

Comparison of Metaphonological and Reading Skills in an Alpha Syllabary Language between Children with Learning Disability and Their Normal Peer Group

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Introduction

"Specific learning disorder" is a type of neurodevelopmental disorder characterized by persistent difficulties with learning and academic skills (eg, reading, writing, and mathematics) that are substantially and measurably below those expected for their chronologic age. It is believed that such disorders interfere with school performance, work performance, or activities of daily life. The difficulties initially present during the formal school years and are not better accounted for by other conditions (e.g., intellectual disability, visual or auditory impairments, insufficient instruction, psychosocial adversity)(1) .

The child who does not meet the expectations for academic performance in school irrespective of having intelligence in the normal range and normal sensory motor skills and no environmental deprivation has received several different diagnostic labels like "Minimal brain dysfunction", "strephosymbolia", "word blindness", "Strauss Syndrome" and "learning disability". The relationship between phonological disorders and educational problems is of interest to the clinicians working with school aged children since oral language skills are fundamental to the development of many academic skills such as reading and spelling because the use of sounds in symbolic lexical units is a task common to learning to speak, read and write.

The cause of learning disability in children is yet debatable and not clearly understood. Neuroanatomic and neurophysiologic deficits have been attributed as one of the causes (2). Another hypothesis is that poor readers have difficulties with phonemes, which are the smallest unit of sound system. Difficulties in phonological coding and phonemic segmentation were looked into using rhyming tasks where

the child is presented with three pairs of rhyming words and required to provide a third word that rhymed with the words in the set. Other strategies such as syllable reversals are used where, the child has to produce syllables in reverse order for both real words and pseudowords, presented both in auditory and visual form. (3,4) Cognitive deficits associated with reading difficulties like meta-language, meta-memory, working memory and short-term memory has also been a focus of research.(5)

Reading and writing are complex behaviors which require interaction between sensory, motor, cognitive and metacognitive skills particularly metalinguistic skills. Metalinguistic skill is a type of metacognition that comprises of a person's skill in understanding the rules that govern his or her spoken language. It refers to the ability to reflect consciously on the nature and properties of language and reflect upon its structural and functional features..(6)

In comparison to typically developing (TD) children differences in metalinguistic skills have been reported in learning disabled children.(7)

Development of metaphonological skills in TD children (8) and Profiling of metalinguistic skills among learning disabled children has been attempted by researchers(9). It is well established that metaphonological skills are predictive of reading skills in alphabetic languages(10). Very little is known about this relationship in alpha syllabary languages. The results of the Studies conducted in Malayalam, an alpha syllabary Dravidian language spoken in Kerala, a state in India and Marathi, a regional language in the state of Maharashtra, India to find out the relationship between metaphonological skills and reading in children is contrary to the findings of similar study in Kannada, and Gujarati which are other Indian alpha syllabary languages.(11–15) Iyyer, Somashekara, Das and Bhat supported the view that metaphonological skills and reading skills are related in the context of Indian alpha-syllabary language . However, Rekha could not find any relationship between metaphonological skills and reading in her study. (11–13) . The present study was designed to investigate the metaphonological and reading skills in Malayalam speaking children with learning disability in comparison to typically developing children.

Materials and Methods

Objective

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To compare the metaphonological skills of Malayalam speaking children with learning disability and typically developing (TD) children matched for sex and age.

Procedure

The study was approved by the research ethics committee of the Institution and informed consent was taken from the parents of the children. In-order to achieve the above goals, study was conducted on 2 groups of subjects - experimental group (learning disabled) and control group.

34 children with learning disability between the age group of 5-9 years diagnosed by a multidisciplinary team consisting of a Neurologist, Speech Pathologist and Clinical Psychologist formed the experimental group.

Table 1. Profile of Children in the Experimental group

Sl No,	Age	Sex	Grade
1	8	M	IV
2	8	M	IV
3	5 ½	M	I
4	6	M	11
5	7	M	III
6	6	M	II
7	7	M	III
8	7	M	III
9	7	M	III
10	6	M	II
11	9	M	V
12	9	M	V
13	9	M	V
14	7	M	III
15	8	M	IV
16	5 ½	F	I
17	8	M	IV

18	6	M	I
19	6	M	II
20	8	M	IV
21	8	M	IV
22	8	M	IV
23	6	M	I
24	7	M	III
25	7	M	III
26	7	M	III
27	8	M	IV
28	9	M	V
29	9	M	V
30	9	M	V
31	9	M	V
32	9	M	V
33	6	M	II
34	5	M	I

The control group consisted of age and sex matched 34 typically developing children. All the participants used Malayalam as their mother tongue and were from the middle and upper strata of the socio-economic ladder.

Both the control and experimental groups were tested using the following tool:

The ‘Test for reading and metaphonological skills in Malayalam’ was considered in this study.(11)

This test consisted of 9 subtests -

1. Oral reading test
2. Rhyme recognition
3. Phoneme Oddity
4. Phoneme Stripping/deletion
5. Syllable stripping/deletion
6. Phoneme reversal
7. Syllable reversal

8. Writing test
9. Shwa test
 - a. Oral
 - b. Writing

Scoring and Statistical Analysis

A score of one was given for each correct response. One way ANOVA was used to analyze the significance of difference between the groups.

Results

Mean scores for each subtest of metaphonological skills and reading were calculated. Statistical analysis was done using the software -IBM SPSS version 19. One way ANOVA was done to find whether there is any significant difference between the children with learning disability and the TD children.

As shown in the Table 2 One-way ANOVA revealed a significant difference ($F=88.533$; $p<0.000$) between the children with learning disability (academic learning disability) and the TD children in terms of total score in Test for reading and metaphonological skills in Malayalam.

Subtest	LD	Normal	F	Significance
Oral reading test (Number of words read correctly in first one minute)	12.56	29.73	22.99	0.000
Oral reading test (Total number of correct words read)	54.33	133.61	99.12	0.000
Rhyme recognition	5.59	10.52	87.50	0.000
Phoneme Oddity	3.4	6.97	24.94	0.000
Phoneme Stripping/deletion	0.00	2.67	37.79	0.000
Syllable stripping/deletion	6.12	15	263.89	0.000
Phoneme reversal	0.00	0.00	-	0.000
Syllable reversal	3.82	11.18	147.0	0.000
Writing test	6.06	10.91	86.38	0.000
Shwa test-Oral	0.32	0.48	1.46	0.20
Shwa test-Writing	0.15	0.5	3.23	0.10
Total M P T	90.79	221.64	88.533	0.000

Table 2. Showing the results obtained using One way ANOVA

Discussion

There was a significant difference noticed on the overall scores of the learning disability children compared to controls. Oral reading scores of the TD children were significantly higher than learning disabled children. Difficulty in learning to read could be due to an inability to establish letter-sound relationship in other words the poor acquisition of metalinguistic skills (16). The scores obtained on the different subtests of metaphonological skills and the reading scores, which is another subtest by the normal children were significantly better than learning disabled children showing a relationship between reading and metalinguistic skills. The results highlights the role of phonological awareness for reading alpha syllabaries as well as already reported in alphabetic languages such as English.(17)

Among the different tasks of metaphonological skills, for both typically developing children and LD children the phoneme tasks were more difficult than

the syllable tasks. Syllable stripping was the easiest and the normally achieving children attained full scores (15/15). The type of speech sound structure of a given language plays a major role in the ability to perform meta cognitive operations essential for reading. The reader may find tasks related to phonemes (English) or syllables (Kannada) or morphemes (Chinese and Japanese Kanji) easier based on the language per say. This is in agreement with the studies of Karanth and Prakash (18–20) which state that syllable stripping is the earliest indicator for a nonalphabetic reader.

Among the phoneme tasks, phoneme reversals were found to be the most difficult. Both typically developing children and learning-disabled children scored zero for the task of phoneme reversal, indicating that these are skills learned at a later age.

Shwa test was found to be difficult for both learning disabled children as well as normal peers. The task was that, one new alphabet adapted from another language which doesn't have any script in the given language was introduced to a known script in the language being tested and the child had to combine both and read it together. The results show that the cognitive skills required for two different types of language script systems are different and the child finds it difficult to combine both reading and writing process.

Conclusion

The aim of this study was to understand the relationship between metaphonological skills and reading in learning disabled children compared to normal peers. The learning-disabled children showed poor metaphonological skills compared to their normally achieving peers. The evaluation of metaphonological skills and targeting those skills during early interventions is recommended to improve reading and writing skills among learning disabled children. However, the tasks selected should be based on the type of language script.

Data Availability Statement

Data is stored and is available for verification.

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Compliance with Ethical Standards

The author has no relevant financial or non-financial interests to disclose.
The author has no competing interests to declare that are relevant to the content of this article.

Informed Consent

The informed consent was obtained from the parents of the children.

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