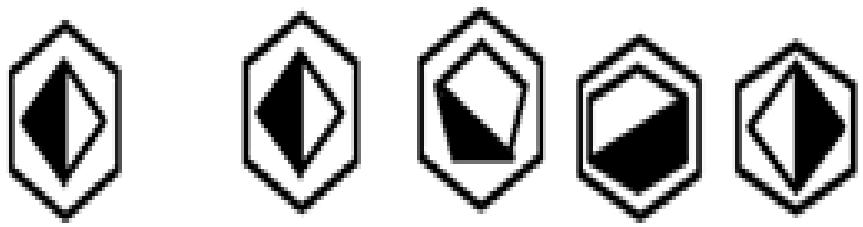
/udaharanam/:



:







ഉ	ഇ	ഊ	ള	ഉ
/u/	/i/	/u:/	/ɭ/	/u/

ത	ന	ധ	ത	ങ
/t̪/	/n/	/dʰ/	/t̪/	/ ŋ/

പ	ച	പ	ഘ	ല
/p/	/ʧ/	/p/	/gʰ/	/l/

സ	ഋ	ഡ	സ	ഢ
/s/	/ ɻ/	/ɖ/	/s/	/ɖʰ/

വ	ഖ	വ	ഥ	പ
/v/	/kʰ/	/v/	/t̪ʰ/	/p/

ഞ	ങ	ഞ	ത	ണ
/ɲ/	/ ŋŋ/	/ɲ/	/t̪/	/ɳ/

ശ	ര	ഗ	ശ	സ
/ʃ/	/r/	/g/	/ʃ/	/s/

ഡ	ഢ	സ	ഗ	ഡ
/ɖ/	/ɖʰ/	/s/	/g/	/ɖ/

ദ	ധ	ഭ	ന്ദ	ദ
/d/	/dʰ/	/bʰ/	/nd/	/d/

ഷ	പ	ക്ഷ	ഷ	ഹ
/ʂ/	/p/	/kʃ/	/ʂ/	/h/
ൽ	ൻ	ൽ	ത	ൾ
/l/	/n/	/l/	/t̪/	/ɭ/
ച്ച	വ്വ	പ്പ	ച്ച	യ്യ
/ʧʧ/	/vv/	/pp/	/ʧʧ/	/jj/

Visual Discrimination Level II

നിർദ്ദേശം:

/nirddeʃam/:

താഴെയുള്ള ഓരോ വരിയും ശ്രദ്ധിച്ചു നോക്കുക.വരിയുടെ ഇടതുഭാഗത്ത് കൊടുത്തിരിക്കുന്ന അക്ഷരങ്ങൾ വലതുഭാഗത്ത് തന്നിട്ടുള്ളവയിൽ നിന്നും കണ്ടുപിടിക്കുക.

ഉദാഹരണം : ഇത ഇന ഉണ ഇത ഉത

/it̪/ /in/ /u ɳ/ /it̪/ /ut̪/

1. ആപ ആച അച അവ ആപ

/a:p/ /a:ʧ/ /a ʧ/ /a:v/ /a:p/

2. രത രന തര രത തസ

/rt̪/ /rn/ /t̪r/ /rt̪/ /t̪s/

3.	ങ്ങം	അം	ങ്ങം	ഞ്ഞം	ഞം
	/ŋam/	/am/	/ŋam/	/ɲɲam/	/ɲam/
4.	ധന	ധത	ദന	ധന	ദത
	/dʰn/	/dʰt̪/	/dn/	/dʰn/	/dt̪/
5.	ന്ത്ര	ന്ത്യ	ന്ത	ന്ത്ര	ത്ര
	/nt̪ra/	/nt̪ja/	/nt̪va/	/nt̪ra/	/t̪ra/
6.	ഘഹ	ലഹ	ഘഫ	ഘഹ	ലഷ
	/gʰh/	/lh/	/gʰpʰ/	/gʰh/	/lʂ/
7.	ളഗ	ളഗ	ഇശ	ളഗ	ഈര
	/ug/	/l̪g/	/iʂ/	/ug/	/i:r/
8.	ഔ	ഈ	ഊ	ഓ	ഔ
	/au/	/i:/	/u:/	/o:/	/au/
9.	ഏവ	ഏവ	ഏഖ	ഏഖ	ഏവ
	/ev/	/e:v/	/e:kʰ/	/ekʰ/	/ev/
10.	നൻ	നൾ	നൻ	നൽ	ധൻ
	/nn̪/	/nl̪/	/nn̪/	/nl̪/	/dʰn/
11.	ഫഹ	ഫച	ഹഫ	ഫപ	ഫഹ
	/pʰh/	/pʰɡ/	/hpʰ/	/pʰp/	/pʰh/

12. അംൽ	അ:ൻ	അംൻ	അംൽ	ആർ
/aml/	/an/	/amn/	/aml/	/a:r/
13. ൻൽ	ൽൾ	ൻൽ	ർൽ	ർൺ
/nl/	/l̪/	/nl/	/rl/	/rɳ/
14. ത്മ	കമ	മ്മ	ത്മ	പമ
/t̪m/	/km/	/mm/	/t̪m/	/pm/
15. ഠറ	ഠഹ	sറ	ഠവ	ഠറ
/ʈʰr/	/ʈʰh/	/ʈr/	/ʈʰv/	/ʈʰr/
16. ക്ല	കപ	ക്ല	ക്യ	ക്ര
/kl/	/kv/	/kl/	/ky/	/kr/
17. ന്ധ	ദ്ധ	ത്സ	ന്ധ	ണ്ഡ
/ndʰ/	/ddʰ/	/t̪s/	/ndʰ/	/ɳɖʲɖɖ̚
18. ഞ്ച	ഞ	ഞ്ച	ഞ്ഞ	ത്ത
/ɲʧ/	/ɲ/	/ɲʧ/	/ ɲ ɲ/	/t̪t̪/
19. ച്ഛ	ച്യ	ച്ച	ച്ഛ	പ്പ
/ʧʧʰ/	/ʧʤ/	/ʧʧ/	/ʧʧʰ/	/pp/
20. ക്ര	കു	ക്ര	ക്ല	ക്യ

/kr/	/ku/	/kr/	/kl/	/kru/
21. ഷ്ണ	ക്ഷ	സ്ന	ഷ	ഷ്ണ
/ʂɳ/	/kʂ/	/sn/	/ʂ/	/ʂɳ/
22. ക്ഷ്വ	ക്ഷം	ക്ഷ്വ	ക്ഷാ	ക്ഷ്യ
/kʂv/	/kʂam/	/kʂv/	/kʂa:/	/kʂj/
23. സ്സ	സ്ര	സ്ല	ഡ്ഡ	സ്സ
/ss/	/sr/	/sl/	/ɖɖ/	/ss/
24. സ്ക	പ്ക	യ്ക	സ്ക	ക്മ
/sk/	/pk/	/jk/	/sk/	/km/
25. അങ്ങ	അണ	അഞ	അങ	അങ്ങ
/aŋŋ/	/aɳ/	/aɲ/	/aŋ/	/aŋŋ/

Syllable grapheme correspondence (Level I)

Beginning consonant

നിർദ്ദേശം:

/nirddeʃam/:

ഞാൻ ചില വാക്കുകൾ പറയും. അത് ശ്രദ്ധിച്ചു കേട്ടതിനു ശേഷം അവയുടെ ആദ്യത്തെ അക്ഷരം എഴുതുക .

/ɲa:n ɟila va:kkukal paraȷum. atə̱ ʃradd^{h}iɟɟə ke:ɽatinə ʃe:ʂam avaȷuʈe a:dȷatte akʂaram ezt̪uka/

ഉദാഹരണം:

/uda:haranam/

പേന	പ
/pe:na/	/p/
തബല	ത
/t̪abala/	/t̪/

1. കാട് /ka:də/
2. ഗമ /gama/
3. ചക്ക /ʧakka/
4. ജന്മം/ȷanmam/
5. താമര/ t̪a:mara/
6. ദയ /daȷa/
7. ധനം/d^{h}anam/
8. നാണയം /na:naȷam/
9. പണം/panam/
10. ഫലം /p^{h}anam/
11. ബാലൻ/ba:lan/
12. ഭയം/b^{h}aȷam/
13. മഴു/maz̪u/
14. യാത്ര/ȷa:t̪ra/
15. രാത്രി/ra: t̪ri/
16. ലക്ഷം/lakʂam/
17. വാനം/va:nam/
18. ശൂലം /ʃu:lam/
19. സമയം /samaȷam/
20. ഞണ്ട് /ɲanɖə/

/

Ending consonant

നിർദ്ദേശം:

ഞാൻ ചില വാക്കുകൾ പറയും. അത് ശ്രദ്ധിച്ചു കേട്ടതിനു ശേഷം അവയുടെ അവസാനത്തെ അക്ഷരം എഴുതുക .

/ɲa:n ɟila va:kkukal paraȷum. atə̱ ʃradd^{h}iɟɟə ke:ɽatinə ʃe:ʂam avaȷuʈe avasa:nat̪te akʂaram ez̪t̪uka/

ഉദാഹരണം :

പേന - ന

/pe:na/ /n/

ഭയം - യ

/b^{h}aȷam/- /ȷ/

/uda:haranam/ :

1. ഇര /ira/
2. മല /mala/
3. വട/vada/
4. തലയണ/t̪alaɟaɳa/
5. കഥ/kat^{h}a/
6. ഗദ/gada/
7. സഭ/sab^{h}a/
8. പുഴ /puʐa/
9. ഗുഹ /guha/
10. തബല /t̪abala/
11. കലമാൻ/kalama:n /
12. സ്ഥിതി /st^{h}it̪i/
13. വേനൽ/ve:nal/
14. തണ്ണീർ/t̪aɳɳi:r/
15. ദുഃഖം /duk^{h}am/
16. കൈ /kai/
17. ഭാഷ/b^{h}a:ʂa/
18. അവൾ/aval/
19. ചിത/ʧit̪a/
20. മേഘം/meg^{h}am/

Consonant blends

നിർദ്ദേശം:

ഞാൻ ചില വാക്കുകൾ പറയും. അത് ശ്രദ്ധിച്ചു കേട്ടതിനു ശേഷം അവയിൽ ഉള്ള കൂട്ടക്ഷരം എഴുതുക .

/nirddeʃam/: /ɲa:n ʧila va:kkukal paraɟum. at̪ə̯ʃradd^{h}iʧʧə ke:ʈʈat̪inə ʃe:ʂam avaɟil uḷḷa ku:ttakʂaram eʐt̪uka/

ഉദാഹരണം : അക്കം - ക്ക /akkam/- /kk/

അവസ്ഥ - സ്ഥ /avast̪a/- /st̪^{h}/

ലജ്ജ /laɟɟa/

മാങ്ങ/ma:ŋŋa/

ചൊവ/ʧovva/

മനസ്സ്/manass/

ഈറ്റ/i:tta/

ഊഞ്ഞാൽ/u:ɲa:l/

വള്ളം/vaɭɭam/	പുച്ഛം/ puʧʧʰam/	ചെണ്ട /ʧeɳɖa/
പട്ടം/paʈʈam/	രക്തം /rakt̪am/	ശുദ്ധി /ʃuddʰi/
എണ്ണ/eɳɳa/	പക്ഷി /pakʂi/	നിശ്ചയം /niʃʧaɟam/
ശയ്യ /ʃaɟɟa/	പന്തയം /pant̪aɟam/	ശല്യം /ʃalɟam/
ബന്ധം /bandʰam/	നന്ദി/nanni/	

Vowel sounds

നിർദ്ദേശം:

ഞാൻ ചില വാക്കുകൾ പറയും. അത് ശ്രദ്ധിച്ചു കേൾക്കുക. അതിനുശേഷം അവയിൽ ഉള്ള സ്വരാക്ഷരം കണ്ടുപിടിച്ചു എഴുതുക .

/nirddeʃam/: /ɲa:n ʧila va:kkukal paraɟum. at̪ə ʃradʰiʧʧə ke:ʈʈat̪inə ʃe:ʂam avaɟil uɭɭa swarakʂaram kanɖu piʈiʧʧ eʐt̪uka/

ഉദാഹരണം : പണം- അ ചുക്ക്- ഉ

/panam/ - /a/ /ʧukk/- /u/

പന /pana/	ചേന /ʧe:na/	പൂവ്/pu:və/
കാക്ക /ka:kka/	പൊട്ട്/poʈʈə/	പെണ്ണ്/peɳɳə/
തിര /t̪ira/	വട/vada/	വേഗം/ve:gam/
വീട് /vi:də/	വാഴ/va:ʐa/	തോക്ക് / t̪o:kk/
കുട /kuda/	ഇര /ira/	കോൽ /ko:l/
നൂല് /nu:lə/	ചീര/ʧi:ra/	പൊക്കം/pokkam/
ചെല്ലം/ʧellam/	പുഴ/puʐa/	

Syllable grapheme correspondence (Level II)

Beginning consonant

നിർദ്ദേശം:

ഞാൻ ചില വാക്കുകൾ പറയും. അത് ശ്രദ്ധിച്ചു കേൾക്കുക. അവയുടെ ആദ്യത്തെ അക്ഷരം താഴത്തെ വരിയിൽ (ഇടതുഭാഗത്) കൊടുത്തിരിക്കുന്നത് ആണെങ്കിൽ അതിനു നേരെ ശരി (✓) ഇടുക അല്ലെങ്കിൽ തെറ്റ് (×) ഇടുക.

/nirddeʃam/: /ɲa:n ɟila va:kkukal paraɟum. at̪ ʃraddʰiɟɟʃ kelkkuka. avaɟuʈe a:dɟatt̪ akʂaram t̪a:ʐatt̪e variɟil (idat̪u bʰa:gatt̪ə) koʈutt̪irikkunnat̪ a:nengil at̪inu nere ʃari iʈuka/

ഉദാഹരണം:	ക	കരി	പക	കൂട്ട്	ഗദ	കായൽ
	/k/	/kari/	/paka/	/ ku:ʈʈ/	/gada/	/ka:ɟal/
		✓	×	✓	×	✓
	വ	വരി	വാക്ക്	പാൽ	വാൾ	വവ്വാൽ
	/v/	/vari/	/va:kkə/	/va:l/	/va:ɭ/	/vavva:l/
		✓	✓	×	✓	✓

ദ	ദയ	ഗദ	ദൂരം	നൂൽ	ദളം
/d/	/daɟa/	/gada/	/dooram/	/nu:l/	/dalam/
ഫ	ഭയം	ഫലം	ഭാരം	കഫം	ഫണം
/pʰ/	/bʰaɟam/	/pʰalam/	/bʰaram/	/kapʰam/	/pʰaɳam/
ധ	ധനം	നന്ദി	വധം	രഥം	ധാര

/dʰ/	/dʰanam/	/nanni/	/vadʰam/	/ratʰam/	/dʰa:ra/
ത	തണൽ	ദാനം	താരം	പാതം	താപം
/t̪/	/t̪aɳal/	/da:nam/	/t̪a:ram/	/pa:t̪am/	/t̪a:pam/
സ	സ്മിതം	സർപ്പം	വസ്ത്രം	യാത്ര	സമാധാനം
/s/	/smit̪am/	/sarppam/	/vast̪ram/	/ja:t̪ram/	/samadʰanam/
ശ	സമയം	ശലഭം	ശുഭം	കാശ്	ശക്തി
/ʃ/	/samaja̮m/	/ʃalabʰam/	/ʃubʰam/	/ka: ʃə/	/ʃakti/

Ending consonant

നിർദ്ദേശം:

ഞാൻ ചില വാക്കുകൾ പറയും. അത് ശ്രദ്ധിച്ചു കേൾക്കുക. അവയുടെ അവസാനത്തെ അക്ഷരം താഴത്തെ വരിയിൽ (ഇടതുഭാഗത്ത്) കൊടുത്തിരിക്കുന്നത് ആണെങ്കിൽ അതിനു നേരെ ശരി (✓) ഇടുക അല്ലെങ്കിൽ തെറ്റ് (×) ഇടുക.

/nirddeʃam/: /ɲa:n ɟila va:kkukal paraja̮m. at̪ ʃraddʰiɟɟʃ kelkkuka. avaja̮ut̪e avasa:natt̪e akʂaram t̪a:ɾatt̪e varija̮il (idat̪u bʰa:gatt̪ə) koɭutt̪irikkunnat̪ a:nengil at̪inu nere ʃari it̪uka/

ഉദാഹരണം: പ	തപം	ബിംബം	പാപി	പുലി	കഫം
/uda:haranam/	/tapam/	/bimbam/	/pa:pi/	/puli/	/kapʰam/
	✓	×	✓	×	×

ത	പദം	പാതം	വധം	മതി	പത
	/padam/	/pa:t̪am/	/vadʰam/	/mat̪i/	/pat̪a/
×	✓	×	✓	✓	

വ	പൂവ്	വവ്വാൽ	തപം	കാവ്യം	കവി
/v/	/puːvə/	/vavvaːl/	/t̪apam/	/kaːvjam/	/kavi/
ന	പന	ദിനം	നദി	ഗതി	ആന
/n/	/pana/	/dinam/	/nadi/	/gat̪i/	/aːna/
ക	സുഖം	പുക	കയം	യാഗം	തുക
/k/	/sukʰam/	/puka/	/kaj̪am/	/j̪aːgam/	/t̪uka/
ശ	മഷി	വാശി	ശരം	ലേശം	ദോശ
/ʃ/	/maʂi/	/vaːʃi/	/ʃaram/	/leːʃam/	/doʃa/
ര	ഇര	കറ	രാത്രി	മരം	പറ
/r/	/ira/	/kara/	/rat̪ri/	/maram/	/para/
ൽ	മീൻ	ഉടൽ	ആൾ	വിരൽ	കമ്മൽ
/l/	/miːn/	/udal/	/aːl̪/	/viral/	/kammal/

Vowel sounds

നിർദ്ദേശം:

താഴെ കൊടുത്തിരിക്കുന്ന വരിയിലെ മൂന്ന് വാക്കുകളും ശ്രദ്ധയോടെ വായിക്കുക. അതിൽ രണ്ടെണ്ണത്തിൽ ഒരുപോലെ ഉള്ള സ്വരാക്ഷരം ഉണ്ട്. അത് ഏതാണ് എന്ന് കണ്ടുപിടിക്കുക.

/nirddeʃam/: /ta:ɾe koɽutt̪irikkunna variyile mu:nn va:kkukaɻum ʃraddʰaɟode va:ɟikkuka. at̪il ranɖennatt̪il oru po:le uɻɻa svara:kʂaram unɖ. at̪ e:t̪a:nenn enn kanɖpidikkuka./

ഉദാഹരണം : രാവ് തബല താളം - ആ

/uda:haranam/ : /ra:və/ /t̪abala/ /t̪a:lam/- /a:/

പകൽ	കോടി	തോട്
/pakal/	/ko:ɽi/	/t̪o:ɽə/
ഗീതം	ഗാനം	പീഠം
/gi:t̪am/	/ga:nam/	/pi:ʈʰam/
തൂണ്	കുട്ട	കൂട്ട്
/t̪u:n/	/kuɽɽa/	/ku:ɽɽə/
കാരണം	ഭൂമി	പാലം
/ka:ranam/	//bʰu:mi/	/pa:lam/
കുപ്പി	പൂക്കൾ	തുള
/kuppi/	/pu:kkaɻ/	/t̪uɻa/

ഭക്ഷണം	തിര	ഭിക്ഷ
/bʰakʂanam/	/t̪ira/	/bʰikʂa/
പന	ഭാരം	തറ
/pana/	/bʰa:ram/	/t̪ara/
കെൽപ്പ്	തെന്നൽ	പായൽ
/kelpp/	/t̪ennal/	/pa:ɟal/
കേരം	പൊടി	പേന
/ke:ram/	/poʈi/	/pe:na/
പൊതി	തേൻ	കൊമ്പ്
/pot̪i/	/t̪e:n/	/komb/

Blending (Level I)

നിർദ്ദേശം:

താഴെ കൊടുത്തിരിക്കുന്ന ഓരോ കളത്തിലും ഒരു ചിത്രവും അതിനൊപ്പം അക്ഷരങ്ങളും ഉണ്ട്. അവ രണ്ടും ചേർത്ത് അർത്ഥമുള്ള ഒരു വാക്ക് ഉണ്ടാക്കുക

/nirddeʃam/: /ta:ɾe koʈut̪t̪irikkunna kaɭat̪ilum oru ɣit̪ravum at̪inoppam akʂaraŋalum unɖ. Ava ranɖum chert̪ oru va:kk unɖakkuka /

ഉദാഹരണം :

കൊടി +  കൊടിമരം

/koṭimaram/

/koṭi/

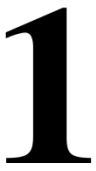
 + വണ്ടി തീവണ്ടി

/vanḍi/ /ṭi:vanḍi/

കുടവയർ /kuṭavaȷar/	 + വയർ /vaȷar/
ചാമരം /ʧa:maram/	 ചാ + /ʧa:/
കൈത	

/kaiṯa/	 + ത /ṯa/
മഴവില്ല് /maẓavillə/	 + വില്ല് /villə/
കണ്ണട /kaṇṇaṭa/	 + ട /ṭa/
കുടൽ /kuṭal/	 + ൽ /l/
ത്രുക്കണ്ണ് / ṯrukkaṇṇ/	 ത്ര + /ṯrə/

തവള / t̪avaḷa/	 ത + / t̪/
തീപ്പെട്ടി /t̪i:ppeṭṭi/	 + പെട്ടി /peṭṭi/
കാലൻ /ka:lan/	 + ൻ /n/
പന്തൽ /pant̪al/	 + ൽ /l/

ഒന്നാമൻ /onna:man/	 + മൻ /man/

Blending (Level II)

നിർദ്ദേശം:

ഓരോ വരിയിലും മൂന്ന് വിധത്തിൽ പിരിച്ചെഴുതിയിരിക്കുന്ന വാക്കുകൾ ശ്രദ്ധിച്ചു വായിക്കുക. അതിൽ ശരിയായ പിരിച്ചെഴുത്ത് ഏതാണ് എന്ന് കണ്ടു പിടിക്കുക.

/nirddeʃam/: /o:ro varijilum mu:nn vidʰat̪il piriɟɟeẓut̪ijirikkunna va:kkukaḷ
ʃraddʰiɟɟə va:jikkuka. at̪il ʃarija:ja piriɟɟeẓutt̪ e:t̪a:nenn kanʧ pidikkuka./

ഉദാഹരണം : കണ്ടു+ മുട്ടി കണ്ട + മുട്ടി കണ്ടു+ ഉട്ടി

നഷ്ടാ + ബോധം നഷ്ട + ബോധം നഷ്ടം + ബോധം

നീല+ ആകാശം നീലാ + കാശം നില + കാശം

/ni:la/+ /a:ka:ʃam/ /ni:la/+/ka:ʃam/ /nila + ka:ʃam/

ആൽ + മരം ആല +മരം അല + മരം

/a:l/+ /maram/ /a:la/+/maram/ /ala/+/maram/

മൊട്ട+ സൂചി മൊട്ട് + സൂചി മൊട്ടു + സൂചി

/moʈʈa/+ /su:ɟi/ /moʈʈə/+ /su:ɟi/ /moʈʈu/+ /su:ɟi/

കടൽ+ ഓരം കടല + ഓരം കടലോ + രം

/kadal/+/o:ram/ /kadala/+/o:ram/ /kadalo:/+/ram/

പല്ല് + പൊടി പല+ പൊടി പാൽ + പൊടി

/pallə/+/poṯi/	/palə/+/poṯi/	/pa:l/+/poṯi/
അ + ദേഹം	ആ + ദേഹം	അം + ദേഹം
/a/+/deham/	/a:/+/deham/	/am/+/deham/
ശുഭ + രാത്രി	ശുഭ് + രാത്രി	ശുഭം + രാത്രി
/ʃubʰa/+/ra:t̪ri/	/ʃubʰ/+/ra:t̪ri/	/ʃubʰam/+/ra:t̪ri/
തത് + കാലം	തല + കാലം	താല + കാലം
/t̪at̪/+/ka:lam/	/t̪ala/+/ka:lam/	/t̪a:la/+/ka:lam/

Structural Analysis

Level I

നിർദ്ദേശം :

താഴെ കൊടുത്തിരിക്കുന്ന വാക്യങ്ങൾ ഉചിതമായ വാക്ക് ചേർത്ത് പൂരിപ്പിക്കുക.

/nirddeʃam/: /ta:ɻe koduṯṯirikkunna va:kʲaŋal uʧiṯama:ʲa va:kk ʧe:reṯṯ pu:rippikuka/

/uda:haranam/ :

പൂച്ച താഴേക്ക് ചാടിയപ്പോൾ _____.

/pu:ʧʧa t̪a:ɻekk ʧa:diʲappol / _____.

[വീണു , വീഴുന്നു , വീഴും]

[/vi:nu/, /vi:ɻunnu/, /vi:ɻum/]

ആന _____.

/a:na_____./

[വലുപ്പം , കറുപ്പ് , വലുതാണ്]

[/valuppam/, /karupp/, /valuṯa:nu/]

1. കുട്ടികൾ പക്ഷിയെ _____ വിട്ടു.

[പറന്ന്, പറത്തുന്ന, പറത്തി]

/kuṭṭikaḷ pakṣiye _____ viṭṭu./

[/parann/, /paraṯṯunna/,/paraṯṯi/]

2. ഇന്നലെ മഴ _____.

[പെയ്യും, പെയ്തു , പെയ്യാം]

/innale maẓa _____.

[/peȷȷum/,/peyṯu/,/peȷȷam/]

3. മരം മനുഷ്യനാൽ _____.

[മുറിച്ചു , മുറിക്കപ്പെട്ടു, മുറിക്കും]

/maram manuṣȷana:l _____./

[/muriɟɟu/,/murikkapeṭṭu/, /murikkum/]

4. അവിടെ ആരെങ്കിലും _____ ?

[ആണോ , ഉണ്ടോ, ഉണ്ട്]

/avide a:rengilum _____??

[/a:no:/,/undo:/, /undə/]

5. മഴ പെയ്യുന്നു, _____ കുട പിടിക്കണം

[എന്തെന്നാൽ, എന്നിട്ട്, അതിനാൽ]

/maẓa peȷȷunnu,_____ kuṯa piṯikkaɳam./

[/ent̪ennal/, /enniʈʈ/, /at̪ina:l/]

6. അവൻ _____ സംസാരിച്ചു.

[എന്റെ, എനിക്ക് എന്നോട്]

/avan _____ samsa:riʧʧu./

[/enʈe/, /enikk/,/ennoʈə/]

7. അദ്ദേഹം _____ വീണു.

[പടിയിൽ , പടിയുണ്ട്, പടിയോടെ]

/addeham _____ vi:ɳu./

[/paʈiʤil/, /paʈiʤunʈ/, /paʈiʤo:ʈe/]

8. മനുഷ്യൻ _____ വധിച്ചു.

[മൃഗങ്ങൾ , മൃഗത്തെ , മൃഗത്തിനാൽ]

/manuʂjan _____ vadʰiʧʧu./

[/mrəgaŋgaɻ/, /mrəgat̪t̪e/, / mrəgat̪t̪ina:l/]

9. എനിക്ക് ആഗ്രഹം _____.

[അതെ, ആണോ , ഉണ്ട്]

/ enikk a:graham _____./

[/at̪e/, /a:ɳo:/,/undə/]

10. അവന്റെകൈയിൽ ഉള്ള പേന _____ ആണ്.

[എന്റെക്കാൻ , അവർ]

/avante kaiʤil uɭɭa pe:na _____ aa:nə.

[/ente/,/ ɲa:n/,/avar/]

11. മഴ _____ ഞാൻ നനഞ്ഞു.

[പെയ്തു , പെയ്തതിനാൽ , പെയ്യും]

/ maʐa _____ ɲa:n nanaɲɲu./

[/peɟṯu/,/peɟṯaṯina:l/,/peɟɟum/]

12. നദിയിൽ വെള്ളം _____.

[പൊങ്ങി , വാങ്ങി , തകർന്നു]

/nadiɟil veḷḷam _____./

[/poɳɳi/,/va:ɳɳi/,/ṯakarnnu/]

13. അവൻ പുസ്തകങ്ങൾ എടുത്ത് _____ താഴേക്ക് പോയി.

[കൂടെ, ആയി , കൊണ്ട്]

/Avan pusṯakaɳɳal eṭuṯṯə _____ ṯa:ʐe:kk po:ɟi/

[/ku:ʈə/, /a:ɟi/,/konɖə/]

14. _____ പറയരുത്.

[ആർക്കും , ആർക്കുമായി , ആരോടും]

/_____ paraɟaruṯə./

[/a:rkkum/, /a:rkkuma:ɟi/,/a:roṭum/]

15. ഞാൻ ഇന്നലെ ഒരു കാര്യം _____

[ഓർക്കും , ഓർമ്മ, ഓർമിച്ചു]

/ɲan innale oru ka:rɟam _____./

[/o:rmmiɟɟu/,/o:rkkum/,/o:rmmiɟɟu/]

Structural Analysis (Level II)

Plurals

നിർദ്ദേശം:

താഴെ തന്നിരിക്കുന്ന വാക്കുകളിൽ ബഹുവചനത്തെ സൂചിപ്പിക്കുന്നവ തിരഞ്ഞെടുക്കുക.

/nirddeʃam/: / ta:ɻe koɽutt̪irikkunna va:kkukaɭ̪il bahuvaʧanatt̪e su:ʧippikkunnava t̪iraɲɲedukkuka/

ഉദാഹരണം : പൂ ക്കൾ പൂവ് താങ്കൾ

/uda:haranam/ : /pu:kkaɭ̪/ /pu:və/ /t̪a:ŋgaɭ̪/

പുരുഷർ	പുരുഷൻ	പുരുഷന്മാർ
/puruʂar/	/puruʂan/	/puruʂanma:r/

അവർ	അവൻ	അവൾ
/avar/	/avan/	/avaɭ̪/

ഞാൻ	നീ	നിങ്ങൾ
/ɲa:n/	/ni:/	/niŋŋaɭ̪/

Past tense

നിർദ്ദേശം :

താഴെ തന്നിരിക്കുന്ന വാക്കുകളിൽ ഭൂതകാലത്തെ സൂചിപ്പിക്കുന്നവ തിരഞ്ഞെടുക്കുക.

/nirddeʃam/: / ta:ɻe koɽutt̪irikkunna va:kkukaɭil bʰu:t̪aka:latt̪e su:ɣippikkunnava t̪iraɲɲedukkuka/

ഉദാഹരണം : പോകുന്നു പോകും പോയി

/uda:haranam/ : /Po:kunnu/ /po:kum/ /po:ji/

കിട്ടി	തരും	താ
/kiʈʈi/	/t̪arum/	/t̪a:/
വരൂ	വന്നു	വരിക
/varu:/	/vannu/	/varika/
പാടി	പാട്ട്	പാടും
/pa:ʈi/	/pa:ʈʈə/	/pa:ʈum/

Superlative degree

നിർദ്ദേശം :

താഴെ തന്നിരിക്കുന്ന വാക്കുകളിൽ വിശേഷണോത്തമരൂപം സൂചിപ്പിക്കുന്നവ തിരഞ്ഞെടുക്കുക.

/nirddeʃam/: / ta:ɻe koɽutt̪irikkunna va:kkukaɭil viʃeʂaɳot̪t̪anaru:pam su:ɣippikkunnava t̪iraɲɲedukkuka/

ഉദാഹരണം : നല്ലത് കെങ്കേമം കേമം

/uda:haranam/ : /nallat̪ə/ keŋgemam /kemam/

ശരി	അത്യുത്തമം	ഉത്തമം
/ʃeri/	/atʲut̪t̪amam/	/ut̪t̪amam/

പുഞ്ചിരി	മന്ദഹാസം	പൊട്ടിച്ചിരി
/puɲʧiri/	/mandaha:sam/	/poʈʈiɻɻiri/

കുറച്ച്	പൂർണം	ഭാഗികം
/kuraɻɻ/	/pu:rɳɳam/	/bʰa:gikam/

Negation

നിർദ്ദേശം: താഴെ നൽകിയിരിക്കുന്ന വാക്കുകളിൽ നിഷേധ പ്രസ്താവത്തെ സൂചിപ്പിക്കുന്നവ തിരഞ്ഞെടുക്കുക.

/nirddeʃam/: / ta:ʐe koʈut̪t̪irikkunna va:kkukaɻil niṣedha prast̪avaat̪t̪e su:ɻippikkunnava t̪iraɲɲedukkuka/

ഉദാഹരണം : ഔപചാരികം (അനൗപചാരികം) ഉപചാരം

/aupaɻa:rikam/ /anaupaɻa:rikam/ /upaɻa:ram/

(വേണ്ട) ഉണ്ട് വേണം

/ve:nɖa/ /unɖə/ /venam/

ലഭ്യത	ലാഭം	ദൗർലഭ്യം
/labʰjat̪a/	/la:bʰam/	/daurlabʰjam/
ഉചിതം	അനുചിതം	അത്യുത്തമം
/uʧit̪am/	/uʧit̪am/	/atjut̪t̪amam/
ഭാഗ്യം	സൗഭാഗ്യം	നിർഭാഗ്യം
/bʰa:gjam/	/saubʰa:gjam/	/nirbʰa:gjam/

Again

നിർദ്ദേശം : താഴെ നൽകിയിരിക്കുന്ന വാക്കുകളിൽ പിന്നെയും അഥവാ വീണ്ടും എന്ന അർഥം വരുന്നവ തിരഞ്ഞെടുക്കുക.

/nirddeʃam/: / ta:ʐe koɽut̪t̪irikkunna va:kkukaɭil pinnejum adʰava vi:nɖum su:ʧippikkunnava t̪iraɲɲedukkuka/

ഉദാഹരണം : നാമം പുനർനാമകരണം നാമകരണം

/uda:haranam/ : /na:mam/ /punarna:makaraɳam/ /na:makaraɳam/

പുനർനിർമ്മാണം നിർമ്മിതി നിർമ്മാണം

/punarnirmmaɳam/ /nirmmit̪i/ /nirmmaɳam/

/

ആരംഭം	പുനരാരംഭം	പ്രാരംഭം
/a:rambʰam/	/punara:rambʰam/	/pra:rambʰam/

പുത്തൻ	പുലരി	പുനരധിവാസം
/putt̪an/	/pulari/	/punarad^{h}iva:sam/

ജനനം	പുനർജ്ജന്മം	ജന്മം
/ɟananam/	/punarɟɟanmam/	/ɟanmam/

Without

നിർദ്ദേശം : താഴെ നൽകിയിരിക്കുന്ന വാക്കുകളിൽ ഇല്ലാതെ അഥവാ കൂടാതെ എന്ന അർഥം വരുന്നവ തിരഞ്ഞെടുക്കുക.

/nirddeʃam/: / ta:ʐe koɻutt̪irikkunna va:kkukaɻil illa:t̪ ad^{h}ava ku:da:t̪e enna ard^{h}am su:ʧippikkunnava t̪iraɲɲedukkuka/

ഉദാഹരണം : ക്ഷമ അക്ഷമ ക്ഷതം

/uda:haranam/ : /kʃama/ /akʃama/ /kʃat̪am/

നിശേഷം വിശേഷം ശേഷം

/viʃe:ʂam/ /niʃe:ʂam/ /viʃe:ʂam/

സ്വാർത്ഥം	അർഥം	നിസ്വാർഥം
/sva:rt̪d^{h}am/	/a:rt̪d^{h}am/	/nisva:rt̪d^{h}am/

നിപുണത	നിഷ്പക്ഷത	പക്ഷം
/nipuɳaṯa/	/niʂpakʂaṯa/	/pakʂam/
നിസ്സാരം	സാരം	സരസത
/nissa:ram/	/sa:ram/	/sarasaṯa/

With

നിർദ്ദേശം : താഴെ നൽകിയിരിക്കുന്ന വാക്കുകളിൽ അതിനൊപ്പം അഥവാ കൂടെ എന്ന അർഥം വരുന്നവ തിരഞ്ഞെടുക്കുക.

/nirddeʃam/: / ta:ẓe koɽuṯṯirikkunna va:kkukaɻil aṯinoppam ad^{h}ava ku:de enna ard^{h}am su:ʧippikkunnava ṯiraɲɲedukkuka/

ഉദാഹരണം : വിനീതം വിനയം (സവിനയം)

/uda:haranam/ : /vini:ṯam/ /vinaɟam/ /savinaɟam/

(സസന്തോഷം) സന്ദാപം സാന്ത്വനം

/sasanṯoʂam/ /sanda:pam/ /sa:ndvanam/

ഭക്തിജനകം	ഭക്തിപൂർവ്വം	വിഭക്തി
/b^{h}akṯijanakam/	/b^{h}akṯijpu:rvam/	/vi/b^{h}akṯi/

സസ്നേഹം	സ്നേഹം	സ്നേഹിതൻ
/sasneham/	/sneham/	/snehiṯan/

സന്തോഷം	സന്തുഷ്ടം	സന്തോഷപൂർവം
/santo̱ʂam/	/santu̱ʂṭam/	/santo̱ʂapu:rvam/

Before

നിർദ്ദേശം : താഴെ നൽകിയിരിക്കുന്ന വാക്കുകളിൽ മുൻപേ അഥവാ കടന്നുപോയ സമയം എന്ന അർഥം വരുന്നവ തിരഞ്ഞെടുക്കുക.

/nirddeʃam/: / ta:ʐe ko̱ṭutti̱rikkunna va:kkuka̱̱il munpe: ad^{h}ava ka̱ṭannu po:ja samaja̱m enna ard^{h}am su:ʁippikkunnava ti̱raɲɲedukkuka/

ഉദാഹരണം : ജന്മാന്തരം പൂർവ്വജന്മം ജന്മം

/uda:haranam/ : /ʁanma:nta̱ram/ /pu:rvaʁanmam/ /ʁanmam/

മനഃപൂർവം പൂർവം മുൻവിധി

/manapu:rvam/ /pu:rvam/ /munvid^{h}i/

വിശ്രമം	ആശ്രമം	പൂർവ്വാശ്രമം
/viʃramam/	/a:ʃramam/	/pu:rva:ʃramam/
അധികം	വളരെയധികം	പൂർവ്വാധികം
/ad^{h}ikam/	/valareja̱d^{h}ikam/	/ pu:rva:d^{h}ikam/

പുലർകാലം	അക്കാലം	പൂർവ്വകാലം
/pularkka:lam/	/akka:lam/	/pu:rvaka:lam/

Structural Analysis (Level III)

താഴെ തന്നിരിക്കുന്ന പദങ്ങളിൽ നിന്നും മൂലശബ്ദം വേർതിരിക്കുക. അങ്ങനെ മൂലശബ്ദം വേർതിരിക്കാൻ കഴിയാത്തവയിൽ വട്ടം വരയ്ക്കുക

/nirddeʃam/: / ta:ʐe koɽuṭṭirikkunna va:kkukaɻil ninnum mu:laʃabdam ve:rṭirikkuka. Aŋgane mu:laʃabdam verṭirikka:n kaʐiɻja:ṭavaɻil vaṯṯam varaɻkkuka/

ഉദാഹരണം: പൂർവ്വകാലം സന്തോഷപൂർവം പൂർവസ്ഥിതി പൂർവികം

/uda:haranam/ : /pu:rvaka:lam/ /santoʂapu:rvam/ /pu:rvast^{h}iṭi/ /pu:rvikam/

തലച്ചോറ് തലവേദന തലവൻ തലമുടി

/ṭalaʧo:rə/ /ṭalave:dana / /ṭalavan/ /ṭalamuɽi/

ഭക്തിപൂർവ്വം	ഭക്തിസാന്ദ്രം	ഭക്തിമയം	വിഭക്തി
/b^{h}akṭijpu:rvam/	/b^{h}akṭisa:ndram/	/b^{h}akṭimaɻam/	/vi/b^{h}akṭi/
കാൽനട	കാൽവിരൽ	കാലൻ	കാൽപാദം
/ka:lnada/	/ka:lviral/	/ka:lan/	/ka:lpa:dam/
കൈത	കൈരേഖ	കൈവെള്ള	കൈവിരൽ
/kaiṭa/	/kaire:k^{h}a/	/kaiveḷḷa/	/kaiviral/
ഗൃഹനില	ഗൃഹപ്രവേശം	ഗൃഹനാഥ	ഗൃഹസ്ഥ

/grəhanila/	/grəhaprave:ʃam/	/grəhana:tʰa/	/grəhastʰa/
മലമ്പാത	മലർ	മലവെള്ളം	മലനാട്
/malamba:t̪a/	/malar/	/malaveɭɭam/	/malana:də/
അണപ്പല്ല്	പല്ലി	പൽപ്പൊടി	പല്ലുവേദന
/aɳappallə/	/palli/	/palppoṭi/	/palluve:dana/
ഇളനീർ	ഇളവെയിൽ	ഇളവ്	ഇളംകാറ്റ്
/iɻani:r/	/iɻaveɻil/	/iɻav/	/iɻamka:ttə/

പലർ	പലചരക്ക്	പലവ്യഞ്ജനം	പലയിടം
/palar/	/palaʧarakk/	/palavɟanɟanam/	/palajiṭam/
മുഖകാന്തി	മുഖവുര	മുഖക്കുരു	മുഖസ്തുതി
/mukʰaka:n̪ti/	/mukʰakavura/	/mukʰakkuru/	/mukʰas̪tut̪i/
കാലശേഷം	കഥാവശേഷം	വിശേഷം	ശേഷക്രിയ
/ka:laʃe:ʂam/	/kadhavaʃeʂam/	/viʃeʂam/	/ʃe:ʂakriɟa/
കലഹം	കലാവേദി	കലാകാരൻ	കലാരൂപം
/kalaham/	/kala:ve:di/	/kala:ka:ran/	/kala:ru:pam/
പഴച്ചാറ്	പഴന്തുണി	വാഴപ്പഴം	പഴക്കം
/paʐaʧʧa:rə/	/paʐan̪t̪uni/	/va:ʐappaʐam/	/paʐakkam/
പുതുമഴ	പുതുമ	പുതുവർഷം	പുതുവത്സരം
/put̪umaʐa/	/put̪uma/	/put̪uvarʃam/	/put̪uvat̪saram/
പൊതുസ്ഥലം	പൊതുസ്വത്ത്	പൊതുവെ	പൊതുജനം
/po̪tst̪ʰalam/	/po̪t̪usvat̪/	/po̪t̪uve/	/po̪t̪uɟanam/

Reading Passage

Level I

മിന്നുവിന് രണ്ട് പൂച്ചക്കുട്ടികൾ ഉണ്ടായിരുന്നു. ഒന്ന് കാർത്തു. മറ്റേത് കുഞ്ഞാറ്റ. മിന്നു സ്കൂളിൽ നിന്ന് വരുന്നതും നോക്കി രണ്ടുപേരും മതിലിന് മുകളിൽ ഇരിക്കും. ഒരു ദിവസം പൂച്ചക്കുട്ടികൾക്ക് മിന്നുവിന്റെ സ്കൂൾ കാണാൻ ആഗ്രഹം തോന്നി. അവർ മിന്നുവിന്റെ സ്കൂളിലേക്ക് നടന്നു. സ്കൂളിലെത്തിയ കാർത്തുവും കുഞ്ഞാറ്റയും മിന്നുവിനെ നോക്കി നടക്കാൻ തുടങ്ങി. അവസാനം നാലാം ക്ലാസ്സിന് മുന്നിൽ എത്തി. അവിടെ അതാ മിന്നു ഇരിക്കുന്നു. കാർത്തുവിനെയും കുഞ്ഞാറ്റയെയും കണ്ടപ്പോൾ മിന്നുവിന് സന്തോഷമായി.

/minnuvinə ranɖ̪ pu:ɟ̊ɟ̊akkuttikal unda:ɟ̊irunnu. onnə ka:rʈ̪tu. matteʈ̪ kuɲɲa:tta. Minnu sku:ɭ̪il ninnə varunnaʈ̪um nokki ranɖ̪əpe:rum maʈ̪ilinə mukaɭ̪il irikkum.oru divasam pu:ɟ̊ɟ̊akkuʈʈ̪ikalkk minnuvinte sku:ɭ̪ ka:nan a:graham ʈ̪onni. Avar minnuvinte sku:ɭ̪ilekk naʈannu. Sku:lil eʈ̪ija ka:rʈ̪tuvum kuɲɲa:ttaɟ̊um minnuvine nokki naʈakka:n ʈ̪uʈaŋi. Avasa:nam nala:m kɭ̪a:sinu munnil eʈ̪i. Avide aʈ̪a: minnu irikkunnu. ka:rʈ̪tuvine:ɟ̊um kuɲɲa:ttaɟ̊e:ɟ̊um kanɖ̪appoɭ̪ santo:ʂ̪ama:ɟ̊i./

1. മിന്നുവിന് എത്ര പൂച്ചക്കുട്ടികൾ ഉണ്ടായിരുന്നു?

/minnuvinə eʈ̪ra pu:ɟ̊ɟ̊akkuttikaɭ̪ unda:ɟ̊irunnu?/

2. മിന്നുവിന്റെപൂച്ചകുട്ടികളുടെ പേര് എന്തായിരുന്നു ?

/minnuvinte pu:ɟ̊ɟ̊akuʈʈ̪ikaɭ̪uɖ̪e pe:rə enʈ̪aɟ̊irunnu?/

3. പൂച്ചകുട്ടികളുടെ ആഗ്രഹം എന്തായിരുന്നു?

/ pu:ɟ̊ɟ̊akuʈʈ̪ikaɭ̪uɖ̪e a:graham enʈ̪aɟ̊irunnu?/

4. മിന്നു എത്രാം ക്ലാസിൽ ആയിരുന്നു പഠിച്ചിരുന്നത് ??

/minnu eʈ̪ram kɭ̪a:ssil a:ɟ̊irunnu pat^{h}iɟ̊ɟ̊irunnaʈ̪ə?/

Level 2

സംസ്കൃതഭാഷയിലെ ശ്രേഷ്ഠമായ ഒരു കവിയാണ് കാളിദാസൻ. വിക്രമാദിത്യ രാജാവിന്റെയസദസ്സിലെ നവരത്നങ്ങളിൽ ഒരാളായിരുന്നു കാളിദാസൻ. മേഘദൂതം കാളിദാസന്റെ പ്രശസ്തമായ സന്ദേശകാവ്യമാണ്. അദ്ദേഹത്തിന്റെമഹാകാവ്യങ്ങളിൽ പ്രശസ്തം കുമാരസംഭവം ആണ്. ഹിന്ദു പുരാണങ്ങളെ ആസ്പദം ആക്കിയിട്ടുള്ളവയാണ് കാളിദാസന്റെ രചനകളിൽ അധികവും. നാലാം നൂറ്റാണ്ടിലാണ് കാളിദാസൻ ജീവിച്ചിരുന്നതായി കണക്കാക്കപ്പെടുന്നത്. അദ്ദേഹത്തിന്റെ ജീവിതത്തെ പറ്റിയുള്ള അറിവുകൾ കുറവാണെങ്കിലും രചനകളിൽ നിന്നുള്ള സൂചനകൾ വെച്ചു പല കഥകളും പ്രചാരത്തിൽ ഉണ്ട്.

/samskrəṯabʰaːʂaɟile ʃreːʂtʰmaːɟa oru kaviɟaːɳə kaːl̪idaːsan. Vikramaːdiṯɟa raːʒaːvinte sadassile navaraṯnaŋalil oraːl̪ aːɟirunnu kaːl̪idaːsan. Meːgʰaduː ṯam kaːl̪idaːsanté praʃasṯamaːɟa sandeːʃa kaːvɟamaːɳə. addehaṯṯinte mahaːkaːvɟaŋalil praʃasṯam kumaːrasambʰavam aːɳə. hindu puraːɳaŋal̪e aːspadam aːkkiɟiṯṯul̪l̪avaɟaːɳə kaːl̪idaːsanté raʧanakalil adʰikavum. Naːlaːm nuːttandilaːɳə kaːl̪idaːsan jiːviʧʧirunnaṯaːɟi kanakkaːkkappeṯunnaṯ. addehaṯṯinte ʒiːviṯaṯṯe pattiɟul̪l̪a arivukal̪ kuravaːɳeŋgilum raʧanakal̪il ninnul̪l̪a suːʧanakal̪ veʧʧə pala katʰakal̪um praʧaːraṯṯil undə./

1. ആരാണ് കാളിദാസൻ ?

/aːraːɳə kaːl̪idaːsan ?/

2. കാളിദാസന്റെദപ്രശസ്തമായ സന്ദേശകാവ്യം ഏതാണ്?

/kaːl̪idaːsanté praʃasṯamaːɟa sandeːʃa kaːvɟam eː ṯaːɳə?/

3. ഏത് നൂറ്റാണ്ടിലാണ് കാളിദാസൻ ജീവിച്ചിരുന്നത് ?

/eː ṯə nuːttandilaːɳə kaːl̪idaːsan jiːviʧʧirunnaṯə?/

4. ആരുടെ സദസ്സിലെ നവരത്നങ്ങളിൽ ഒരാളായിരുന്നു കാളിദാസൻ ?

/aːrude sadassile navaraṯnaŋalil oraːl̪ aːɟirunnu kaːl̪idaːsan?/

Level 3

മനുഷ്യന് വേണ്ട നല്ല ശീലങ്ങളിൽ ഒന്നാണ് വായനാശീലം. വായന എന്നതുകൊണ്ട് അർത്ഥമാക്കുന്നത് പാഠപുസ്തകങ്ങളോ വർത്തമാനപത്രങ്ങളോ വായിക്കുക എന്നതു മാത്രമല്ല, നല്ല പുസ്തകങ്ങൾ വായിക്കുക എന്നാണ്. വിനോദവും വിജ്ഞാനവും നമുക്ക് വായനയിൽ നിന്ന് ലഭിക്കുന്നു. ജീവിത വിജയം കൈവരിക്കുന്നതിന് അറിവ് കൂടിയേ തീരു. അതിനു പുസ്തകങ്ങൾ നമ്മളെ സഹായിക്കുന്നു. വായന മാനസിക വളർച്ചയ്ക്കും ഉയർച്ചയ്ക്കും അത്യന്താപേക്ഷിതമാണ്. ഇതിനു അടിവര ഇടുകയാണ് ആധുനിക ശാസ്ത്രം. തലച്ചോറിന്റൊ കഴിവ് വർദ്ധിപ്പിക്കുന്ന മരുന്ന് ആയിട്ടാണ് ശാസ്ത്രജ്ഞർ വായനയെ കാണുന്നത്. വായിക്കുന്ന പുസ്തകത്തിലെ ഒരു സംഭവം ഭാവനയിൽ വരുത്തുക വഴി തലച്ചോറിൻ്റെ പ്രവർത്തനം മെച്ചപ്പെടുന്നു. വായിക്കുന്നത് എന്തുമാകട്ടെ, അതിൽ വിവരിച്ചിരിക്കുന്ന സ്ഥലം, കഥാപാത്രങ്ങൾ, വ്യത്യസ്ത നിറങ്ങൾ, മണങ്ങൾ തുടങ്ങിയവ വായനയോടൊപ്പം അനുഭവിക്കുന്ന പ്രതീതിയാണ് തലച്ചോറിന് ഉണ്ടാവുക. ഇത്, ശാരീരികമായും വായനക്കാരന് ഗുണം ചെയുന്നു. മനസ്സിനെ ഉന്മേഷത്തോടെ നിലനിർത്താനും, അതു വഴി തലച്ചോറിന്റെന്ബുദ്ധികൂർമ്മത വളർത്താനും സഹായിക്കുന്നതിനാൽ കുട്ടികളെ പരമാവധി വായിക്കാൻ പ്രോത്സാഹിപ്പിക്കേണ്ടതാണ്. പ്രാഥമിക വിദ്യാഭ്യാസം പോലും മുഴുവനാക്കാൻ കഴിയാത്ത 'ബർണാഡ് ഷാ ' പുസ് തകവായനയിലൂടെയാണ് വിശ്വപ്രസിദ്ധനായ സാഹിത്യകാരൻ ആയത്.

/manuʂjanə ve:nda nalla ʃi:laŋaʟil onn a:ɳə va:jana:ʃi:lam. Va:jana ennat̪ukond ar ʰama:kkunnat̪ə pa: ʈʰapust̪akaŋaʟo varttama:na pat̪raŋaʟo va:jikkuka ennat̪ə ma:t̪ramalla, nalla pust̪akaŋaʟ va:jikkuka ennat̪a:ɳə. Vino:davum viɟɲa:navum namukk va:janaji̯l ninn labʰikkunnu. ɟi:vit̪a viɟaji̯am kaivarikkunnatt̪inə arivə ku:ʈiji̯e t̪i:ru. at̪inə pust̪akaŋaʟ namme saha:jikkunnu. va:jana manasikavaʟarɣɣaji̯kkum uji̯arɣɣaji̯kkum atjant̪a:pe:kʂikama:ɲə. it̪inə aʈivaraji̯iʈukja:ɳə a:dʰunika ʃa:st̪ram. t̪alaɣɣo:rinte kaʐivə vardʰippikkunna marunna:ji̯ʈʈa:ɳə ʃa:st̪raɟɲar va:janaje viʃeʂippikkunnat̪. Va:jikkunna pust̪akatt̪ile oru sambʰavam bʰa;vanaji̯l varutt̪unna vaʐi t̪alaɣɣo:rinte pravart̪anam meɣɣapedunnu. vaji̯kkunnat̪ ent̪uma:kaʈʈe, at̪il vivariɣɣirikkunna stʰalam, katʰa:pa: t̪raŋaʟ, vjatjast̪a niraŋal, maɳaŋal t̪uʈaŋiji̯ava va:janaji̯o:ʈoppam anu bʰavikkunna prati:t̪i a:ɳə t̪alaɣɣo:rinə labʰikkuka. it̪ə ʃa:ri:rikama:jum va:janakka:ranə guɳam ɣejjunnu. Manassine unmeʂatt̪o:ʈe nirtt̪a:num at̪uvaʐi budʰi ku:rmat̪a vardʰippikka:num saha:jikkunnat̪ina:l kuʈʈikaʟe va:jikka:n pre:rippikke:nda t̪a:ɳə. Pra:tʰamika vidja bʰja:sam po:lum muʐuvana:kka:n kaʐiji̯a:tt̪a barna:rḍ ʂa pust̪aka va:janaji̯lu:ʈe a:nə viʃva prasi dʰana:ja sa:hitjaka:rana:ja t̪./

1.ജീവിത വിജയം കൈവരിക്കുന്നതിന് എന്ത് കൂടിയേ തീരു?

/ ɟi:viṯa viɟaɟam kaivarikkunnaṯṯinə en ṯə ku:ʈiɟe ṯi:ru.?/

2.പുസ്തകവായനയിലൂടെ വിശ്വപ്രസിദ്ധനായി തീർന്ന സാഹിത്യകാരൻ്റെ പേര്?

/pusṯaka va:ɟanaɟilu:ʈe viʃva prasi dʰana:ɟa sa:hiṯɟaka:rana:ɟi ṯi:rnna sa:hiṯɟaka:ranante pe:rə?/

3.വായന എന്തിനുവേണ്ടിയുള്ള മരുന്നായിട്ടാണ് ശാസ്ത്രജ്ഞർ വിശേഷിപ്പിക്കുന്നത് ?

va:ɟana enṯinu ve:ndiɟuḷḷa marunna:ɟiʈʈa:ɳə ʃa:sṯraɬɲar viʃeṣippikkunnaṯ??

4. വായിക്കുമ്പോൾ എന്ത് പ്രതീതിയാണ് തലച്ചോറിന് ഉണ്ടാകുന്നത്?

/Va:ɟikkumboḷ enṯə praṯi:ṯi a:ɳə ṯalaɟɟo:rinə labʰikkuka

Level 4

കിണറുകളും പുഴകളും വറ്റി തുടങ്ങി. പച്ചപ്പ് മങ്ങി. പൊടിയും അഴുക്കും ഭൂതലത്തെ വൃത്തിഹീനമാക്കുന്നു. നാളേറെയായി കുളിക്കാൻ ഒത്തിട്ടില്ലാത്ത മുഖപ്രകൃതിയോടെ ഭൂമി വിളറി കിടക്കുന്നു. വല്ലപ്പോഴും ഒരു ഇല അനക്കമേ ഉള്ളു. വീശുന്ന കാറ്റിനു ചൂട് ഏറെ. ഭൂഗർഭജലവും വറ്റി വരണ്ടിരിക്കുന്നു. ഇതിലെ വീശിയിരുന്ന കാറ്റ് എന്തേ മടിയനായി തീർന്നു? നൂറ്റാണ്ടുകൾ ആയുള്ള പതിവുകൾ എന്ത് കൊണ്ട് തെറ്റുന്നു ?പരിസ്ഥിതി മാറുമ്പോൾ ഈ ചോദ്യങ്ങൾ ഉരുത്തിരിയുന്നത് സ്വാഭാവികം മാത്രം. മേല്പറഞ്ഞ എല്ലാ ചോദ്യങ്ങൾക്കും ഉത്തരം ഒന്ന് മാത്രം. 'മനുഷ്യൻ'. പ്രകൃതിയോട് നാം ചെയ്തുകഴിഞ്ഞ ക്രൂരതകളുടെ ഫലമാണ് കൊടും വരൾച്ചകളും പ്രളയവും, മഹാമാരികളും എന്ന തിരിച്ചറിവ് ഉണ്ടാകേണ്ട സമയം എന്നോ അതിക്രമിച്ചിരിക്കുന്നു. നമ്മുടെ സൗകര്യത്തിനും സന്തോഷത്തിനും വേണ്ടി ഈ തിരിച്ചറിവിനെ നാം കണ്ടില്ലെന്ന് നടിക്കുന്നു. അതുകൊണ്ട് തന്നെ ഇതിനു വേണ്ടി എന്തെങ്കിലും ചെയ്യാനും നാം തയ്യാറാവുന്നില്ല. മനഃപൂർവം മറവിയുടെ ഭാണ്ഡക്കെട്ടിൽ ഇവയേയും നാം കുത്തിനിറയ്ക്കുന്നു. ആധുനിക ശാസ്ത്രം തരുന്ന അറിവ് വെച്ച് നോക്കിയാൽ നാം ഉണ്ടാക്കിവെക്കുന്ന വിപത്ത് തിരുത്താൻ ഒട്ടും കഴിയാത്തതും അതീവ ഗുരുതരവുമാണ്. ഒരു ജീവി എന്ന നിലയിൽ മനുഷ്യൻ പ്രകൃതിയിൽ വളരെ അധികം മാറ്റം ഉണ്ടാക്കുന്നു. മനുഷ്യൻ ഉണ്ടാക്കുന്ന ഈ മാറ്റം ആവാസവ്യവസ്ഥായിൽ കണ്ണികളായ എല്ലാ ജീവജാലങ്ങളിലേക്ക് പടരുകയും ചെയ്യുന്നു. മറ്റു ജീവികൾ താങ്കൾ ഉൾപ്പെടുന്ന ഭക്ഷ്യശൃംഖലയുടെ മുറതെറ്റാതെ

പങ്കെടുക്കുമ്പോൾ മനുഷ്യൻ ജീവലോകത്തിലെ കളിയുടെ നിയമം തെറ്റിച്ചു ജീവിക്കുന്നു. ഇതുകാരണം ജീവലോകത്തിനു മുറിവേൽക്കുന്നതിൻ്റെ അളവനുസരിച്ച് ജീവജാലങ്ങളുടെ വംശനാശം സംഭവിച്ചുകൊണ്ടിരിക്കുന്ന. ഒരു ജീവിക്കോ വർഗ്ഗത്തിനോ മാത്രമായി നിലനിൽപ്പ് എന്നൊന്ന് സാധ്യമല്ല എന്നത് മനുഷ്യനുള്ള താക്കീതായി എന്നും നിലകൊള്ളുന്നു.

/kiɳarukaḷum puẓakaḷum vatti tuṭaŋi. paɟɟapp maŋi. poṭijum aẓukkum bʰu:talat̪ te vrəttihi:nama:kkunnu. Na:le:reja:ji kuḷikkan ottiṭṭilla:tta mukʰaprakrutijo:ṭe bʰu:mi viḷari kiṭakkunnu. vallappoẓum oru ila anakkame uḷḷu. Vi:ʃunna ka:ttinə ɟu:ṭə e:re. bʰu:garbʰajalavum vatti varandirikkunnu. itile vi:ʃija ka:tt ent̪e maṭijana:ji ti:rnnu?? Nu:tta:ndukaḷ a:juḷḷa pativukaḷ entə kondə t̪ettunnu??? paristtʰi ma:rumbol i: ɟo:djaŋal urutirijunnat̪ swabʰa:vikam ma: t̪ram. Me:lparaɳɳa ella: ɟo:djaŋalkum utt̪aram onn ma: t̪ram.. manuʂjan. prakrətijo:ṭə na:m ɟeja̱tə kaẓɳɳa kru:rat̪akaḷuṭe pʰalam a:ɳə koṭum varaḷɟakaḷum maha:ma:rikaḷum enna tiriɟɟariv unake:nda samaja̱m enno: atikramiɟɟirikkunnu.nammuṭe saukarjatinum santo:ʂatinum ve:ndi i: tiriɟɟarivine na:m kandillenn naṭikkunnu. atkondə t̪anne itinu ve:ndi ent̪eŋgilum ɟeja̱:num na:m t̪aja̱:ra:vunnilla. Manappu:rvam maravijuṭe bʰa:ɳḍʰakkeṭṭil ivaje:jum na:m kutt̪inirajkkunnu.a:dʰunika ʃa:s t̪ram t̪arunna arivə veɟɟ no:kkija:l na:m unda:kki vekkunna e vipatt tirutt̪a:n oṭṭum kaẓija:tt̪atum ati:va gurut̪aravum a:ɳə. Oru ʃi:vi enna nilajil manuʂjan prakrətijil unda:kkunna ma:ttam valutt̪a:ɳə. manuʂjan unda:kkunna ma:ttam ava:stʰa vjavastʰajil kaɳɳikal a:jiṭṭulḷa ella: ʃi:vaʃa:laŋalile:kk paṭarukajum ɟeja̱junnu. mattə ʃi:vaʃa:laŋal t̪a:ŋgaḷ uḷppedunna bʰakʂjaʃrəŋgalajil murat̪etta: t̪e paŋgeṭukkumbo:l manuʂjan ʃi:valo:kattinte kaḷijuṭe nijamam t̪ettiɟɟu ʃi:vikkunnu. ituka:raɳam ʃi:valo:kat̪inə murive:lkkunnat̪inte alavanusariɟɟ ʃi:vikaḷuṭe vamʃana:ʃam sam bʰaviɟɟukondirikkunnu. Oru ʃi:vikko varggatt̪ino ma:t̪rama:ji nilanilpp sa:dʰamalla ennatə manuʂjanuḷḷa t̪a:kki: t̪a:ji ennum nila nilkunnu./

1. ജീവലോകത്തിലെ കളി തെറ്റിച്ചു ജീവിക്കുന്ന ജീവി ഏതാണ്?

   / ʃi:valo:kattinte kaḷijuṭe nijamam t̪ettiɟɟu ʃi:vikkunna ʃi:vi e: t̪a:ɳə?/

2. പ്രകൃതി മനുഷ്യന് നൽകുന്ന താക്കീത് എന്താണ് ?

   / prakrəti manuʂjanu nalkunna t̪a:kki: t̪ə ent̪a:ɳə?

3. മനുഷ്യന് ഉണ്ടാകേണ്ട തിരിച്ചറിവ് എന്താണ്?

   / manuʂjanu undake:nda tiriɟɟariv ent̪a:ɳə?/

4. ഈ ഖണ്ഡികയ്ക്ക് ഒരു തലക്കെട്ട് നൽകുക

/i: kʰaɳɖikaʝkk oru t̪alakkeʈʈə nalkuka./