

**PHONOLOGICAL AWARENESS  
AND ORTHOGRAPHIC SKILLS IN  
TAMIL SPEAKING CHILDREN**

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*Master's Dissertation as a part fulfilment of M.Sc.  
(Speech and Hearing), submitted to the University of Mysore*

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*May - 2000*



*Dedicated*

*To*

*My Dearest Amma, Dada*

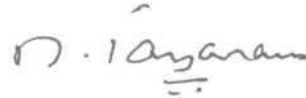
*Kavi, Devi and Ammu*

*with Love*

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# **CERTIFICATE**

This is to certify that this dissertation entitled "*PHONOLOGICAL AWARENESS AND ORTHOGRAPHIC SKILLS IN TAMIL SPEAKING CHILDREN*" is a bonafide work in part fulfilment for the degree of Master of Science, (Speech and Hearing) of the student with *Register No. M 9801*.



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# CERTIFICATE

This is to certify that this dissertation entitled "*PHONOLOGICAL AWARENESS AND ORTHOGRAPHIC SKILLS IN TAMIL SPEAKING CHILDREN*" has been prepared under my supervision and guidance.

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# DECLARATION

This dissertation entitled "*PHONOLOGICAL AWARENESS AND ORTHOGRAPHIC SKILLS IN TAMIL SPEAKING CHILDREN*" is the result of my own study under the guidance of **Dr. K.S. PREMA**, Lecturer in Language Pathology, Department of Speech Pathology, All India Institute of Speech and Hearing, Mysore and has not been submitted earlier at any University for any other Diploma or Degree.

**Mysore**

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## INTRODUCTION

Learning to read is not a natural act (Gouger and Hillinger, 1980). In the recent years a lot of interest is shown in the literature on learning theories, including reading acquisition, that emphasize the importance of the learner's metacognition or the knowledge and control learners have over their thinking and learning activities.

Meritt, (1970) views the process of acquisition of reading, in terms of three levels: acquisition of primary skills, where the child recognises the units, letters or group of letters and associates these with sounds and meanings, intermediate skills, where the child relates to sequences of printed words and symbols to sequences which are familiar in his spoken language and higher order skills, where the child learns to enrich his comprehension skill by evaluating the patterns of thought and respond imaginatively or critically. These three levels of skills are presumed to involve both maturational and learning factors which in turn, lead to skilled reading. Skilled reading is viewed by Frederick sen (1981) as being the result of the successful acquisition of a number of highly automatic component processes that operate together in an integrated and mutually facilitate manner.

Perfetti (1985, 1986) on the other hand, views acquisition of reading at two levels. Basic literacy, which views reading as simply a decoding ability which is more applicable to children learning to read and intelligent literacy, which views reading as thinking guided by print which is more applicable to older children and adults who learn from text.

In English, the alphabetic code is both abstract and complex. Text provides several different levels of cues including letters, context, and structural cues. The mature reader attends to, and interprets all of these simultaneously. One goal of reading instruction is to make the reader aware of each of these cue systems and to provide him or her with the knowledge needed to interpret the available cues.

Letters on the page are a first set of cues - simple letters, letter patterns (Eg: - tion), and even written whole words make cue the reader to the sounds of words provided, the reader has knowledge of the correspondences needed to interpret these cues. Instruction for beginning readers includes teaching them to attend carefully to letter cues as well as, the knowledge of correspondence that is needed to interpret letter cues. While it might appear to be a visual task, decoding places great demands on the phonological system as it requires mapping sounds to letters.

The phonology of a language is the sound system, the way sounds are put together to form meaningful units that are intelligible to speakers.

Phonics is usually described as "Instruction in the relationship between letters and speech sounds". The goal of phonics is not that children are able to state "rules" governing letter - sound relationships. Rather, the purpose is to get across the alphabetical principle, the principle that there are systematic relationships between letters and sounds. Phonics ought to be conceived as a technique for getting children off to a fast start in mapping relationships between letters and sounds.

Phonological awareness is the ability to identify and manipulate the sounds of language i.e., the ability to analyse and reconstruct words from their components, syllables and phonemes. Because phonemes are the units of sound that are represented by the letters of an alphabet, an awareness of phonemes is key to understanding the logic of the alphabetic principle and thus to the learnability of phonics and spelling. This ability, or the lack thereof, may be linked to the literacy levels of at risk young adults. (Welsford, Assistive Technology).

A large body of research indicates that phonological awareness is highly related to early reading ability (Blackman 1989; Wagner and Torgesen 1987). Studies have shown that children with poor phonological awareness have more difficulty learning to read than do children with well-developed speech sound awareness (Bradley and Bryant 1985; Lundberg, Oloffson & Wall 1980; Mann and Liberman 1984; Maclean, Bryant & Bryant, 1987; Stanovich, Cunningham and Crammer 1984). It is argued that a lack of an awareness of the sound structure of language makes it particularly difficult to learn the correspondence between letters and speech sounds they represent (Catts, 1989a; Jorm and Share 1983). This, in turn can result in poorly developed decoding and word recognition skills.

Research suggests that development of phonological awareness and learning to read are reciprocal processes. In other words, it may be that children learn to attend to the abstract sounds of language in the process of learning to read, that leads to further reading development.

Yet another element contributing to good reading ability in the orthographic skills which have been widely researched in the recent years. Orthographic skills is defined as the ability to visually analyse the structure of words. While in alphabetic reading, both the awareness of sounds and the knowledge of orthographic patterns, have been thought as important, in non-alphabetic scripts, there has been a very scanty research.

Orthographic knowledge requires certain pre-requisite skills. First, children need to know how and where to look for salient visual information. Second children must recognise and distinguish between letters. They also need to know how letters work to form words and how spelling patterns are mapped onto meaning and pronunciation.

In short, orthographic processing relies first on visual perception of print and because it requires that children know how and where to look at the print. It is also strongly linked with phonemic awareness through the mapping of sound onto letters, graphemes and syllables, particularly so in the alphabetic scripts.

However, the Indian orthographic system is quite different from English orthography. Tamil is an Indian language which belongs to the dravidian family of languages. Tamil is spoken and written by majority of people in the state of Tamil nadu. The Tamil script dates back to 200 B.C. Tamil is written an alpha - syllabic system like that of other south Asian languages. It derives from the Ashokan Brahmi script (Grimes, 1992).

The Tamil script does not have separate representations / symbols for voiced stops, voiceless aspirated and voiced aspirated stops. There is no representations / symbols for fricatives other than glottal and voiceless alveolar, retroflex and dental sibilants (which are also borrowed from another script used for writing of Sanskrit words) & for many other sounds (such symbols are not necessary for the representation of words) and (Thirumalai 1978) various studies have been conducted in Indian languages related to phonological awareness and orthography. Karanth, (1981,1985) Purushothama (1988), Prakash and Joshi (1989) Nigam (1988), Rekha, (1987), Jayaram (1986) and Prema (1997).

### **NEED FOR THE STUDY**

Over the years extensive research has taken place with respect to phonemic awareness and reading acquisition in alphabetic scripts. However, research studies in non -alphabetic scripts highlight the importance of knowledge of orthographic skills in addition to that of phonemic awareness. Tamil, a South Indian Dravidian language which has an alpha - syllabic script would present an interesting plane for investigation. As there is no published report about the acquisition of reading in Tamil, the present study would serve to enrich our theoretical knoweldge from the perspective of alpha - syllabic script. Thus the study would contribute towards delineating therapeutic intervention procedures for children with reading disability.



### AIM OF THE STUDY:

To identify the relationship between phonological awareness and orthographic skills in Tamil speaking children learning to read and write Tamil.

### HYPOTHESES:

- I. There is no significant relationship between phonological awareness and orthographic skills.
  - a. There is no significant relationship between syllabic awareness and orthographic skills.
  - b. There is no significant relationship between phonemic awareness and orthographic skills.
- II. There is no significant difference in performance of the children from grade III and IV on phonology and orthographic skills.
- III. There is no significant difference between boys and girls of grade III and IV on phonology and orthographic skills.

## **REVIEW OF LITERATURE**

Reading is one of the most prominent features which separates human from other beings. It is a fascinating skill which an individual possesses through which he/she understands the meaning of the printed or written material, intended by the author. The reader too, can contribute to the meaning of the material based on his past experiences.

Reading is a complex process, by nature of which it cannot be defined by a simple definition. An effective and useful reading needs the co-ordination of a variety of skills, which a normal speaker is usually unaware of. Various researchers have defined reading as the "the recognition of printed or written symbols which serve as the stimuli to the recall of meanings built up through the reader's past experience. New meanings are derived through the manipulation of the concepts already in his possession. The organisation of these meanings is governed by the purposes clearly defined by the reader".

Spache and Spache (1972) have attempted to include the processes involved in reading. They define reading as "a skill development, a visual act, a perceptual act, a thinking process and related to cultural background".

### **FACTORS FOR READING**

The process of reading acquisition is very complex because of the interaction of various factors. The investigative reports suggest various factors for the acquisition of reading.

Gibson et. al. (1962) have stressed the usefulness of grapheme - phoneme conversion in facilitating reading. Bradley and Bryant (1985) opined that phonological awareness has been proven to be the crucial precursor for later reading abilities.

In the early stages of language acquisition, children predominantly focus their attention on the content and the use of language: whereas little attention is given to the speech sound structure of the language. However, with development, children gradually come to appreciate this structure. For example, they become explicitly aware that speech is composed of individual words and that words may rhyme or share segments with the other words. They also realise that words are divisible into syllabic and phonemic units. This explicit knowledge about the sound structure of the language is referred to as phonological awareness.

Contrastive to Bradley and Bryant (1983), Naslund (1990) suggested that lexical access influences the reading ability. He studied 169 German pre-schoolers in their general verbal ability, verbal memory span, phonological awareness, lexical access, speed and accuracy and letter knowledge. He found a significant three-way interaction among lexical access, memory capacity and phonological awareness for  $ah^1$  reading measures.

Thus the above studies indicate that the interaction and subsequent effects of these linguistic skills precedes and influences reading acquisition.

Majstereck and Ellenwood (1995) conducted a school based screening procedure in phonological awareness and beginning reading. They

administered experimental phonological systems and analysis task to children in spring preceeding their kinder garten entry. A group of 76 children (39 boys and 37 girls) of End-of-kinder gartens, end-of-first grade, and end-of-second grade. Their results showed that phonological synthesis task (sound blending) was significantly related to most of the interim and outcome measures. The phonological analysis task (rhyme detection) was related to fewer measures of beginning reading.

Thus from all the above studies, it is evident that lexical access, memory capacity, phonological awareness (synthesis and analysis) are some of the factors which facilitate reading.

In addition to the above, Prefetti et. al. (1987) suggest that it is reading which enables the child to analyse words and to manipulate the speech segments. They also state that learning some of the orthographic principles through reading enables the discovery of parallel phonemic principles, where as Ehri et al (1980, 1984; Ehri Wiler and Taylor 1981) argue that phonological knowledge develops from the understanding that the internal representation of print be closely linked with "orthographic images of speech". Ehri emphasizes that the process of acquiring written or print languages is a visuol-spatial analog of speech and that learning spellings as symbols of phonetic realization of underlying phonological representation which influences children's perceptual of discrete phonetic unit in the integration of reading / spelling processes.

Thus from the above it is evident that phonology as well as orthography influences reading and spelling.

In summary, a large number of studies indicate that phonological awareness is related to reading ability and that this relationship is reciprocal in nature. Children appear to acquire some aspects of speech sound awareness as part of their maturation of cognitive linguistic abilities. For most children this includes awareness of rhyme, alliteration and the syllabic structure of words. Variability in this awareness appears to be causally related to reading ability. That is, children with limited awareness of these aspects of language often experience difficulties in learning to read, whereas those with a high degree of sound awareness often excel at reading. Awareness of phonological segments, on the other hand, is significantly influenced by reading experience or instruction. Children who successfully learn an alphabetic writing system become explicitly aware of phoneme sized units and can perform a wide variety of tasks that require the segmentation and are manipulative of these units. Individuals however who are illiterate or who are raised in a culture that does not employ an alphabetic orthography may have very limited explicit awareness of phonemes.

#### PREDICTORS OF GOOD READING

The complex interaction of many factors for reading, though supported by many studies, has been further investigated to trace the factors that could help in the prediction of good reading.

Naslund and Schneider (1996) studied the kinder-garten letter knowledge, phonological skills and memory process and their effects on early literacy. They studied in the kinder-garten children by comparing phonological awareness task to their later literacy performance independent of letter

knowledge for a group of German children. Results showed that the phonological awareness tasks vary in their prediction of later literacy performance, which includes spelling and a variety of reading tasks in the first and second grades.

Similar results were indicated by Mutter et al (1997). Who reported that segmentation, NOT rhyming, predicts early progress in learning to read. Their results indicated that segmentation is strongly correlated with attainment of reading and spelling at the first year at school which was similar to that of Naslund and Schneider (1996). In addition Mutter et al (1997) showed that letter name knowledge predicted both reading and spelling skill besides having an interactive effect with children's segmentation skills. By the end of the second year of school, however rhyming had started a predictive effect on spelling but not on reading.

Prema (1997) studied the metaphonological skills in Kannada (a syllabic script) which indicated that rhyme recognition and syllable stripping approximated the maximum by grade III students, whereas the scores on syllable oddity (words and non-words) were far below the scores on phoneme stripping and phoneme oddity task being the lowest. Results of the orthographic principles (ie both oral and written mode) indicated that majority of the children from higher grades were able to grasp the principle but the poor readers failed to adapt the principle in the written mode, she also reported of adoption of vowel from other scripts (English and Hindi) while responding to test of orthographic skills in the written mode.

The studies in various languages with different scripts, however are not in consonance with respect to the predictors of good reading. The equivocal results suggest that the factors for prediction of good reading may not be the same for all languages and scripts.

## **PHONOLOGICAL AWARENESS AND READING IN ALPHABETIC SCRIPTS**

The relationship between phonological awareness and reading ability appears to be one in which causation is bidirectional. That is phonological awareness may be both an antecedent of reading development and a consequence of reading experience.

The investigative efforts of Haskins reading research group has led to the conviction that the difficulty of most, though not all children who have problems in learning to read is basically linguistic in nature and not visual or auditory or motor (Lieberman and Mann, 1981).

Elkonin 1963, 1973, Mattingley 1972; Shankweiler and Liberman 1972; 1976; Liberman et al 1971; 1980; they have explained about the necessity of phonological awareness by stressing that reading process is dependent on the ability to analyze the sound structure of spoken words into component units (phonemes) and to blend these units in creating the sounds of syllables which are basic units of reading. On the other hand, Tunmer and Fletcher (1981) commented that the child's fundamental task of learning to read is to discover how to map the printed text onto his/her existing language, a task which requires the ability to deal explicitly with the structural features of the

spoken language. Therefore they commented that the metalinguistic ability (i.e., it is the way that children learn to identify words by the phonological level of representation captured in alphabetic orthographies) reflects upon language and is an important pre-requisite for spoken language which are central correspondences to its written form. They found no direct relationship between phonological awareness and reading ability. They found that phonological awareness was necessary but not a sufficient condition for being able to read synthetic words.

Thus it is evident that phonological awareness is a pre-requisite for being able to learn grapheme-phoneme conversion levels, the knowledge of which is strongly related to reading ability particularly so for alphabetic scripts.

### **PHONOLOGICAL AWARENESS AND READING IN NON-ALPHABETIC SCRIPTS**

Read, Zhang Nie and Ding (1986) have shown that some aspects of phonological awareness do not seem to be the natural result of maturation but rather the consequence of learning an alphabetic orthography. Without this instruction, individuals may gain only minimal explicit awareness of phonemic units. This is supported by Morais, Bertelson, Cary and Alegria (1986) who investigated the ability of illiterate portugese adults to add delete, and reverse the phonemes of real and nonsense words. They found that illiterate subjects performed significantly poorly on phoneme segmentation tasks. Out demonstrated syllable segmentation skills and rhyme awareness. Similar findings are reported by Read and Ruyter (1985) who investigated illiterates in U.S.A. In another study Read et. al. (1986)



examined the ability to add or delete phonemes from spoken syllables in two groups of Chinese adult literates - one group trained only in logographic reading and the other learnt a supplemental alphabetic system. Results indicated that the subjects who had learnt an alphabetic system had more advanced skill in phoneme segmentation than those who knew only the traditional logographic system. These results suggest that instruction involving a phonologically based writing system promotes phonological awareness and not just any reading instruction.

Nigam (1988) examined the effect of literacy on speech segmentation tasks in Hindi (syllabo - alphabetic script). Speech segmentation ability among illiterates and literates was studied through different segmentaion tasks.

The results of his study showed that illiterates performed poorly on phoneme oddity, syllable stripping and phoneme stripping as compared to literate subjects. However no significant difference between literate and illiterates was found in the task of recognizing rhyme.

Performance on syllable stripping was found to be better in both group. The author concluded that *"SYLLABLE MANIPULATION CAN BE DEVELOPED WITHOUT ANY SPECIFIC READING INSTRUCTION WHERE AS IT CAN BE FURTHER DEVELOPED BY SPECIFIC READING INSTRUCTION; WHEREAS PHONEMIC AWARENESS REQUIRES INSTRUCTION ON EXPERIENCE OF ALPHABETIC ORTHOGRAPHY"*.

In contrast to the above studies Mann (1986) showed that Japanese children not exposed to alphabetic writing could successfully perform phonemic segmentation tasks by the time they entered the fourth grade. This finding is attributed by Morais (1991a) to some of the phoneme like features of the Japanese syllabary system. Morais claims that the entire writing system need not be alphabetic for the development of phonemic awareness. A non alphabetic writing system would allow such a development to a certain degree depending on the specific orthographic features present. This premise is further supported by Prakash et. al. (1993) who conducted a series of studies-first in the early stages of literacy in Kannada (a Indo-Dravidian language), second comparison of performance on phonological awareness tasks by Hindi (Indo-Aryan language) unilliterates and illiterates and the third, comparison of the performance of Kannada unilliterates and Kannada-English literates. On the basis of these 3 studies they concluded that one's ability to manipulate the structural features of language is facilitated by literacy in general and by the features of the script employed in particular.

A cross cultural study in American and Japanese children by Mann (1986) showed that in contrast to the American first graders who tend to be aware of both syllables and phonemes, almost all first graders in Japan were aware of mora (phonological unit roughly equivalent to syllables) but relatively few were aware of the phonemes. This difference could be attributed to the fact that Japanese first graders learn syllabary whereas American first graders learn to read alphabet. Cossu et al (1987) in a comparative study of English and Italian children found a discrepancy in the scores of segmentation ability which seemed to reflect phonologic and orthographic differences between the languages.

Rekha (1987) did not find phonological awareness as an important factor in children learning to read Kannada children which presents a semi-syllabic script. She concluded that children, who are exposed to syllabic a semi-syllabic scripts thus can become proficient readers without being good in phonological segmentation task.

The foregoing review suggests that the nature of the relationship between whether phonological awareness and learning is a precursor to or a result of learning to read an alphabetic script, in particular, or is the relationship a reciprocal one ? Some researchers believe that it is a pre-requisite to reading (Elkonin 1973; Liberman et al, 1977; Bradley and Bryant 1983). Others believe that it is a consequence of learning to read (Morais et al 1979; Liberman and Mattingly 1985; Read et al 1986) two other positions take the middle ground regarding the relationship of reading and metaphonological knowledge. One suggests that metaphonological skills and reading interact i.e., the relationship is a reciprocal one (Ehri 1979; Bryant and Goswami 1987; Prefetti, Beck, Bell and Hughes 1987). The other middle position considers the possibility that these skills correlates not because one causes, the other but because both rely on a common underlying cognitive ability (Hakes, 1980).

### **EFFECT OF TRAINING IN PHONOLOGY ON READING**

The equivocal findings on the role of phonological awareness in reading has led to a number of studies on children with reading disability. Several studies have attempted to train normal children and those with reading disability on phonological awareness skills to see its effect on reading.

Lieberman et al (1974) found that in a sample of four, five and six year olds, none of the nursery age children could segment phoneme, where as half managed to do syllable segmentation. At six, 90% of the children were able to do syllable segmentation, only 70% were successful with, phoneme segmentation.

It is evident that awareness of phoneme segments is harder to achieve as compared to awareness of syllable segments.

Savin (1972) viewed that children who failed to read even the simplest prose by the end of the first grade has been unable to analyze syllables into phonemes and he categorized them as the following:

1. Those children who are insensitive to rhymes.
2. Children unable to learn piglatin which requires one to modify English and shifting the initial consonant cluster (Part of a syllable) of each word to the end of the word and then add to the sound 'ey'.
3. Those children who are unable to analyse syllables into phonemes. However able to segment speech.

Rosner (1979) included a 13 item which required deletion of initial medial and final sounds, first at the syllable level (eg: say, picnic, now say without nic) and then at the phoneme level (eg: say coat, now say without 'C'). He found that good readers scored slightly higher on this test.

Thus, the review suggests that primary literacy skills such as reading and writing demands children to exercise their ability to deal explicitly with the structural features of the spoken language while deciphering the print. There are numerous studies reported over the last decade which suggest that poor readers in contrast to normals are reported to be deficient in use of morphology and syntax, and poor in phonemic analysis, structural ambiguity detection, grammaticality judgement, synonymy judgement, message consistency judgement etc., (Fletcher et al 1981).

Nevertheless, it is phonological awareness which caught utmost interest among the researchers because of its intimate yet intricate relationship with learning to read and write. Phonological awareness which includes awareness of phonological strings (awareness of phonological length, sound similarity' etc.) awareness of syllables, awareness of phonemes (also called segmental awareness) and awareness of phonetic features (Morais et al. 1987) is considered to be a bridge between language and literacy (Morais, 1989). However, among the researchers in the field there are divergent views with regard to the nature of relationship i.e., whether phonological awareness is a pre requisite (for learning to read), a facilitator or a consequence of learning to read and write. Adding to this, there is controversy about the consequences and constraints different writing systems. A non-alphabetic writing system while not requiring or facilitating phonological awareness to the same extent as alphabetic scripts may allow development of phonological awareness to a certain degree depending on the specific orthographic features present which favour such an awareness.

The studies in general reveal that the children with reading disability are poor in their phonological skills.

### **ORTHOGRAPHY AND READING**

Orthography refers to the role of a writing system. Earlier the writing system were in picture form. Presently writing system has been classified into 3 types of writing systems based on their level of representation. They are 1. Ideography 2. Syllabary 3. Alphabetic. Ideographic scripts such as Chinese represents the language at morphemic level, syllabaries like Kana at syllabic level and alphabetic like English at morpho-phonemic level. (Ellis 1984).

Carello and Turvey (1985) from their study have concluded that the relationship between script and speech differs among the various orthographic categories. It is generally assumed that alphabetic script puts the heaviest and ideographic the least while the syllabary poses an optimal level of demand on readers.

Gokani (1992) studied the orthographic factor in phonological awareness with relation to reading in both English medium childrens and in Gujarati medium childrens. They were administered the following test.

- > Listening comprehension.
- > Word reading test (for English medium)
- > Word recognition test ( for Gujarati medium)
- > Measures of phonological awareness

for rhyme recognition, Syllable stripping and Phoneme stripping.

Results indicated that there was no significant difference in the speech segmentation ability as a whole of children exposed to either alphabetic or semi-syllabic script. Rhyme recognition for 2 groups were almost similar significant difference in phoneme stripping task between English and Gujarathi medium children in favour of the English medium children. This indicates that such phoneme level tasks are sensitive to orthographic variations. Word reading and speech segmentation ability were highly correlated for English medium children. Correlations between these tasks is low to moderate or even negative at times for Gujarathi medium children.

Fukuzawa and Prakash (1993) carried out a study on development of reading proficiency as related to childrens metalinguistic awareness and cognitive processing skills. Also to find out whether orthography interacts with instructional process ? They took 180 children learning to read Oriya an Indian language belonging to Grade I, III, and V. They were administered two tests of reading achievement (oral reading and reading comprehension) and Raven's colored progressive matrices. Results indicates that oral reading performance and reading comprehension did not develop simultaneously, though they were positively related to each other in all the grades. The children, in their literacy acquisition process, seemed to follow two successive stages: phonemic (syllabic) decoding alone and phonemic decoding plus comprehension, which were otherwise not considered as two distinct stages of the acquisition process. The interaction between the nature of orthography and instructional process was supported.

Caravolas and Bruck (1993) studied the effect of oral and written language input on the development of phonological awareness in 4,5 and 6 year old children. The abilities of czech and English speakers were contrasted because these two languages differ considerably both with respect to syllable structure (oral language) and in orthographic depth (written language). Results revealed that czech children do possess higher levels of awareness of complex onsets than English. English children showed better awareness of simple onsets than the czech children on the oral task. Results suggest that the early development of phonological awareness is shaped to some extent by aspects of the phonology and the nature of the orthography additionally impacts on the rate and pattern of development of phonological awareness and literacy skills.

Badian (1998) studied the phonological and orthographic skills in the prediction of reading in two cohorts of children to determine whether tests of phonological awareness (syllable tapping), orthographic processing (visual matching), and serial naming speed (RAN objects), added to a pre school battery, would improve prediction of reading. Sentence memory, visual matching and colour naming together yielded an 87% to 90% hit rate in predicting which individual children would be poor or good readers. The orthographic and serial naming speed tasks were useful additions to pre-school predictive battery, but recommendations were that alternative pre-school phonological tasks, not based on syllable recognition, should be used to predict reading.



The studies on non - alphabetic scripts, however, suggest that the features of orthography play an important role in the acquisition as well as prediction of reading.

## **READING ACQUISITION IN ALPHABETIC SCRIPT**

The complexity involved in the process of reading acquisition has stimulated researchers to attempt modelling reading acquisition from varied perspectives. A few developmental models are detailed below which is concerned with the acquisition of reading.

### **Chall§ Model:**

Chall§s Model(1983) conceptualizes reading development in terms of stages.

*Stage-0:* A pre-reading or emergent reading stage which begins during the preschool years and lasts until the children are able to read print independently. During this time, children learn to comprehend and produce spoken language. Emergent readers are ready to enter the next stage when they are familiar with the letter names and acquire phonemic segmentation skill.

*Stage-1:* An initial reading or decoding stage where the children learn to understand how the spelling system represents spoken language. They learn how letters symbolize phonemes and how to convert a sequence of letters into a pronounced word. They also learn to generate plausible spellings of words.

**Stage-2:** A fluency stage where children become skilled performing the various reading operations learned at stage-1 i.e., decoding unfamiliar words, reading known words with greater speed, co-ordinating word-reading operations with text comprehension. An important contributor to development at this stage is practice.

**Stage-3:** A reading to learn stage wherein the children gain sufficient skill performing the mechanics of reading. This enables them to read well enough to comprehend more difficult material whose ideas are unfamiliar. At this stage, the amount of reading that students do becomes a major determiner of differences that distinguish good from poor readers(Juel, 1988).

### **Friths Model:**

Frith (1985) proposed a model of learning to read and spell. She used Marsh's framework. The development of literacy according to Frith involves three phases in series of six steps. The three phases are identified with three strategies called Logo graphic, Alphabetic and Orthographic.

**Logographic Stage:** This is the initial stage in which children identify single words by specifically visual properties. Salient graphic features act as important cues in this process. Letter order is largely ignored and phonological factors are entirely secondary. Child guesses on the basis of contextual or pragmatic cues.

***Alphabetic Stage:*** Here children are capable of using procedures for mapping letters onto sounds with the knowledge and use of individual phonemes and graphemes and their correspondences. It is an analytic skill involving a systematic approach i.e., decoding grapheme by grapheme.

Letter order and phonological factors play a crucial role. This strategy enables the child to pronounce (though not correctly always) novel and non-sense words.

***Orthographic Stage:*** The child identifies words via analysis of their abstract orthographic structure. Orthographic units coincide with morphemes. They are internally represented as abstract letter-by-letter strings. These units make up a limited set (in loose analogy-syllabary) that can be used to create an unlimited number of words. This differs from the alphabetic stage in that the recognition of the word can follow directly from the orthographic analysis without requiring an intermediate phonological translation.



The six-step model of skills in reading and writing acquisition (Frith, 1985) is depicted in Table-AA






**Table AA****Steps in reading Acquisition (Frith, 1985)**

STEP	READING	WRITING
1a	Logographic 1	(Symbolic)
1b	Logographic 2	Logographic 2
2a	Logographic 3	Alphabetic 1
2b	Alphabetic 2	Alphabetic 2
3a	Orthographic 1	Alphabetic 3
3b	Orthographic 2	Orthographic 2

**TAMIL ORTHOGRAPHY**

Tamil is a language of the Dravidian family of languages, mainly spoken in South India and Srilanka. Speaker's of Tamil are found in several South East Asian and African countries as well, notably in Malaysia and Singapore where this language has some official status and patronage also. Tamil has several regional and social dialects but the written form of the language is used for all the formal purposes. (Both at the speaking and writing levels).

Tamil is written in an alpha-syllabic system like that of south Asian languages. It is derived from the Ashokan Brahmi script. Vowels have two forms, one used at the beginning of a word, for ex:  - /a/ as in case of /amma/ - , another used following consonant symbols.

For ex:  - /ka/ as in case of /kalai/ - . Each consonant graph symbolizes the consonant plus following vowel "a" for ex: /k/ + /a/ = /ka/ /  / + /  / = /  /. When another vowel is used the vowel "a" is

suppressed i.e., when /k/ + /a/ + /a/ = /ka:/- / க் / + /அ / + /அ / = /கா/ consonant symbols with a diacritic are used to represent just the consonant itself. (Steever 1987: 734)

Tamil like other Dravidian languages, is an agglutinating language in which morphemes are transparently separable and analyzable affixes which are attached to roots or stems; such affixes in Tamil are nearly always suffixal. Words are made up of lexical roots: or stems (roots that have been expanded by a derivational suffix), followed by inflectional suffix (es) which mark such categories as, for example, person, number, mood, tense, etc.,

Tamil script does not have separate representations/symbols for voiced stops, voiceless aspirated and voiced aspirated stops and no representation / symbols for fricatives other than glottal, and voiceless alveolar retroflex and dental sibilants (which are also borrowed from another script used for the writing of Sanskrit words), and for many other sounds, (such symbols are not at all necessary for the representation of nature words). Thus, international vocabulary would undergo a lot of changes in the process of their graphemic representation in Tamil script so much so that a reading pronunciation of these items, when one follows faithfully the reading conventions adopted for the Tamil script, would not be understood by a non Tamil scientist even when that non - Tamil scientist is familiar with or a user of the international vocabulary.

In Tamil only humans are classified with regard to their natural gender, masculine or feminine. Their body parts are treated in neuter gender. All

non-humans, animate and inanimate objects are referred to in neuter gender. Technical terms, thus, fall generally into the category of neutral gender. In Tamil, the finite verb is inflected for person, gender and number. Accordingly when a technical term occurs in the subject position in a Tamil sentence, the corresponding verb will be suitably inflected.

### **NEED FOR THE STUDY**

**Over** the years extensive research has taken place with respect to phonemic awareness and reading acquisition in alphabetic scripts. However, research studies in non alphabetic scripts highlight the importance of knowledge of orthographic skills in addition to that of phonemic awareness. Tamil a South Indian Dravidian language which has a alpha-syllabic script would present an interesting plane for investigation. As there is no published report about the acquisition of reading in Tamil, the present study would serve to enrich our theoretical knowledge from the perspective of alpha -syllabic script.

## **METHODOLOGY**

To identify the relationship between phonological awareness and orthographic skills in Tamil speaking children. Tests for phonological awareness and orthographic principles were administered, on 40 children from in Tamil medium in from Grade DI and Grade IV.

### **I. DATA COLLECTION**

The study was carried out in Tamilnadu (Chennai), where majority of them are Tamil speakers. The children were selected on the basis of principle of randomization from the attendance register. The testing was conducted in the school premises in a quiet condition. Rapport was established with each subject prior to test administration. Testing was completed in a single session. The average time taken for administration ranged from 30 minutes to 1 hour. Tangible reinforcement (sweets) was given to each subject after the completion of the test.

### **II. CRITERIA FOR SELECTION**

The following are the criteria for selection of children.

- > Native speakers of Tamil language.
- > Children studying in Tamil medium.
- > Normal with respect to hearing, language, intelligence, and behaviour as per the screening report of a qualified speech and language pathologist.

- > Children from Grade III and grade IV.
- > No family history of Reading disability.
- > No history of failures
  
- > No history of significant medical or psychological problems.

### III. TABLE 1

#### SUBJECTS

GRADE	SEX	NUMBER	TOTAL
<b>in</b>	Males	10	20
	Females	10	
IV	Males	10	20
	Females	10	
TOTAL			40

### IV. TESTS

#### I. TESTS FOR PHONOLOGICAL AWARENESS

1. Rhyming - Non Rhyming (RNR)
2. Phoneme Oddity (PH.ODD)
3. Phoneme Deletion (PH.DEL)
4. Syllable Deletion (SY.DEL)
5. Syllable Reversal (SY.REV)
6. Syllable Oddity (SY.ODD)



## II. TESTS FOR SENSITIVITY TO ORTHOGRAPHIC PRINCIPLES

1. Through oral mode (Oral)
2. Through written mode (Writ)

The tests used for assessment of phonological skills are listed below.

**Table 2: Items for Phonological Tests**

Sl.No.	Tests	No. of Items	Maximum Score
1.	Rhyming / Non-rhyming	12 pairs	12
2.	Syllable deletion	12	12
3.	Syllable oddity	12	12
4.	Syllable reversal	12	12
5.	Phoneme deletion	12	12
6.	Phoneme oddity	12	12

**Table 3 : Items for Orthographic Skills.**

Sl.No.	Tests	No. of Items	Maximum Score
1.	Oral mode	16	16
2.	Written mode	16	16

**Rhyme Recognition:**

12 pairs of rhyming and non-rhyming words with CVCV configuration were selected. The pairs of words are presented orally to the children. They were asked to identify whether the paired words were rhyming or Not. (Eg: janai -panai)

**Instruction:**

"I will say two words together. Listen carefully, you should tell me whether the pairs of words sound similar or not.

**Total Score: 12**

**Syllable Deletion:**

12 words of CVCVCV type were presented orally to the children. The children were asked to delete a syllable indicated by the tester and say the rest of the word. (For eg: rasati - rasa)

**Instruction:**

"I will say a word. You are required to remove a small part of the syllable that I indicate and say the rest".

**Note:** As the children did not understand the instructions on analogy to the required task was indicated through demonstration using pieces of chalk. Eg: 3 pieces for 3 syllable was taken and each piece was said to represent syllable of a word, and the child was asked to delete a particular syllable and say the remaining.

**Total Score: 12**

**Syllable Oddity:**

12 sets of four words each with CVCVCV configuration were presented orally to the children. The children were asked to identify the particular word that did not belong to the set. Specific instruction was given to listen to the sound aspect of the word matter than paying attention to the meaning.

(Eg: tannir, pannir, Ved/m, kannir)

**Instruction:**

"I will say four words together. Listen carefully you should try to attend to the sound aspect of the words and not to the meaning of the words. Among the set of four words, only one word does not match the group". You should identify (or name) the one that does not belong to the set.

**Total Score: 12**

**Syllable reversal:** 12 words of CVCVCV type were presented orally. One by one the children were asked to reverse the syllable of each word and say it out. (Eg: Pora: mai - mai ra:po)

**Instruction:**

"I will say a word, you are requested to reverse the syllable and say it".

**Total Score: 12**

**Phoneme Deletion:**

12 syllabic words of CVCV type were presented orally to children. They were asked to listen to the words and delete a sound of each word which was indicated by the tester and say the rest.

(Eg: kuvə! – u və!).

**Instruction:**

"I will say a word, listen carefully. You are requested to removed a sound of the word that I indicate and say the rest".

**Total Score: 12**

**Phoneme Oddity:**

12 sets of four non-words each with CVCV configuration were presented orally to the children. They were asked to listen to the non-words and choose the one that did not belong to the set.

(Eg: pamai; pall;,para, samu)

**Instruction:**

"I will say four non-words. Listen carefully. You should try to attend to the sound aspect of the non-word that you hear. Among the set, only one does not match the group. You should identify (or name) the one that does not belong to the set.

**Total Score: 12**

### SHWA TEST:

Children's sensitivity to the underlying phonemic/alphabetic principles of the Tamil syllabary, was tested by adapting SHWA test with necessary modifications developed by Karanth and Prakash (1996). This test requires the child to combine a given vowel with a phoneme represented by a visual syllable (grapheme) both of which do not exist in the particular orthography. For example, a child would be asked to combine vowel /i/ with the phoneme /zhl/. The visual symbol (grapheme) of which would be represented as A3/, which is non-existent in Tamil script. The child is required to say the new syllable and also write the same. This particular test is observed to be a sensitive test to check whether a given child has a grasp of the orthographic rules.

In its original form, SHWA test incorporated five symbols and 8 vowels. Also it was administered as a test for writing.

Prema (1997) modified the original test to test children learning to read Kannada by including four symbols, two of which resembled Kannada grapheme and the other two did not. She used five short vowels (a,e,i,o,u) for combining with the syllables instead of 8 vowels.

In the present study the test was modified as follows:

1. The test item consists of two symbols, which do not exist in Tamil script.

2. The representative imaginary phonemes of the symbols were chosen from other south Indian languages.

/ʒ/ - /Z<sup>h</sup>/

/k/ - /K<sup>h</sup>/

3. Four short and four long vowels were chosen for combining with the symbols. (a,i,o,u) & (a:, i:, o:, u:)
4. The responses were elicited in both oral and written modes. Initially without model as the subjects did not understand the task, one illustration was given.

All the children were administered the test individually. The children were asked to combine the given vowel with the new phoneme and form a new syllable. The oral responses were recorded in the response sheet. Later, the children were asked to write down the new syllables by making use of the new symbols. The written responses were filed. If the child failed to give either an oral response or the written response, one illustration was given for the first symbol in combination with /a/. The oral and written responses with the model were recorded in the response sheet.

### **Instruction:**

#### **ORAL MODE:**

"I will teach you a new sound that does not exist in Tamil. I want to see now well you learn. I say / Z<sup>h</sup>/ now you tell me what happens when you combine / Z<sup>h</sup>/ with /u/ ?

Similar instructions were given for the other grapheme / K<sup>h</sup>/ in consideration with /a/, /i/, /o/, /u/.

**Total Score: 16**

**WRITTEN MODE:**

"can you show me how we can write what ever that you said just now by making use of the new symbol ?". One illustration was given to ah<sup>1</sup> the children for the first symbol in combination with /a/, for the written mode as the children failed to understand the task.

(1)  (2) 

**Total Score: 16 (Two graphemes and 8 VOWELS).**

The raw scores on tests of phonological awareness and orthographic skills were tabulated in the data entry sheet prepared by the tester. The raw data were computed and statistically analysed.

## RESULTS AND DISCUSSION

In order to investigate the relationship between phonological awareness and orthographic skills in an alpha-syllabic script, 40 children studying in Grade-III and IV in Tamil medium school were given tests of phonological skills and orthographic skills. The raw data was subjected to statistical analysis.

### QUANTITATIVE ANALYSIS

#### A. Mean and SD Scores

##### I. Tests for Phonological Awareness:

Six tests were administered for the assessment of phonological skills. Means and standard deviation, (S.D) scores were computed. A comparison of the means and SD's across grades is presented in Table-4 and across sex is presented in Table-5.

##### a. Rhyming non-rhyming Test:

Of the six tests for phonological awareness rhyming non-rhyming task was found to be the easiest, as the mean scores of both the grades approximated the maximum of 12 (Grade III = 8.50: Grade.IV = 8.65). The S.D. scores (Gr. III = 2.32: Gr. IV = 1.98) are suggestive of higher variability in Grade III (Table - 4: Figure 1 and 2). Table - 5 and figures 3 & 4 indicate that the mean scores of boys was 8.20 and that of girls was 8.95 for a maximum of 12. The scores suggest that the performance is almost approximating the



maximum. The girls performed better than the boys, and also were more stable. (S.D of boys 2.35 girls 1.87).

**b. Syllable Deletion Test:**

The mean scores on syllable deletion for Grade III was 5.10 and Grade IV was 4.55 for a maximum of 12 (Table -4, Figures 1 and 2). Although, the performance of the children is less than 50% of the maximum, Grade-III, Children were slightly better than that of Grade-IV, but were highly variable in their performance. (S.D. of Grade. III = 3.14; Grade-IV = 2.39).

The mean scores of boys on syllable deletion was 5.65 and girls was 4.0 (Table 5, Figure 3 & 4) for a maximum of 12 suggesting that the performance of boys was better and more stable than the girls. (S.D of boys 2.32 and girls 2.99).

**Table 4:**  
Mean \* and SD of Grade III and Grade IV Children on Phonological Awareness Tests

Sl. No.	Variables	Grade III		Grade IV	
		Mean	SD	Mean	SD
1.	RNR	8.5000	2.328	8.6500	1.981
2.	Sy. Del	5.1000	3.144	4.5500	2.395
3.	Sy. Odd	4.6000	2.854	4.6000	2.349
4.	Sy. Rev	3.7500	3.492	3.9000	2.292
5.	Pho Del	3.4000	2.415	4.2000	2.238
6.	Pho Odd	3.7500	2.653	4.4000	2.415

*Scores for a maximum of 12*

RNR :	Rhyming-Non-Rhyming	Sy Odd:	Syllable Oddity
Sy.Del:	Syllable Deletion	Sy. Rev:	Syllable Reversal
PhoDel:	Phoneme Deletion	Ph Odd:	Phoneme Oddity

**Table 5:**  
Mean \* and SD of Boys and Girls on Phonological Awareness Tests

Sl. No.	Variables	Boys		Girls	
		Mean	SD	Mean	SD
1.	RNR	8.2000	2.353	8.9500	1.877
2.	Sy. Del	5.6500	2.323	4.0000	2.991
3.	Sy. Odd	5.0500	3.017	4.1500	2.033
4.	Sy. Rev	4.7500	2.900	2.9000	2.693
5.	Pho Del	4.5000	2.351	3.1000	2.150
6.	Pho Odd	4.6500	2.996	3.5000	1.850

\* Scores for a maximum of 12

**c Syllable Oddity Test:**

Although the mean scores on syllable oddity for Grade III and Grade IV was same i.e., 4.60 [Table-4: Figures 1 & 2 ] for a maximum of 12. Children from Grade III were slightly more variable than the children from Grade IV as indicated by their S.D. scores (Grade III, 2.85; Grade IV = 2.34).

The mean scores of boys and girls on syllable oddity was 5.05 and 4.15 for a maximum of 12 [Table-5; Figure 3 & 4] suggesting that the performance of boys was better than the girls, but was more variable as indicated by the S.D. scores [Boys = 3.01; Girls = 2.03].

**Figure-1**  
**Mean and SD of Grade III Children on Phonological Awareness**  
**Test**

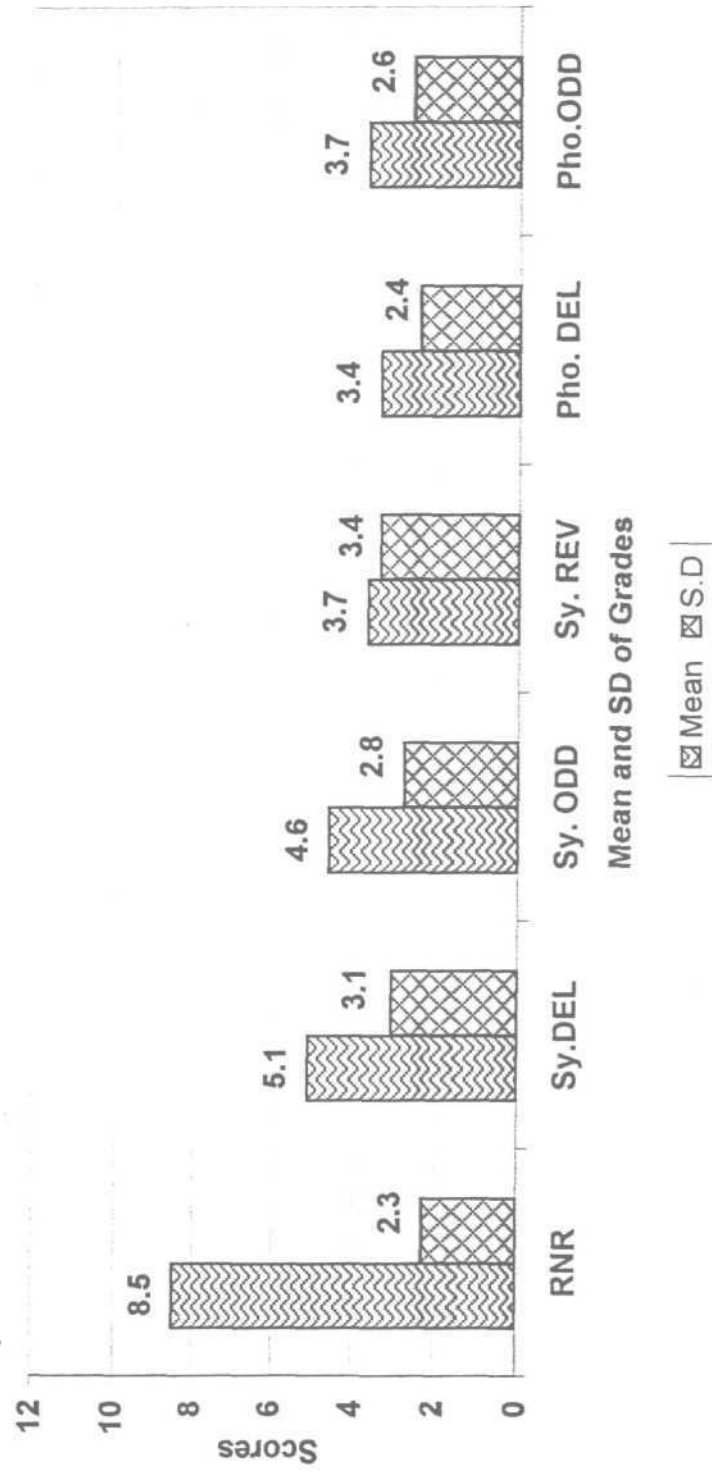
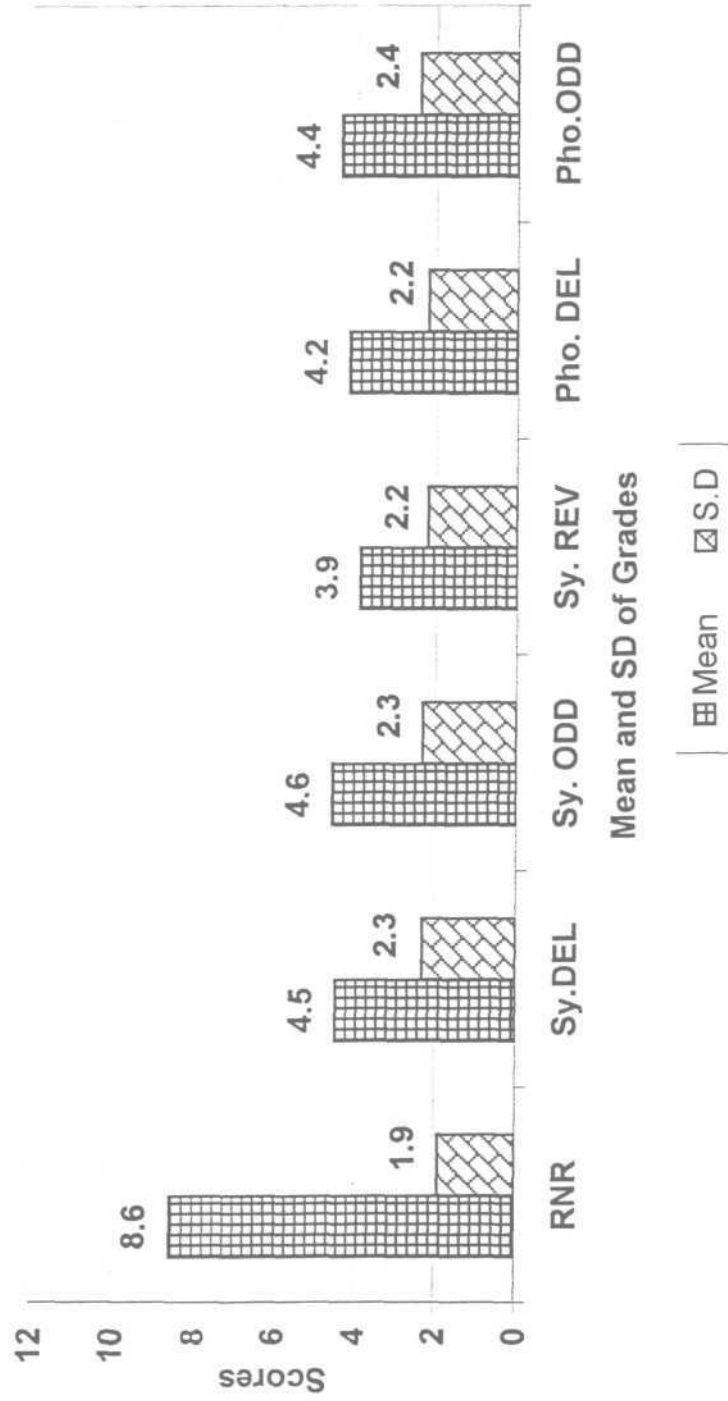


Figure-2  
 Mean and SD of Grade IV Children on Phonological  
 Awareness Test



**d. Syllable Reversal Test:**

Although not much difference was noted in the mean scores on syllable reversal (Grade III = 3.75; Grade IV = 3.90 in Table 4: Figure 1 & 2). The children from Grade III were found to be more variable than those from Grade IV (S.D. of Grade III = 3.49; Grade IV = 2.29).

The mean scores of boys and girls on syllable reversal was 4.75 and 2.90 respectively (Table - 5, Figure 3 & 4) for a maximum of 12 suggesting that the performance of the boys was better than the girls. However, the boys showed higher variability in their performance (S.D. of boys = 2.90 and girls = 2.69).

**e. Phoneme Deletion Test:**

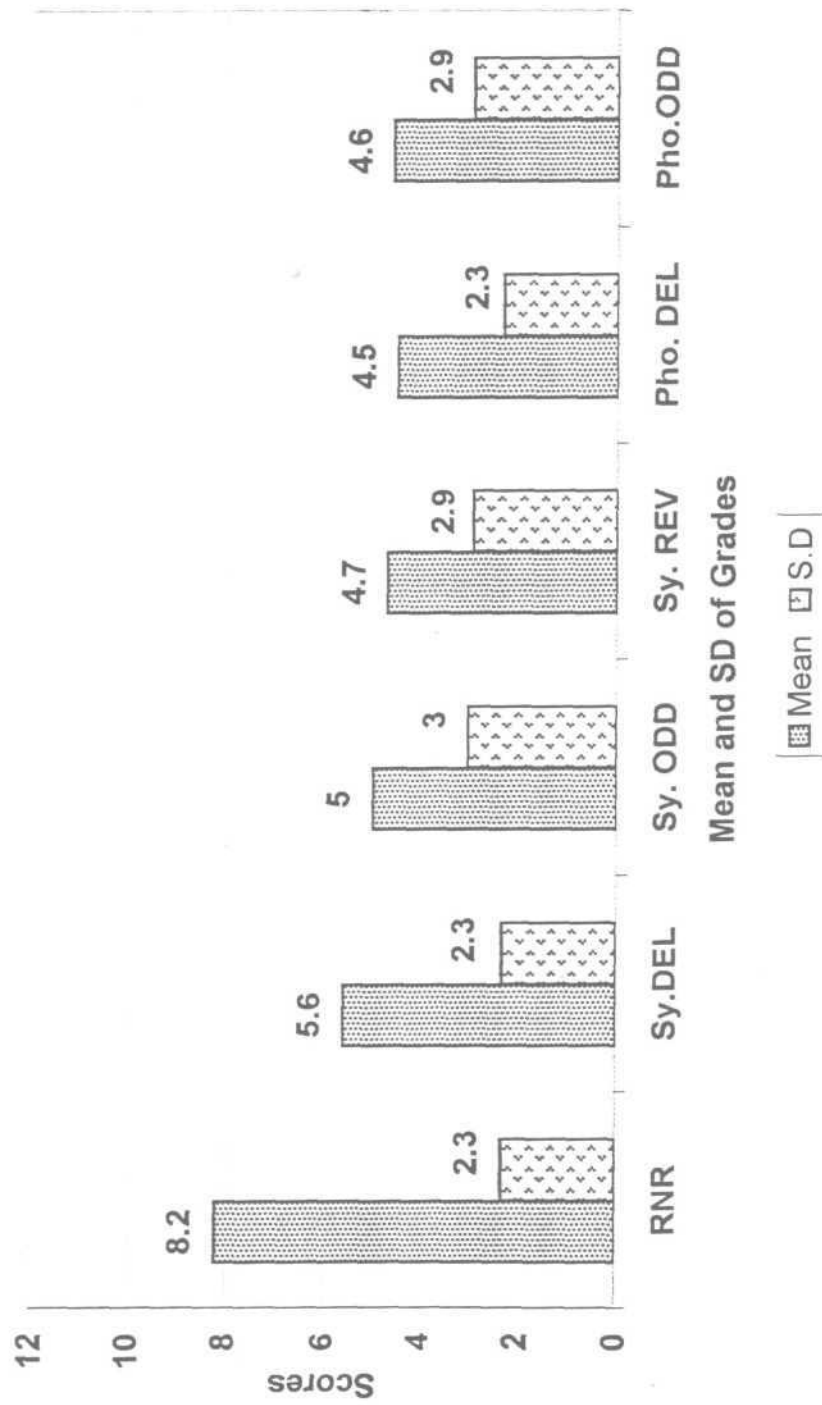
The mean scores on phoneme deletion for Grade III and 3.40 and Grade IV was 4.20 (Table -4; Figure 1 & 2) for a maximum of 12 suggesting that the Grade IV children performed better than the Grade HI children. They were also more stable (S.D. of Grade IE = 2.41: Grade IV =2.23).

Although the performance of boys were better than the girls. (Mean scores of boys = 4.50; Girls = 3.10 in Table 5 and figure 3 & 4) higher variability in their performance is indicated by their S.D. scores (S.D of boys = 2.35; Girls = 2.15).

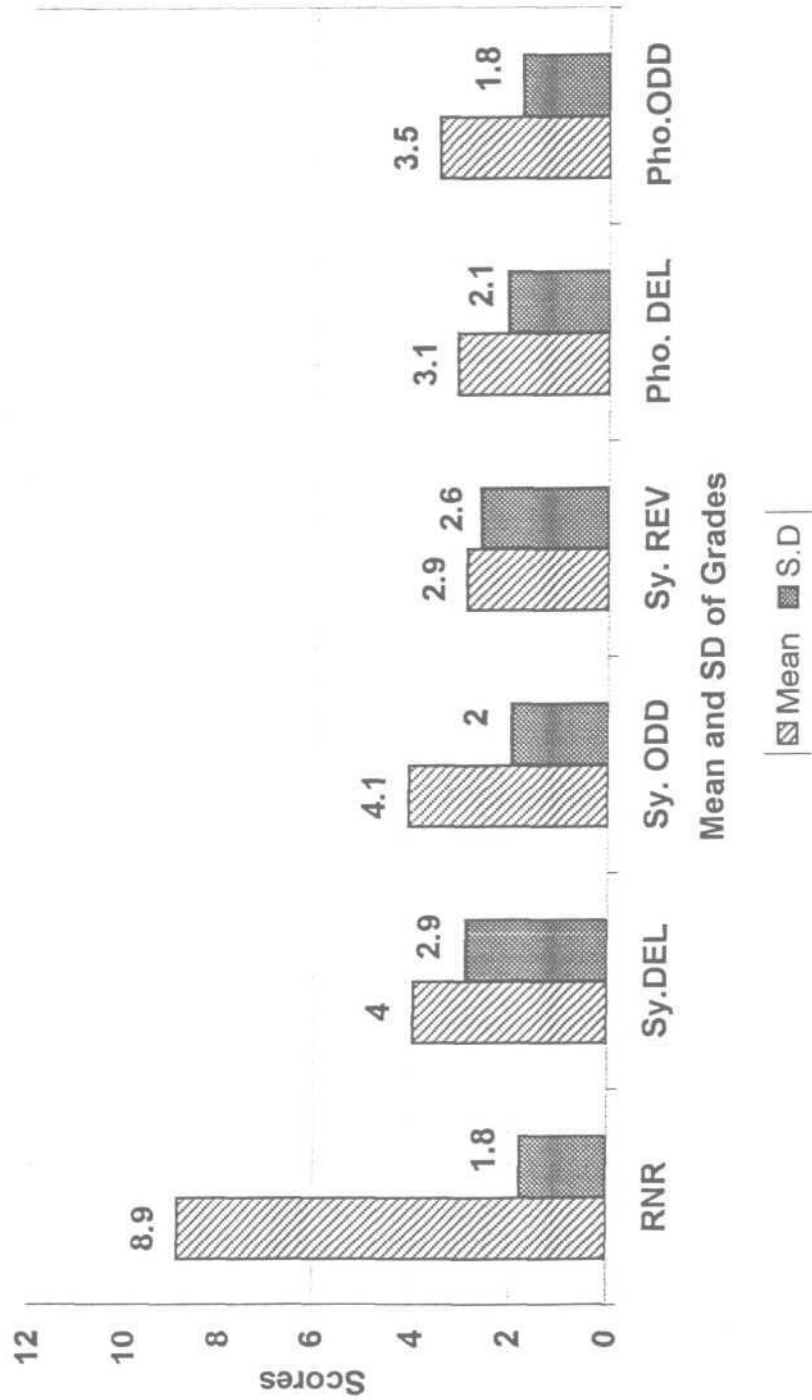
**f. Phoneme Oddity Test:**

The mean scores on phoneme oddity for Grade III was 3.75 and Grade IV was 4.40 (Table 4 and Figure 1 & 2) for a maximum of 12, indicating that

Figure-3  
 Mean and SD of Boys on Phonological Awareness Test



**Figure-4**  
**Mean and SD of Girls on Phonological Awareness Test**



the performance of Grade IV children was better than the children of Grade III and also it was more stable (S.D of Grade III = 2.65, Grade IV = 2.41).

From, Table-5, Figure 3 & 4 it can be observed that the performance of the boys was better than the girls (Mean score of boys = 4.65 and girls = 3.50 for a maximum of 12). But were more variable than the girls (S.D for boys = 2.99, Girls = 1.85). An analysis of the performance of the children of both the grades and sex revealed that in general, the children from Grade IV performed better than those from Grade III and that the performance of the boys was better than the girls. However, higher variability in performance was observed among the boys.

In order to check for the significance of the difference between the mean scores of grades and sex, t-test for significance of means and Levene's test for significance of variance, was employed. The results of both the test did not indicate significant difference for the grades (Table 5a). However for boys and girls a significant difference between the mean scores at 0.05 (p)level was noticed for syllable reversal, phoneme deletion and SHWA (witten mode) which is indicated in table 5b.

The results are supportive of hypothesis II which states that , "There is no significant difference in performance of the children from Grade III and Grade IV on phonology and orthographic skills" and results partially refutes hypothesis III which states that "There is no significant difference between boys and girls of Grade III and Grade IV on phonology and orthographic skills".



**Table 5a:**  
T-Test for Equality of Means (between grades) of Grade III and Grade IV  
Children on Phonological Awareness and Orthographic Skills

Variable	<b>t-value</b>	<b>Df</b>
RNR	<b>-.22</b>	<b>38</b>
Sy. Del	<b>.62</b>	<b>38</b>
Sy. Odd	<b>.00</b>	<b>38</b>
Sy. Rev	<b>-.16</b>	<b>38</b>
Pho Del	-1.09	<b>38</b>
Pho Odd	<b>-.81</b>	<b>38</b>
Oral	<b>.46</b>	<b>38</b>
Writ	<b>.54</b>	<b>38</b>

**Table 5b:**  
T-Test for Equality of Means (between sex) of Grade III and Grade IV  
Children on Phonological Awareness and Orthographic Skills

Variable	t-value	Df
RNR	-1.11	38
Sy. Del	1.95	38
Sy. Odd	1.11	38
Sy. Rev	2.09*	38
Pho Del	1.97*	38
Pho Odd	1.46	38
Oral	-.30	38
Writ	3.44*	38

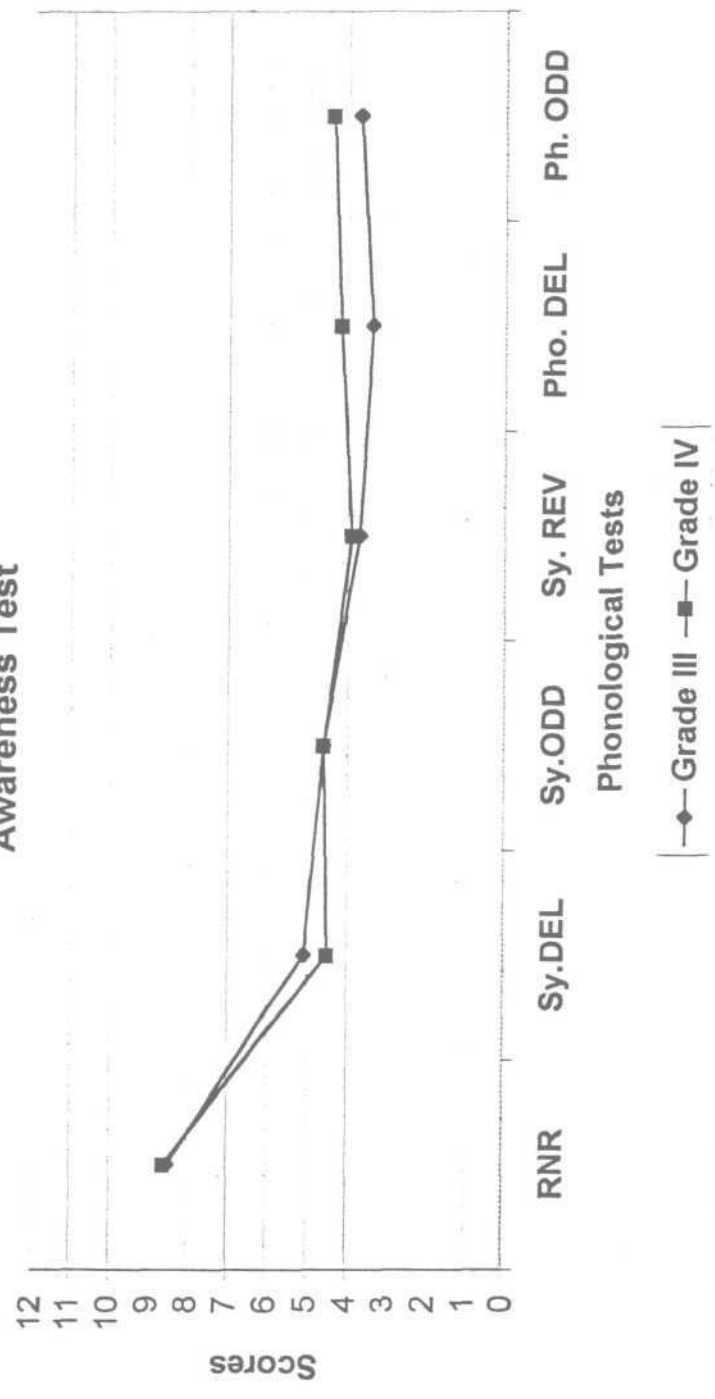
\* *Significant difference noticed.*

An analyses of the relative performance on various phonological tests revealed that the rhyming non-rhyming task was the easiest followed by syllable deletion, syllable oddity and syllable reversal. The scores on the phoneme deletion and phoneme oddity were almost similar and also much poorer than the syllable tests. (Figure 5). From these results, the order of acquisition of various phonological awareness skills in an alpha syllabic script may be denoted as being in the hierarchy from easiest to most difficult - rhyming, syllable deletion, syllable oddity, syllable reversal, phoneme oddity and phoneme deletion.

It is evident from Figure - 5, that for both the Grades rhyming and syllable skills are acquired parallelly, but there is a slight increase in the performance on the phoneme task by the children of Grade IV. This finding could be explained either taking support from Morais (1979) who suggested that phonemic awareness is acquired with exposure to alphabetic like features of the script or from the study of Liberman et al., (1981) who proposed that it develops with maturation. However, the data of the present study is insufficient to support either of the above findings. Further investigations including higher grade children would probably help to throw more light on this issue.

Karant & Prakash (1996), Rekha (1987) and Prema (1997) while studying phonological awareness of children learning to read Kannada, a semi syllabic script have reported that rhyming skill is identified with syllable skill. In the present study, the scores on rhyming tests are the highest suggesting that in an alpha-syllabic script also rhyming ability is the foremost ability acquired by the children. These findings are consistent with

Figure-5  
Mean of Grade III and Grade IV Children on Phonological Awareness Test



those of Majsteresk and Ellenwood (1995) who found that rhyme detection skill was related to beginning stage of reading.

The findings of the present study also support Liberman et al. (1974), who state that phoneme skills are harder to achieve than the syllable skills.

## **II. SHWA Test for Orthographic Skills:**

SHWA is a special test to check the sensitivity to orthographic principles. It was conducted in two modes oral and written. The scores are tabulated in Table - 6 and Table - 7 respectively.

### **a. Oral Mode:**

The mean scores (Table - 6 and Figs 6 & 7) shows that for SHWA test in oral mode. The Grade III children had a better performance than Grade IV (Mean of Grade-III = 0.97; Grade-IV = 0.75 for a maximum of 16). However, Grade III children were more variable in their performance than those of Grade IV (S.D of Grade HI = 1.63; Grade IV = 1.48).

The girls showed a better performance than the boys (mean score of boys = 0.78; girls = 0.93. Table - 7; Figs 8 & 9). But the girls showed higher variability in their performance (S.D. of boys =1.12; Girls 1.89).

**Table 6:**  
**Mean\* and SD of Grade III and Grade IV Children on Orthographic Skills**

Sl. No.	Variables	Grade III		Grade IV	
		Mean	SD	Mean	SD
1.	Oral	0.9750	1.634	0.7500	1.480
2.	Written	2.2500	2.493	1.8375	2.302

\* Scores for a maximum of 16.

Oral: Oral mode of orthographic principles

Written: Written mode of orthographic principles

**Table 7:**  
**Mean\* and SD of Boys and Girls On Orthographic Skills**

Sl. No.	Variables	Grade III		Grade IV	
		Mean	SD	Mean	SD
1.	Oral	0.7875	1.128	0.9375	1.899
2.	Written	3.1875	2.504	0.9000	1.607

\* Scores for a maximum of 16.

Oral: Oral mode of orthographic principles

Written: Written mode of orthographic principles

#### **b. Written Mode:**

In the written mode also. The grade III children showed a better performance than grade IV (Mean score of Grade-in = 2.25; Grade IV 1.83, in Table 7 figs 7 & 8). Greater variability was also seen in Grade III (S.D. of Grade III = 2.49; Grade IV = 2.30).

**Figure-6**  
**Mean and SD of Grade III Children on**  
**Orthographic Skills**



**Figure-7**  
**Mean and SD of Grade IV Children on**  
**Orthographic Skills**

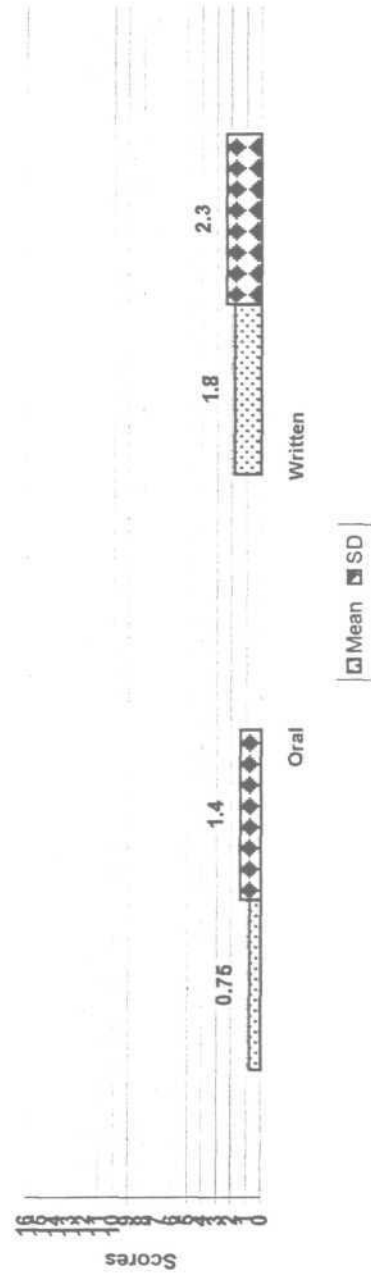


Figure-8  
Mean and SD of Boys on Orthographic Skills

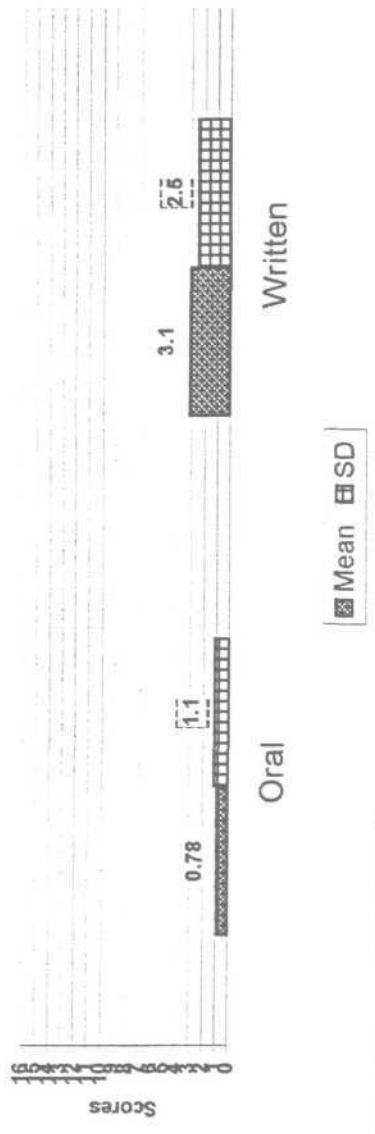
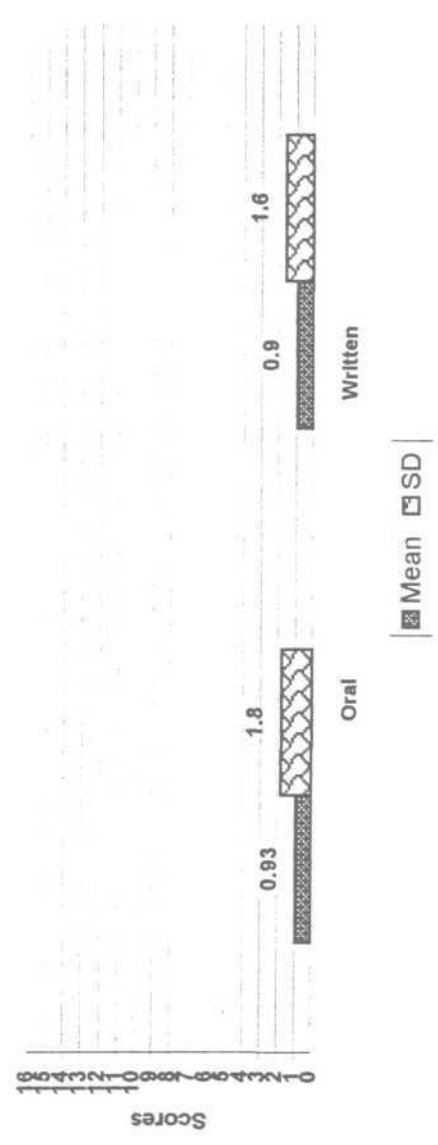


Figure-9  
Mean and SD of Girls on Orthographic Skills



A comparison of the mean scores of boys and girls shows that the boys showed a better performance than the girls (Mean score for boys = 3.18 and girls = 0.90. in table 7 fig 8 & 9)but were more variable in their performance (S.D of boys 2.50, girls =1.60).

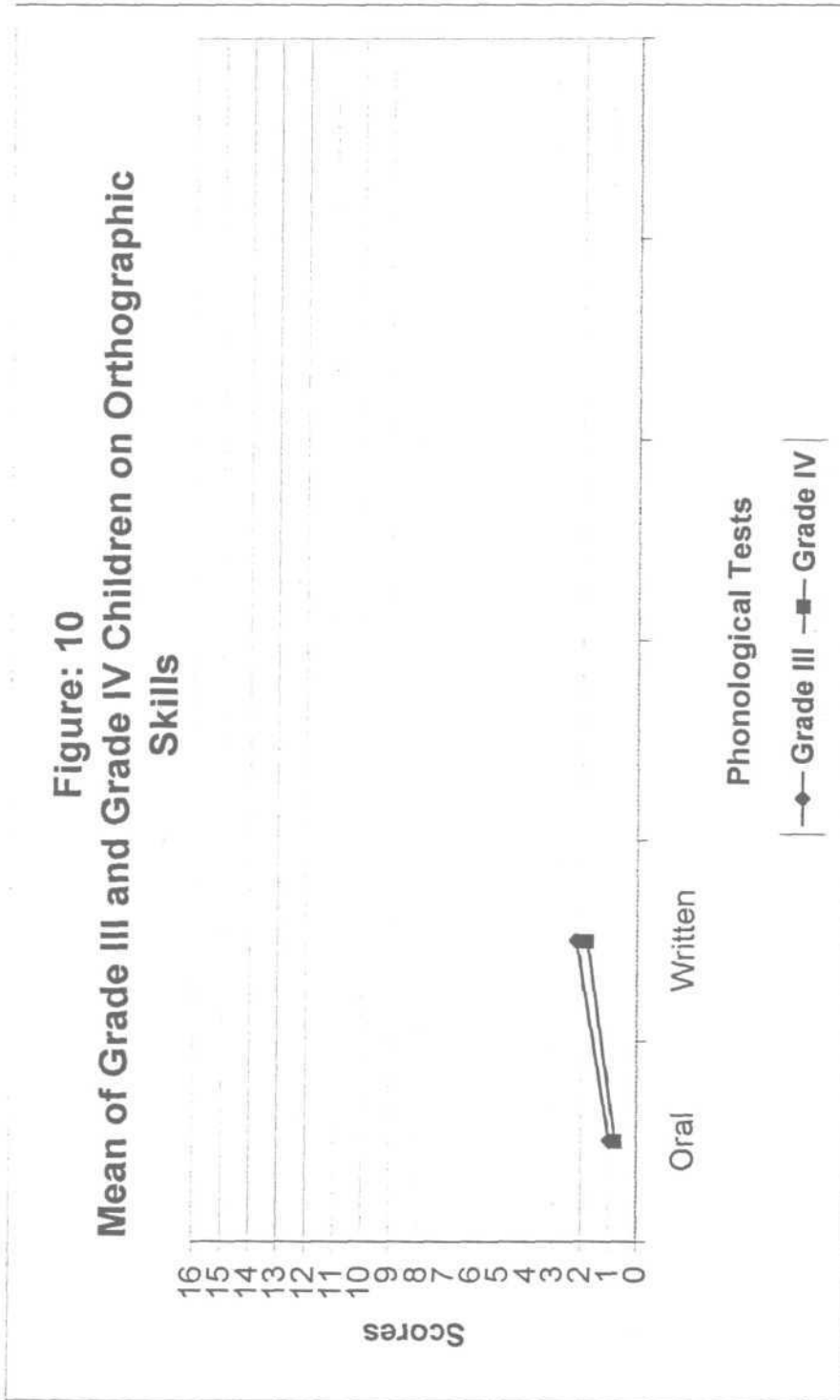
Figure 10 shows a comparison of performance on SHWA in the oral and written mode of grade III and grade IV children. The figure suggests that, in orthographic skills children are better in written modality than in oral modality. These findings match with those stages of reading acquisition proposed by Chall (1983) and Firth(1985) where they emphasize that children learn analytical skill i.e., decoding grapheme by grapheme before they develop fluency in reading.

A comparison of the results of phonological awareness tests and SHWA suggests that the performance of children was very poor in SHWA when compared to phonological awareness tests. Between the oral mode and the written mode, the performance was better in the written mode. Particularly by the boys.

The relationship between phonological awareness skills and orthographic skills was explored by correlation analysis.



**Figure: 10**  
**Mean of Grade III and Grade IV Children on Orthographic Skills**



## B. Correlation Analysis:

The performance on tests of phonological awareness and SHWA was further studied through the Karl Pearson's correlation analysis. A two-tailed test to check the significance of correlation was employed.

**Table 8:**

Correlation among the phonological skills,  
SHWA in oral mode and written mode.

SL No.	Phonological tests	SHWA (Oral mode)	SHWA (Written mode)
1.	Rhyming Non Rhyming	0.3768*	0.0656
2.	Syllable Deletion	0.1980	0.3590*
3.	Syllable Oddity	0.3352*	0.1962
4.	Syllable Reversal	0.3634*	0.2858
5.	Phoneme Deletion	0.1506	0.2350
6.	Phoneme Oddity	0.1518	0.2524

From the Table - 8, it can be observed that the SHWA- in oral mode correlates well with syllable tests, particularly the rhyming, syllable oddity and the syllable reversal at 0.05 P level, whereas the SHWA- in written mode correlates with syllable deletion at 0.05 P level. The correlation results are not in support of hypothesis- I which is stated as, "There is no significant relationship between phonological awareness and orthographic skills".

The correlational analysis did not reveal significant relationship between orthographic skills (oral and written mode) with any of the phonemic awareness task.

Hence these results support hypothesis I (b) which is stated as, "There is no significant relationship between phonemic awareness and orthographic skills"

The significant correlation that is established between orthographic skills and the two tests for syllabic awareness syllable oddity, syllable reversal refutes hypothesis I (a) which is stated that 'there is no significant relationship between syllabic awareness and orthographic skill'.

The correlation analysis reveals that in an alpha - syllabic script, syllabic skills particularly syllable oddity and syllable reversal along with rhyming skills are related with orthographic skills. This finding is consistent with Rekha (1987) who suggested that such children who are exposed to syllabic or semi syllabic scripts can become proficient readers without being good in phonological segmentation task. The lack of significance of correlation between orthographic skills and phonemic skills is also in support of the above statements. Further more, it also supports Read et al., (1986) & Nigam (1988) who reported that "phonemic awareness requires experience in alphabetic orthography".

An interesting finding derived from the correlation analysis is that for learning to write an alpha-syllabic script, sensitivity to syllable deletion

which is the only correlated skill with SHWA in written mode, plays a crucial role.

The quantitative analyses of the data revealed that there was no significant difference between the two grades. However, a significant difference was noticed for boys and girls on phoneme deletion, syllable reversal and SHWA (written mode) at 0.05 P level. The children from both the grades were found to fall in line with one of the stages of reading acquisition proposed by Chall, (1983) and Frith, (1985) where the children were found to be better in writing than in reading. The correlation analyses suggested that few syllable skills are related for SHWA (Oral mode) where as syllable deletion is the only skill which was correlated with SHWA (written mode) suggesting its crucial role in learning to write an alpha syllabic script.

The results in general are not in agreement with those reported for alphabetic script in the Western literature.

## **QUALITATIVE ANALYSIS**

In addition to the quantitative analyses, qualitative analyses of the data was done.

## **PHONOLOGICAL TESTS**

Almost all the children performed well in the rhyming - non rhyming test.

### **Syllable deletion:**

Performance on syllable deletion was better than that of phoneme deletion. But, one particular test item was consistently erred by majority of the children.

Test item (2): /rendu/ - /redu/

/ரெண்டு | - | ரெடு/

When /n/ is deleted from /rendu/ (spoken form) the children are expected to say /redu/ but a few children responded as /iredu/. This discrepancy could be because the spoken form is different from the written form for this target word in Tamil. In the spoken form it is said as /rendu/ - /ரெண்டு / but in the written form it is /irendu/ - /இரெண்டு /.

The response of the children to this particular target word is suggestive of the children's attention being focussed on the orthographic feature than on the phonemic features during deletion task. This result is also supported by the higher mean scores on written mode of SHWA than on oral mode.

### **Syllable Reversal:**

Majority of the children had difficulty in on of the test items where they were required to reverse /taimai/ as /maitai/ (தாய்மை - மைதாய் ). Most of the children responded as / maita / - / மைதா /.

This response could be explained on the basis of the orthographic features in / taimai/- ( தாய்மை ) is not represented as 3 different graphemes as in English, but as 2 syllabaries. Hence the children while focussing on the

orthographic features, could have failed to reverse it in the expected fashion.

These observations further support the previous findings where performance on written SHWA was better than the oral SHWA.

### **Phoneme Deletion:**

This was comparatively poor response than the syllable task. The children had difficulty in the test items. (From 8 to 11).

Instead of /viagu/, /aradi/, /kaudai/, and /uvə!/, majority of the children responded as /vigu/, /radi/, /kadai/, /və!/. However few children responded correctly as /viagu/, /aradi/, /kaudai/, /uvə!/. While the quantitative analyses did not show any relation between phonemic awareness and orthographic skills, the qualitative analysis revealed that children who showed consistently good performance on phoneme deletion task, performed well all the other tests.


These results indicate the possibility of considering phoneme deletion task as a predictor of good reading. This is consistent with Rosner (1979), who found that good readers scored high scores on phoneme deletion task.

### **TESTS FOR ORTHOGRAPHIC PRINCIPLES**

Although the performance of children on the SHWA was poorer in comparison to phonological awareness tasks, there was an interesting pattern


of responses on SHWA. The emergence of orthographic skills could be traced by classifying these responses into different stages.

Stage I: In this stage, the children substituted the imaginary symbols with Tamil graphemes along with right vowel. But they orally produced and also wrote the symbols as two separate graphemes.

Eg:   
/k,a/ /s, a/ /k, i/ /s, il

Stage II: In the oral mode the children initially used the Tamil phoneme along with vowel, but later shifted to the imaginary phoneme with the right vowel. Similar performance was observed in the written mode also.

Eg:   
/ka/ /sa/

Later:   
/khu /, /z<sup>h</sup>u/

Stage III: A reverse of Stage II was observed in the oral mode where the children initially used imaginary symbol along with the right vowel form.

Eg:

  
/z<sup>h</sup>a/ /z<sup>h</sup>a:/ /kha/ /kha:/

But later shifted to the Tamil phoneme.








Eg:

			
/ku/	/ku:/	/su/	/su.V

and also produced the same in the written mode.

Stage IV: In this stage, the vowels followed the imaginary symbol both in oral and written modes, by the children and they maintained the same throughout the all the test items.

Eg:

			
/ka/	/ka:/	/kha/	/kha:/
			
/ku/	/ku:/	/khu/	/khu:/

The qualitative analysis of performance on phonological tests and SHWA revealed that the children while learning to read and write alpha syllabic script mainly focussed on the orthographic features. Though the quantitative analyses failed to show a correlation between orthographic skills and phonemic awareness, in the qualitative analyses it was found that children who performed well on phoneme deletion task were equally good across all



the tests and that those who performed poorly in phonemic tests were in the preliminary stage of SHWA. Further research would be required to confirm whether phoneme deletion could be taken as a predictor of good reading.

In order to see whether the stages proposed for SHWA are in hierarchy, a percentage of accuracy of responses on phonological awareness tests was calculated. Keeping the highest and the lowest percentage of response for all the five tests i.e., (syllable oddity, syllable reversal, syllable deletion, phoneme oddity and phoneme deletion) a range was determined. The children who fell below 1/3 of the range on both syllable and phoneme tasks were considered to be poor readers. (Table - 9). These poor readers were also found to be functioning in stage I of SHWA. These results indicate that phonological awareness skills are related to orthographic skills and that both are necessary for good reading.

The number of poor readers as evidenced by the percentage of accuracy of response was found to be 7 children out of 40 (i.e., 17.5%). These results are in consensus with the incidence of core learning disabled children as being 18% (Rao, 1984) & 15% (Rao, 1999).

The quantitative and qualitative analysis of the data obtained on 40 children for Test of phonological awareness and orthographic skills revealed that some factors are crucial for the alpha-syllabic script. The results also identified that syllable deletion could be considered as a factor for writing skills and few syllabic skills (syllable oddity and syllable reversal) would be required for reading.

**Table 9:**  
Percentage of Accuracy of Responses on  
Phonological Awareness Tests and Stages of SHWA

SL No.	Total Syllable (Syllable Reversal, Syllable Oddity and Syllable Deletion)	Total Phoneme (Phoneme Oddity and Phoneme Deletion)	Stages of SHWA
1.	66.6	70.8	
2.	69.5	41.6	
3.	<b>*5.5</b>	*12.5	Stage I
4.	27.7	33.3	
5.	63.8	58.3	
6.	52.7	45.8	
7.	36.1	25.0	
8.	30.5	29.1	
9.	50.0	8.3	
10.	66.6	54.1	
11.	52.7	45.8	
12.	<b>*8.3</b>	*8.3	Stage I
13.	<b>*5.5</b>	*8.3	Stage I
14.	27.7	16.6	
15.	<b>61.1</b>	37.5	
16.	25.0	20.8	
17.	<b>*8.3</b>	*16.6	Stage I
18.	<b>58.3</b>	33.3	
19.	25.0	16.6	
20.	<b>*5.5</b>	*12.5	Stage I
21.	<b>55.5</b>	45.8	

22.	27.7	33.3	
23.	25.0	33.3	
24.	69.4	70.8	
25.	22.2	20.8	
26.	44.4	37.5	
27.	*13.8	*12.5	Stage I
28.	44.4	62.5	
29.	38.8	29.1	
30.	47.2	37.5	
31.	47.2	37.5	
32.	33.3	29.1	
33.	*8.3	*8.3	Stage I
34.	44.4	45.8	
35.	5.5	50.0	
36.	44.4	33.3	
37.	44.4	33.3	
38.	36.1	33.3	
39.	36.1	29.1	
40.	36.1	33.3	

*\*Identified as Poor Readers*

## SUMMARY AND CONCLUSION

The aim of the study is to identify the relationship between phonological awareness and orthographic skills in Tamil speaking children.

In order to see if such a relationship exists, tests of phonological awareness and orthographic principles were administered on 40 children (20 boys and 20 girls) from Grade III and Grade IV studying in Tamil medium.

The following hypothesis were formulated for the study.

- I. There is no significant relationship between phonological awareness and orthographic skills.
  - a. There is no significant relationship between syllabic awareness and orthographic skills.
  - b. There is no significant relationship between phonemic awareness and orthographic skills.
- II. There is no significant difference in the performance of children from Grade III and IV on phonology and orthographic skills.
- III. There is no significant difference between the boys and girls of Grade III and IV on phonology and orthographic skills.

The raw scores on the test of phonological awareness and orthographic skills were computed and statistically analysed the following are the results.

- > There is significant relationship between the phonological awareness (i.e., rhyming, syllable oddity and syllable reversal) and orthographic skills. Hypothesis I is refuted by this finding.
- > There is significant relationship between the syllabic awareness (i.e., syllable oddity and syllable reversal) and orthographic skills. Hypothesis I(a) is refuted by this finding.
- > There is no significant relationship between the phonemic awareness and orthographic skills. Hypothesis I (b) is supported by this finding.
- > There is no significant difference in the performance of children from Grade IE and Grade IV on phonology and orthographic skills. Hypothesis II is supported by this finding.
- > There is significant relationship between the boys and girls of Grade III and IV on phonology and orthographic skills. Hypothesis IE is refuted by this finding.
- > Results of the present study also indicate that syllabic awareness is acquired earlier to phoneme awareness in an alpha-syllabic script.

- > Results also indicated the order of acquisition i.e., rhyming, was the earliest followed by syllable deletion, syllable oddity and syllable reversal, phoneme oddity and phoneme deletion.

Some of the findings are not in consonance with the findings of alphabetic script.

- > The findings of the present study indicates that the phoneme skills acquires by grade IV.
- > Results of SHWA indicated that, written mode of SHWA was better than oral mode suggesting writing was better than reading around Grade III and IV.
- > Correlation analyses indicates that oral (SHWA) correlates with rhyming, syllable oddity and syllable reversal and not the phoneme test, suggesting that for learning to read an alpha-syllabic script, sensitivity to syllables is more important than that of phonemes.
- > Results indicate that written (SHWA) correlates with syllable deletion, which suggest that it plays a crucial role in learning to write an alpha-syllabic script.
- > Though the quantitative analyses failed to show a correlation between orthographic skills and phonemic awareness, in the qualitative analyses it was found that children who performed well on phoneme deletion task were equally good across all the tests

and that those who performed poorly in phonemic tests were in the preliminary stage of SHWA.

- > Qualitative analyses revealed that to perform on phonological task children relied more on orthographic features than on phonological features of the tests stimuli which leads to the speculation that phoneme deletion task could be considered as a predictor of good reading and also that knowledge of orthographic features facilitates phonological awareness in an alpha syllabic script,
- > Incidence of poor readers was identified as 17.5%.

#### Implication:

- > This study adds to the existing literature from the alpha-syllabic script.
- > This study would help in the identification, assessment and in planning remedial education for poor readers of Tamil script.
- > This study is suggestive of the use of syllabic skills than phoneme skills while teaching children to read Tamil.

**Limitation:**

- > Because only two grades were included in the study comprehensive discussion on some of the issues of phonological awareness and orthographic skills could not be done.

**Recommendations for Further Study:**

Cross script comparison would help us to know more about phonological awareness and orthographic features in children learning to read and write.



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## APPENDIX

### I. RHYMING AND NON-RHYMING

1.	யானை	-	பானை	/janai/	-	/panai/
2.	வறுமை	-	அம்மா	/varuma:/	-	/amma:/
3.	பாராட்டு	-	அக்கா	/paratu/	-	/akka/
4.	அன்னம்	-	கிண்ணம்	/annam/	-	/kinam/
5.	தினை	-	மாவு	/tinai/	-	/ma:vu/
6.	அம்மா	-	சும்மா	/amma:/	-	/summa/
7.	தேங்காய்	-	மாங்காய்	/tengai/	-	/mangai/
8.	கல்வி	-	பெருமை	/kalvi/	-	/peru:mai/
9.	தொண்டை	-	வெண்டை	/tondai/	-	/vendai/
10.	விலங்கு	-	தங்கம்	/vilngu:/	-	/tngm/
11.	பால்	-	தேன்	/pa:l/	-	/ten/
12.	மன்றம்	-	குன்றம்	/mandram/	-	/kundram/

### II. SYLLABLE DELETION

1.	சுவாகதம்	-	வாகதம்	/swagatam/	-	/wagatam/
2.	ரெண்டு	-	ரெடு	/reñdu/	-	/redu/
3.	வாடை	-	டை	/va:dai/	-	/dai/
4.	தாய்மை	-	தாய்	/taimai/	-	/tai/
5.	அம்ருதம்	-	அம்தம்	/amrudam/	-	/amrdm/
6.	அண்ணன்	-	ணன்	/a:nnn/	-	/nnn/
7.	ராசாத்தி	-	ராசா	/rasaṭhi/	-	/rasa/
8.	நாட்டுக்கு	-	நாக்கு	/natuku/	-	/naku/
9.	பாடம்	-	டம்	/paḍm/	-	/ḍm/
10.	காமாலை	-	காமா	/kamalai/	-	/kama/
11.	குரங்கு	-	குரகு	/kuruṅgu:/	-	/kuragu:/
12.	வாடாமை	-	வாடீ	/vadamai/	-	/vada/

### III. SYLLABLE ODDITY

1.	பாட்டி /pati/	பாடம் /padam/	காலை /kalai/	பாம்பு /pambu/
2.	தேகை /te:kai/	காக்கு /kaku/	தொகை /tokai/	வைகை /vikai/
3.	தண்ணீர் /tannir/	பன்னீர் /pannir/	வேடம் /vedam/	கண்ணீர் /kannir/
4.	தொடாதே /todadai/	தேவையான /tevaijana/	கோவையாக /kovaijaga/	சேவையற்று /sevaiytru/
5.	தாத்தா /tata/	தாளம் /talam/	தாம்ப /tambu/	அம்மா /amma:/
6.	பழமை /palmai/	தா டி பள்ள /talpal/	புதுமை /pudumai/	இனிமை /enimai/
7.	மேலாடை /meladai/	பாலாறு /palaru/	நெருக்கம் /nerukkam/	நூலாமை /nulamai/
8.	மாலை /malai/	மாவடு /mavdu/	மாமா /mama/	தேவை /tevai/
9.	மென்மையான /menmaijana/	ஒளவையார் /au:vaijar/	மென்மையாக /me:n maijaga/	உண்மையில் /unmaiyyil/
10.	தொடு /todu/	காலை /kalai/	மாலை /malai/	சாலை /salai/
11.	திண்டாதே /teindotai/	வேண்டாமை /vendamai/	தொடாமே /todamae/	வென்றாவன் /vendravan/
12.	வாகை /vagai/	தேம்பு /tembu/	வாக்கு /vakku/	வாடா /vadda/

#### IV. SYLLABLE REVERSAL

1.	பொறாமை	-	மைறாபொ	/pora:mai/ -	/maira:po/
2.	காலை	-	லைகா	/kabi/ -	/kaika/
3.	வாழாமை	-	மைழாவா	/va:ʒa:mai/ -	/maiʒa:va:/
4.	மாதா	-	தாமா	/ma:ʒha/ -	/dhama/
5.	சாலை	-	லைசா	/salai/ -	/lai sa/
6.	மாலை	-	லைமா	/malai/ -	/laima/
7.	யானை	-	னையா	/janai/ -	/naija/
8.	ஒளவையார்	-	யார்வைஒள	/au:vaijɔr/ -	/jɔrvaiau:/
9.	வாடாமை	-	மைடாவா	/vada:mai/ -	/maida:va/
10.	காமாலை	-	லைமாகா	/kama:lai/ -	/laima:ka/
11.	தாய்மை	-	மைதாய்	/tai:mai/ -	/mai:tai/
12.	விடலை	-	லைவிட	/vedalai/ -	/laiveda/

## V. PHONEME DELETION

- |     |          |   |         |              |           |
|-----|----------|---|---------|--------------|-----------|
| 1.  | அசுத்தம் | - | சுத்தம் | /asutham̄/ - | /sutham̄/ |
| 2.  | கண்ணாடி  | - | கண்டி   | /kannadi/ -  | /kandi/   |
| 3.  | மரம்     | - | மர      | /maram̄/ -   | /mara/    |
| 4.  | சலடை     | - | அலடை    | /saladai/ -  | /aladai/  |
| 5.  | ரயில்    | - | ரயி     | /rayil/ -    | /rayi/    |
| 6.  | ஐவர்     | - | ஐர்     | /ivər/ -     | /iɻ/      |
| 7.  | ஆரம்     | - | ஆர      | /a:ram/ -    | /a:ra/    |
| 8.  | விலகு    | - | வியகு   | /vilagu/ -   | /viagu/   |
| 9.  | காடி     | - | அாடி    | /karadi/ -   | /aradi/   |
| 10. | கழுதை    | - | கவுதை   | /kaludai/ -  | /kaudai/  |
| 11. | குவல்    | - | உவல்    | /kuvəl/ -    | /uvəl/    |
| 12. | ஈரம்     | - | ஈர      | /e:ram/ -    | /e:ra/    |



## VI. PHONEME ODDITY (Non-sense)

















1.	பாமை /pamai/	பாள்ளி /palli/	பாரா /para/	சாமு /samu/
2.	நாங்கு /nangu:/	மேங்கி /mengi/	தார்வா /tarva/	தோங்க /tonga/
3.	பிட்டு /pi:tu/	தெப்பு /teipu:/	தெள்ளு /teillu:/	தெங்கு /tengu/
4.	மாவம் /mavam/	தோட்டா /todita/	மாஹம் /maham/	மானிகு /manigu/
5.	பலைக /palaiga/	திலைவ /telaiwa/	கொலைன /kolaina/	நீற்று /ni:riru/
6.	திபாலை /tibalai/	குவாலை /kuva:lai/	நாடிகு /nadiku/	விமாலை /vima:lai/
7.	கண்ணு /kannu:/	மேண்பக /menpaga/	சடுககு /sudukagu/	நன்பை /nenpai/
8.	தழம் /talam/	சகும் /sagu:m/	மகுக /magu:ka/	யகூர் /jguru/
9.	தாராமு /taramu/	தாடைய /tadajai/	மாசைனு /masainu/	தாமாலி /tamali/
10.	பார்ம் /parma/	தோகனி /togani/	மால்ம /malma/	தான்ம /tanma/
11.	தாருமா /taruma/	தாரினோ /tarino:/	மாவினோ /mavino:/	பாலினோ /palino:/
12.	பாணாடி /panadi/	நயரா /najara/	சாமிடி /samidi/	தாகுடி /tagudi/

# ORTHOGRAPHIC PRINCIPLES: SHWA:

## 1. ORAL MODE

- 1) /kʰ/ ē /a/ → /kʰa/ ; /kʰ/ ē /a:/ → /kʰa:/  
2) /kʰ/ ē /u/ → /kʰu/ ; /kʰ/ ē /u:/ → /kʰu:/  
3) /kʰ/ ē /i/ → /kʰi/ ; /kʰ/ ē /i:/ → /kʰi:/  
4) /kʰ/ ē /o/ → /kʰo/ ; /kʰ/ ē /o:/ → /kʰo:/
- 1) /zʰ/ ē /a/ → /zʰa/ ; /zʰ/ ē /a:/ → /zʰa:/  
2) /zʰ/ ē /u/ → /zʰu/ ; /zʰ/ ē /u:/ → /zʰu:/  
3) /zʰ/ ē /i/ → /zʰi/ ; /zʰ/ ē /i:/ → /zʰi:/  
4) /zʰ/ ē /o/ → /zʰo/ ; /zʰ/ ē /o:/ → /zʰo:/

## 2. WRITTEN MODE

- 1)  ;   
2)  ;   
3)  ;   
4)  ; 
- 1)  ;   
2)  ;   
3)  ;   
4)  ; 

TAMIL SCRIPT

அ	ஆ	இ	ஈ	உ	ஊ	எ	ஏ	ஐ	ஔ	ஓ	ஔ	ஔ	ஔ
க	கா	கி	கீ	கு	கூ	கெ	கே	கை	கொ	கோ	கோ	கொ	கீ
ங	ஙா	ஙி	ஙீ	ஙு	ஙூ	ஙெ	ஙே	ஙை	ஙொ	ஙோ	ஙோ	ஙொ	ஙீ
ச	சா	சி	சீ	சு	சூ	செ	சே	சை	சொ	சோ	சோ	சொ	சீ
ட	டா	டி	டீ	டு	டூ	டெ	டே	டை	டொ	டோ	டோ	டொ	டீ
ண	ணா	ணி	ணீ	ணு	ணூ	ணெ	ணே	ணை	ணொ	ணோ	ணோ	ணொ	ணீ
த	தா	தி	தீ	து	தூ	தெ	தே	தை	தொ	தோ	தோ	தொ	தீ
ந	நா	நி	நீ	நு	நூ	நெ	நே	நை	நொ	நோ	நோ	நொ	நீ
ப	பா	பி	பீ	பு	பூ	பெ	பே	பை	பொ	போ	போ	பொ	பீ
ம	மா	மி	மீ	மு	மூ	மெ	மே	மை	மொ	மோ	மோ	மொ	மீ
ய	யா	யி	யீ	யு	யூ	யெ	யே	யை	யொ	யோ	யோ	யொ	யீ
ர	ரா	ரி	ரீ	ரு	ரூ	ரெ	ரே	ரை	ரொ	ரோ	ரோ	ரொ	ரீ
ல	லா	லி	லீ	லு	லூ	லெ	லே	லை	லொ	லோ	லோ	லொ	லீ
வ	வா	வி	வீ	வு	வூ	வெ	வே	வை	வொ	வோ	வோ	வொ	வீ
ழ	ழா	ழி	ழீ	ழு	ழூ	ழெ	ழே	ழை	ழொ	ழோ	ழோ	ழொ	ழீ
ள	ளா	ளி	ளீ	ளு	ளூ	ளெ	ளே	ளை	ளொ	ளோ	ளோ	ளொ	ளீ
ற	றா	றி	றீ	று	றூ	றெ	றே	றை	றொ	றோ	றோ	றொ	றீ
ள	ளா	ளி	ளீ	ளு	ளூ	ளெ	ளே	ளை	ளொ	ளோ	ளோ	ளொ	ளீ
ஞ	ஞா	ஞி	ஞீ	ஞு	ஞூ	ஞெ	ஞே	ஞை	ஞொ	ஞோ	ஞோ	ஞொ	ஞீ
	ஐ	ஓ	ஔ	ஔ	ஔ	→	(SANSKRIT LETTERS IN TAMIL)						

- உயிர் எழுத்து - 12
- ஆய்த எழுத்து - 1
- மெய் எழுத்து - 18
- உயிர் மெய் எழுத்து - 216