

# LANGUAGE IN INDIA

Strength for Today and Bright Hope for Tomorrow

Volume 12 : 9 September 2012

ISSN 1930-2940

Managing Editor: M. S. Thirumalai, Ph.D.

Editors: B. Mallikarjun, Ph.D.

Sam Mohanlal, Ph.D.

B. A. Sharada, Ph.D.

A. R. Fatihi, Ph.D.

Lakhan Gusain, Ph.D.

Jennifer Marie Bayer, Ph.D.

S. M. Ravichandran, Ph.D.

G. Baskaran, Ph.D.

L. Ramamoorthy, Ph.D.

Assistant Managing Editor: Swarna Thirumalai, M.A.

## Iconic and Echoic Memory in Children with Learning Disability

Vinaya Ann Koshy, Intern B.Sc. Speech and Hearing

Jyothi Thomas, Intern B.Sc. Speech and Hearing

Ms. Theaja Kuriakose, M.Sc., Speech and Hearing

Ms. Meghashree, M.Sc., Speech and Hearing

### Abstract

The present study focused on the iconic memory and echoic memory in children with learning disability (LD). A total of 35 subjects participated in the study. The subjects were divided into two groups. Group I consisted of fifteen children with LD and group II consisted of twenty normal children. All the subjects belonged to an age range of 8-12 years. Standardized line drawn pictures of frequently occurring nouns were taken as stimuli from Early Language Training Kit (Karanth, 1999).

Language in India [www.languageinindia.com](http://www.languageinindia.com)

12 : 9 September 2012

Vinaya Ann Koshy, Intern B.Sc. Speech and Hearing, Jyothi Thomas, Intern B.Sc. Speech and Hearing, Ms. Theaja Kuriakose, M.Sc., Speech and Hearing and Ms. Meghashree, M.Sc., Speech and Hearing

Iconic and Echoic Memory in Children with Learning Disability

The study consisted of two tasks; first task was to check iconic memory, while the second task was to check echoic memory. For task one, fifteen slides were made with each slide having one picture. The participants were instructed in Kannada as “We will show you some pictures on the computer screen one after the other. At the end you have to name all the pictures which you have seen”. A score of '1' was given for each correct verbal response and '0' for an incorrect response. For task two, the names of the nouns (which were used in the task one) were uttered by a female native speaker of Kannada and were recorded using a SONY Digital IC recorder (ICD-P320). The recorded sample served as the stimulus. Scoring was similar to that of the task one. Results revealed that children with learning disability performed poorly in both iconic and echoic memory task compared to normal. Hence, the presence of poor memory should be considered during assessment, therapy and also while making therapeutic prognosis of children with learning disability.

**Key words: Learning Disability, Iconic memory, Echoic memory.**

## **Memory**

Memory is an active system that stores, organizes, alters and recovers information (Baddeley, 1996). There are three major processes in memory: encoding, storage and last one is retrieval. During every moment of an organism's life, sensory information is being taken in by sensory receptors and processed by the nervous system. Humans have five main senses: sight, hearing, taste, smell, and touch.

Sensory memory (SM) allows individuals to retain impressions of sensory information after the original stimulus has ceased. Cognitive studies on memory in normal individuals, functional neuro-imaging studies and neuropsychological investigations of individuals with memory loss indicate that memory is not a unitary phenomenon (Giovanello & Verfaillie, 2001). Rather, it has several functional systems which help in a unique way to encode, store and retrieve information.

Language in India [www.languageinindia.com](http://www.languageinindia.com)

12 : 9 September 2012

Vinaya Ann Koshy, Intern B.Sc. Speech and Hearing, Jyothi Thomas, Intern B.Sc. Speech and Hearing, Ms. Theaja Kuriakose, M.Sc., Speech and Hearing and Ms. Meghashree, M.Sc., Speech and Hearing

Iconic and Echoic Memory in Children with Learning Disability

264

## Two Types of Memory

The generally accepted classification of memory is based on the duration of memory retention and identifies two types of memory: short term memory or working memory and long term memory. Short-term memory allows one to recall something from several seconds to as long as a minute or a day without rehearsal. Its capacity is also very limited. Short term memory can be either in the form of verbal memory and nonverbal memory. Based on the type of stimuli it can be further classified as visual short-term memory and auditory short-term memory.

Visual memory (iconic memory) involves the ability to store and retrieve previously experienced visual sensations and perceptions when the stimuli that originally evoked them are no longer present (Cusimano, 2010). That is, the student must be capable of making a vivid visual image of the stimulus in his mind, such as a word, and once that stimulus is removed, to be able to visualize or recall this image without help. Various researchers have stated that as much as eighty percent of all learning takes place through the eye with visual memory existing as a crucial aspect of learning (Farrald & Schamber, 1973). Auditory memory involves being able to take in information that is presented orally, process that information, store it in the mind and then recall what is heard (Cusimano, 2010). Basically, it involves the task of attending, listening, processing, storing, and recalling.

Cusimano (2010) stated that children who have not developed their visual memory skills cannot readily reproduce a sequence of visual stimuli. They frequently experience difficulty in remembering the overall visual appearance of words or the letter sequence of words for reading and spelling. They may remember the letters of a word but often cannot remember their order, or they may know the initial letter and configuration of the word without having absorbed the details, that is, the subsequent letters of the word. When teachers introduce a new word, generally they write it on the chalkboard, have the children spell it, read it and then use it in a sentence. Students with good visual memory will recognize that same word later in their readers or other texts and will be able to recall the appearance of the word to spell it. Students with visual memory problems often will not. Without a good development of visual memory these

Language in India [www.languageinindia.com](http://www.languageinindia.com)  
12 : 9 September 2012

Vinaya Ann Koshy, Intern B.Sc. Speech and Hearing, Jyothi Thomas, Intern B.Sc. Speech and Hearing, Ms. Theaja Kuriakose, M.Sc., Speech and Hearing and Ms. Meghashree, M.Sc., Speech and Hearing

students fail to develop a good sight vocabulary and frequently experience serious writing and spelling difficulties.

### **Learning Disabilities and Memory**

Learning Disabilities (LD) is a generic term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical abilities. These disorders are intrinsic to the individual and presumed to be due to central nervous system dysfunction. Children with learning disability face a variety of memory problems (National Joint Committee on Learning Disabilities 1980).

It has been reported that many dyslexics have poor visual sequential memory, i.e., a poor ability to perceive things in sequence and then remember the sequence. This in turn affects their ability to read and spell correctly. Individuals with poor visual memory find it difficult to recall visual images immediately or after a long period of time. A large number of memory studies undertaken with children exhibiting reading deficiencies have shown consistently that these children, relative to their peers without disability, have difficulty with short term verbal memory tasks. Verbatim, sequential memory appears to be one area of primary deficit. These children exhibit difficulty on a large number of short term memory tasks that require recall of letters, digits, words or phrases in exact sequence (Corkin, 1974; Lindgren & Richman 1984; McKeever & VanDeventer, 1975; Ritchie & Aten, 1976).

Students with LD will often experience difficulty in developing a good understanding of words, remembering terms and information that has been presented orally. Bradley & Bryant, 1981; Hulme, 1981; Watson & Willows, 1995, reported that poor readers perform more poorly than younger typical readers on tasks requiring the recall of serial verbal information, list of words, and multisyllabic names. Merry Elizabeth Roy, Sara Paul and S.P. Goswami (2009) compared verbal memory span and sequential memory both in forward and backward order in

Language in India [www.languageinindia.com](http://www.languageinindia.com)

12 : 9 September 2012

Vinaya Ann Koshy, Intern B.Sc. Speech and Hearing, Jyothi Thomas, Intern B.Sc. Speech and Hearing, Ms. Theaja Kuriakose, M.Sc., Speech and Hearing and Ms. Meghashree, M.Sc., Speech and Hearing

Iconic and Echoic Memory in Children with Learning Disability

266

children with LD and reported that the verbal memory span was better than the sequential memory and forward ordered tasks were easier than backward order.

The review of literature suggests that the children with LD show deficits in memory. This in turn affects their ability to read and spell correctly. It has also been proposed that variations in stimuli i.e. auditory and/or visual stimuli are also important variables that can influence the performance in this clinical population. Hence, the present study attempts to study the iconic and echoic memory in children with LD.

## **Method**

**Subjects:** A total of 35 subjects were taken up for the study. All the participants were in the age range of 8-12 years. They were having Kannada (L-1) as their mother tongue and English (L-2) as the medium of instruction in their school. The participants were divided into two groups. Group 1 consisted of fifteen children with LD (8 males and 7 females) and group 2 consisted of 20 normal children (10 males and 10 females).

**Stimuli:** In order to check the iconic memory 15 line drawn pictures of frequently occurring nouns were selected from Early Language Training Kit (Pratibha Karanth, 1999). Microsoft Power Point (2007 version) slides were made with one picture on each slide. Each stimulus was displayed for duration of 30 seconds as it requires a minimum of 30 seconds to form a visual imagery. To check for echoic memory the same nouns which were used to test iconic memory was considered. A female native speaker of Kannada named these 15 pictures with an inter-word duration of 3 seconds and these were recorded using a SONY Digital IC recorder (ICD-P320). The stimulus was played using a DELL laptop and was presented through headphones.

**Procedure:** Each participant was seated comfortably in a quiet room in front of the computer screen. The environment was made as distraction free as possible by removing the potential visual distracters. All the participants were given the verbal explanation regarding the nature of Language in India [www.languageinindia.com](http://www.languageinindia.com)

12 : 9 September 2012

Vinaya Ann Koshy, Intern B.Sc. Speech and Hearing, Jyothi Thomas, Intern B.Sc. Speech and Hearing, Ms. Theaja Kuriakose, M.Sc., Speech and Hearing and Ms. Meghashree, M.Sc., Speech and Hearing

the test. The test consisted of two tasks; task1 was to check iconic memory, and the task 2 was to check echoic memory. For task 1, the participants were instructed in Kannada as “We will be showing you some pictures on the computer screen one after the other. Each picture will be displayed for 30 seconds. At the end you have to name all the pictures which you have seen”. A score of '1' was given for each correct verbal response and '0' for an incorrect response. For task 2, the instruction given was “You will be hearing few names, after listening you have to repeat all the names which you have heard”. Scoring was similar to that of the task 1.

In order to avoid the familiarity effect, each task was carried out on two different days. Statistical analyses were done using SPSS software (Version 17). Univariate analysis of variance was carried out to compare the difference in performance between normal children and children with LD.

## Results and discussion

The scores obtained for task 1 and task 2 in both the groups were subjected to statistical analysis using SPSS version 17 software. Mean scores were calculated for both task 1 (iconic) and task 2 (echoic) for both normal and children with LD. Scores obtained for task 1 and task 2 were compared between the two groups using univariate ANOVA. The results are as follows.

	Mean	Standard deviation	Sig.Value
Normal children	12.55	1.538	0.000
Children with learning disability	9.63	1.496	

Table1: Mean values for task1 for LDs and normal

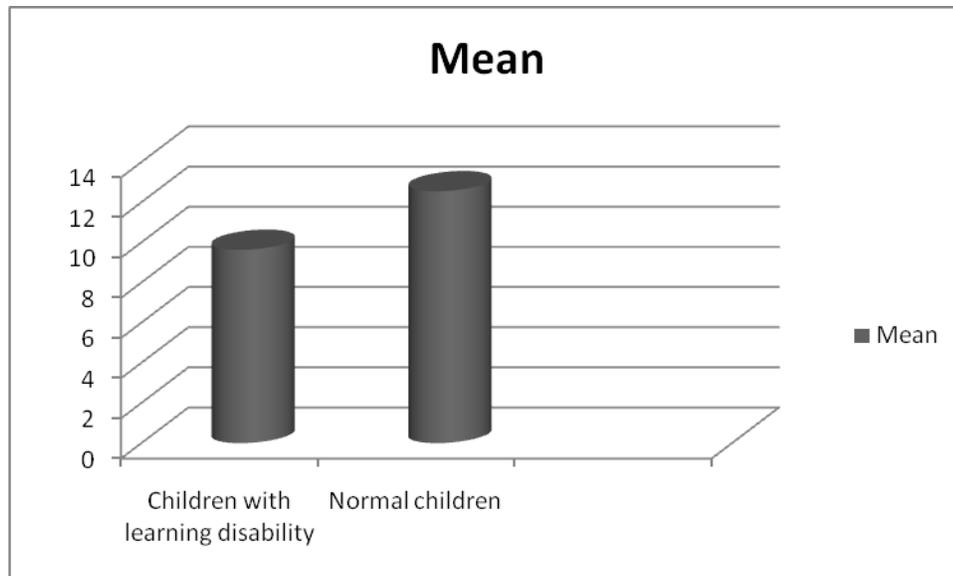
Language in India [www.languageinindia.com](http://www.languageinindia.com)

12 : 9 September 2012

Vinaya Ann Koshy, Intern B.Sc. Speech and Hearing, Jyothi Thomas, Intern B.Sc. Speech and Hearing, Ms. Theaja Kuriakose, M.Sc., Speech and Hearing and Ms. Meghashree, M.Sc., Speech and Hearing

Iconic and Echoic Memory in Children with Learning Disability

268

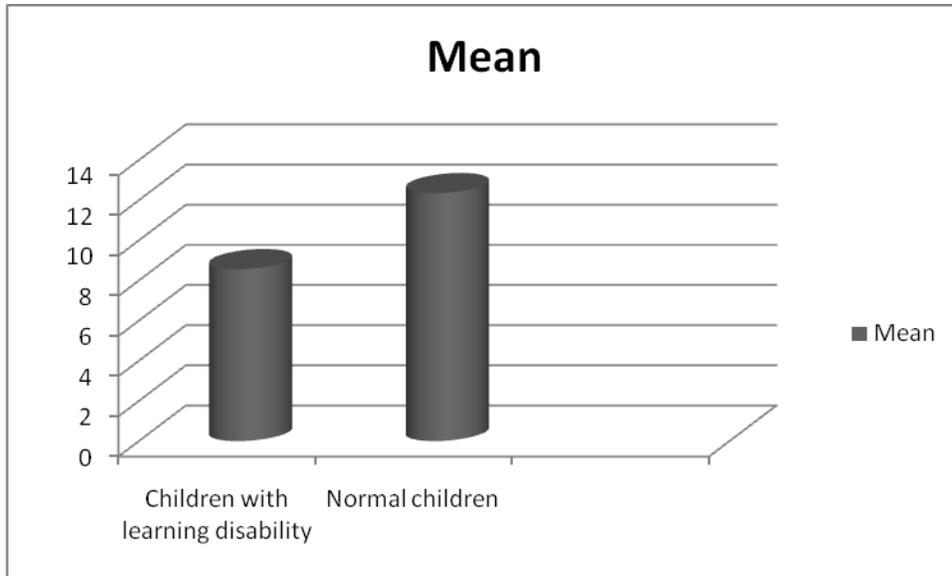


Graph1: Mean values for task 1 for LD and normal.

Table 1 and graph 1 reveals that, the mean score for task 1 in normal children were better than in children with LD. i.e. mean score for normal children for task 1 is 12.55 and for children with LD is 9.63. Results of Univariate ANOVA shows a significant difference in task one between normal children and children with LD i.e.  $p < 0.01$

	Mean	Standard deviation	Sig. Value
Normal children	12.35	1.663	0.000
Children with learning disability	8.56	1.355	

Table2: Mean values for task 2 for LD and normal



Graph2: Mean values for task 2 for LD and normal.

Table 2 and graph 2 depicts the mean score for task 2 in normal children and children with LD. Similar trend was noticed in task 2 i.e. normal children had a better mean score compared to that of LD. The mean scores obtained for normal children are 12.35 and for children with LD are 8.56. Univariate ANOVA revealed a significant difference in task 2 between normal children and children with LD i.e.  $p < 0.01$ .

The above results indicated that children with learning disability performed poorly in both iconic and echoic memory task compared to normal. Studies by Beneventi (2010) also reported working memory deficits in dyslexics. Short term memory (working memory) and long term memory systems for task that require the processing of information, appear to be clearly deficient in individuals with LD as compared to non learning disabled peers (Swanson, 1998).

Hulme and Snowling (1992) also reported poor auditory short term memory in children with LD. Bradley and Bryant (1981), and O'Shaughnessy and Swanson (1998) also reported that children with learning disability performed more poorly than typically developing children

Language in India [www.languageinindia.com](http://www.languageinindia.com)

12 : 9 September 2012

Vinaya Ann Koshy, Intern B.Sc. Speech and Hearing, Jyothi Thomas, Intern B.Sc. Speech and Hearing, Ms. Theaja Kuriakose, M.Sc., Speech and Hearing and Ms. Meghashree, M.Sc., Speech and Hearing

Iconic and Echoic Memory in Children with Learning Disability

on tasks requiring the recall of serial verbal information, lists of words, and multi-syllabic names.

## Conclusion

Children with learning disability face a variety of memory problems. It is observed both in iconic and echoic memory. These are crucial aspect of learning, thus, memory problems lead to problems in reading and writing. Hence, the presence of poor memory should be considered during assessment, therapy and also while making therapeutic prognosis of children with learning disability.

---

## References

- Baddeley, (1996). The fractionation of working memory. *Proceedings of the national academy of sciences of the united states of America*, 93 no. 24, 13468-13472
- Beneventi, H., Tønnessen, F.E., Ersland, L., & Hugdahl, K. (2010). Executive working memory processes in dyslexia: Behavioral and fMRI evidence. *Scandinavian Journal of Psychology*, 51, 192–202.
- Bradley, L., & Bryant, P. (1981). Visual memory and phonological skills in reading and spelling backwardness. *Psychological Research*, 43,193-199.
- Corkin, S. (1974). Serial- ordering deficits in inferior readers. *Neuropsychologia*, 12, 347-354.
- Cusimano, A. (2010). cited in Learning Disabilities: There is a Cure, A Guide for Parents, Educators and Physicians Revised and Expanded Second Edition, chapter 3: Visual Memory And Beyond.
- Farrald & Schamber (1973). cited in Learning Disabilities: There is a Cure, A Guide for Parents, Educators and Physicians by Addie Cusimano (2010). Revised and Expanded Second Edition, chapter 3: Visual Memory and Beyond
- Giovanello, M. S., & Verfaellie, M. (2001). Memory systems of the brain: A Cognitive Neuropsychological Analysis. *Seminars in speech and language*, 22, 107-116.
- Language in India [www.languageinindia.com](http://www.languageinindia.com)  
12 : 9 September 2012
- Vinaya Ann Koshy, Intern B.Sc. Speech and Hearing, Jyothi Thomas, Intern B.Sc. Speech and Hearing, Ms. Theaja Kuriakose, M.Sc., Speech and Hearing and Ms. Meghashree, M.Sc., Speech and Hearing
- Iconic and Echoic Memory in Children with Learning Disability

Hulme, C. (1981). The effects of manual tracing on memory in normal and retarded readers: Some implications for multi-sensory teaching. *Psychological Research*, 43, 179-191.

Karant, P. (1999). Early Language Training Kit. *Books for Change*.

Lindgren, S. D., & Richman, L. C. (1984). Immediate memory functions of verbally deficient reading disabled children. *Journal of Learning Disabilities*, 17, 222-225.

McKeever, W. F., & VanDeventer, A. D. (1975). Dyslexic adolescents: Evidence of impaired visual and auditory language processing associated with normal lateralization and visual responsivity. *Cortex*, 11, 361-378

Merry Elizabeth Roy, Sara Paul, & S.P. Goswami. (2009). Verbal Memory Span and Sequential Memory in Children with Learning Disability. *Journal of Indian Speech and Hearing Association*, 23, 19-24.

National Joint Committee on Learning Disabilities. Learning Disabilities and Young Children: Identification and Intervention - A Report from the National Joint Committee on Learning Disabilities (1980).

O'Shaughnessy, T. E., & Swanson, H. L. (1998). Do immediate memory deficits in students with learning disabilities in reading reflect a developmental lag or deficit? : A selective meta-analysis of the literature. *Learning Disability Quarterly*, 21, 123-148.

Ritchie, D. J., & Aten, J. L. (1976). Auditory retention of nonverbal and verbal sequential stimuli in children with reading disabilities. *Journal of Learning Disabilities*, 9, 312-318.

Snowling, M. J., Hulme, C., Wells, B., & Gonlandris, N. (1992). Continuities between speech and spelling in case of a developmental dyslexia. *Reading and Writing: An Interdisciplinary journal*, 4, 19-31.

Watson, C., & Willows, D. M. (1995). Information processing patterns in specific reading disability. *Journal of Learning Disabilities*, 28, 216-231

=====

Vinaya Ann Koshy  
Intern B.Sc. Speech and Hearing  
JSS Institute of Speech and Hearing  
Language in India [www.languageinindia.com](http://www.languageinindia.com)  
12 : 9 September 2012

Vinaya Ann Koshy, Intern B.Sc. Speech and Hearing, Jyothi Thomas, Intern B.Sc. Speech and Hearing, Ms. Theaja Kuriakose, M.Sc., Speech and Hearing and Ms. Meghashree, M.Sc., Speech and Hearing

Mysore-570025  
Karnataka  
India  
[vina.anna@gmail.com](mailto:vina.anna@gmail.com)

Jyothi Thomas  
Intern B.Sc. Speech and Hearing  
JSS Institute of Speech and Hearing  
Mysore-570025  
Karnataka  
India

Ms. Theaja Kuriakose, M.Sc., Speech and Hearing  
Lecturer, Department of Speech and Language Pathology,  
JSS Institute of Speech and Hearing  
Mysore-570025  
Karnataka  
India  
[thejakuriakose@gmail.com](mailto:thejakuriakose@gmail.com)

Ms. Meghashree, M.Sc., Speech and Hearing  
Lecturer, Department of Speech and Language Pathology,  
JSS Institute of Speech and Hearing  
Mysore-570025  
Karnataka  
India  
[meghashree1704@gmail.com](mailto:meghashree1704@gmail.com)

Language in India [www.languageinindia.com](http://www.languageinindia.com)

12 : 9 September 2012

Vinaya Ann Koshy, Intern B.Sc. Speech and Hearing, Jyothi Thomas, Intern B.Sc. Speech and Hearing, Ms. Theaja Kuriakose, M.Sc., Speech and Hearing and Ms. Meghashree, M.Sc., Speech and Hearing

Iconic and Echoic Memory in Children with Learning Disability