

# **LANGUAGE IN INDIA**

**Strength for Today and Bright Hope for Tomorrow**

**Volume 7 : 3 March 2007**

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.

K. Karunakaran, Ph.D.

Jennifer Marie Bayer, Ph.D.

## **MEAN LENGTH UTTERANCE AND SYNTACTIC COMPLEXITY IN THE SPEECH OF THE CEREBRAL PALSIED**

**Shyamala Chengappa, Ph.D.**

**Sapna Bhat, Ph.D.**

**Nandini Iyer, M.Sc. (Speech and Hearing)**

# **MEAN LENGTH OF UTTERANCE AND SYNTACTIC COMPLEXITY IN THE SPEECH OF THE CEREBRAL PALSIED**

**Shyamala Chengappa, Ph.D., Sapna Bhat, Ph.D. & Nandini Iyer, M.Sc. (Speech and Hearing)**

---

---

## **MEAN LENGTH OF UTTERANCES IN CHILDREN**

Communication is the most essential base for getting along with others and for satisfying both intra and interpersonal needs. The pattern of language development is sequential universally, unless and until interference is caused due to any sensory or motor deficits, the cognition also plays a very important role in the language acquisition.

Present study aimed at comparing the mean length of utterance values of the normal (4-11 yrs) with that of cerebral palsied. Brown (1973) first found that at comparable MLU's children used the same grammatical structures up to the MLU of about 4. He observed that chronological age was not a good predictor of language development, this he said after analyzing longitudinally, the speech samples of 3 children-Adam, Eve and Sarah. Brown's stages are designated with Roman numerals and are as follows:

Stage I: Semantic roles and syntactic relations (MLU 1.0 – 2.0 morphemes or 1.75 morphemes). Here child puts noun-verb sequences together.

Stage II: Grammatical morphemes and modulation meaning (MLU = 2.0 – 2.5 with average of 2.25 morphemes). The child starts to change word endings to portray grammar.

Stage III: Modalities of simple sentences (MLU = 2.5 – 3.25 with average of 2.75 morphemes). The child begins to use questions and imperatives.

Stage IV: Embedding (MLU = 3.25 – 3.75 with average of 3.5 morphemes). The child begins to use complex sentences.

Stage V: Co-ordination (MLU = 3.75 – 4.25 with average of 4 morphemes). The child may use connectors and more functions.

## **LANGUAGE IMPAIRMENTS IN THE CEREBRAL PALSIED CHILDREN**

Language impairments in the cerebral palsied children were overlooked until recently, because of the very obvious disruptions of speech. Among the speech and language problems found in the group of cerebral palsied, Denhoff and Robinavlt (1968) reported delayed speech, agraphia, anomia, alexia, stuttering and voice disorders. Myers (1965) studied the language ability of a large group of spastic and athetoid types of cerebral palsied. He found spastic to be superior to athetoids on tasks involving the automatic sequential level whereas the athetoids were superior on language tasks at the representational level.

A comparative study of grammatical development in normals and cerebral palsied children was conducted by Singer (1976). Spontaneous responses were recorded and categorized using a list of 87 grammatical forms. Each of these forms was scored as being present or absent in each child. A total number of points earned out of 87 were the competence. The data revealed that the cerebral palsied children did not speak less during a given unit of time but used fewer age appropriate and more agrammatical forms than the ones used by non-brain injured. The brain-injured children in this study did not appear to acquire many of grammatical strategies even with advancing age.

## **INDIAN STUDIES ON THE SPEECH-LANGUAGE OF THE CEREBRAL PALSIED CHILDREN**

Indian studies are few and far in between, Ananthamurthy (1972) found that delayed speech was predominant among the cerebral palsied population. He did not discuss the details of the speech and language disorder in detail. First attempt to explore the speech and language characteristics of cerebral palsied was made by Shyamala (1987). She studied cerebral palsied children, grouped into spastic, quadriplegics, and athetoids using spontaneous and elicited speech and language samples. Poor intelligibility and dysarthria characterized the speech of the cerebral palsied, other specific characteristics were limited grammatical categories, limited lexicon, deficient phonology, deficient lexicon, deficient phonology, deficient grammatical categorizes and disfluency in speech, etc. The differences among subgroups were evident at phonological level more than other levels.

Thus, as is evident from the review, the speech-language characteristics of cerebral palsied have to be described and investigated in detail. This study aims at studying the MLU and syntactic complexity in cerebral palsied children.

## METHOD

### SUBJECTS

20 normal children and 10 cerebral palsied children in the age group of 4-11 years were taken. Two types of cerebral palsy, namely, Spasticity and Athetosis, were considered, since they were the most common types available. The 10 cerebral palsied children were divided into 2 groups based on degree of neuromuscular involvement, 5 children each with mild and moderate involvement. The judgment regarding severity was based on reports by physiotherapists and neurologists. The details of subjects are given in Table 1.

**Table 1: Age, Sex, Type and Severity of 10 Cerebral Palsied Children**

Subject	Age/Sex	Type	Severity
S1	4/M	A	Moderate
S2	5/M	SQ	Mild
S3	6/M	SQ	Mild
S4	7/M	SQ	Mild
S5	8/F	SQ	Moderate
S6	9/F	SQ	Mild
S7	9/F	SQ	Moderate
S8	9/M	SQ	Mild
S9	10/M	A	Moderate
S10	10/M	SQ	Moderate

Subjects were all from middle class and had Kannada as mother tongue. Only subjects with hearing within 20dB and I.Q. of 80 or above were considered for the study.

The subjects were chosen such that they had minimal exposure to speech therapy (less than 6 months) or no therapy at the time of study. The primary mode of communication

of these children was verbal but gestures and pantomime along with verbal communication was noted.

## **PROCEDURE**

Initially, time was spent to build a working rapport with the child. The actual data collection commenced when the child was comfortable and he/she could verbalize freely with the investigator. Spontaneous speech and elicited/narrative speech (using toys and pictures) were used to collect the samples of language from each child. Spontaneous speech samples were recorded with the parent's or/and investigator around. The child's interaction in natural free play with toys and picture books were also recorded.

Each session lasted 20-30 minutes or longer depending on each child's comfort. Tape recordings and diary keeping of each session of speech interaction were made. A language sample consisting of a minimum of 100 utterances were collected during spontaneously and elicited speech. Verbal interactions included interactions between mother-child and mother-child-investigator.

## **ANALYSIS**

The 100 utterances elicited from each child were analyzed in terms of its mean length of utterances and their syntactic complexity. Mean length of utterances for words [MLU (W)] and mean length of utterance for morphemes [MLU (M)] were calculated for each of the 30 subjects. (See Appendix-A for rules to calculate MLU).

Analysis of syntactic complexity was three fold:

- a) Count of lexical categories in the child's speech
- b) Description of the syntactic pattern
- c) Count of the number of words in each utterance, e.g. 1 word utterance, 2 word utterance, etc.

## **RESULTS**

The present study aimed at exploring the mean length of utterance and syntactic complexity in the group of 20 normal children and in a group of 10 children with cerebral palsy in the age range of 4-11 years.

Results for MLU (words) and MLU (morphemes) in normals and cerebral palsy is given in the table 2. The group of normal children ranging in age from 4.5-10.11 years with means age of 7.6 years had a MLU (w) of 2.4. The MLU (m) of the normal group was 4.14. As is evident from table 2, MLU did not increase with increase in age for both words as well as morphemes.

**Table 2: Distribution of MLU(W) and MLU (M) as a Function of Age**

Age group in years	MLU (W)		MLU (M)	
	N	CP	N	CP
4-5	2.44 (006)	0.93	4.21 (0.09)	1.13
5-6	1.95 (0.46)	1.95	3.61(1.28)	3.07
6-7	2.15 (0.78)	1.47	3.62(1.27)	2.33
7-8	2.19 (0.38)	1.91	3.44(0.83)	2.64
8-9	3.13 (0.54)	2.91 (0.07)	5.16(0.17)	3.20(0.08)
9-10	2.62 (0.57)	2.23 (0.27)	4.25(1.23)	3.24(0.60)
10-11	2.80 (0.57)	1.95 (0.92)	4.68(1.09)	3.24(1.26)
	2.47	1.80 (0.58)	4.14	2.69(0.9)

The cerebral palsied group had children in the age range of 4.6 and 10.11 years with a mean age of 8.1 years. The MLU (w) in this group was 1.80 and MLU (m) was 2.69. From Table 1, it is apparent that when the cerebral palsied were ordered into a group in terms of their age, age did not emerge as a definite variable for language skills. In these age groups also subjects with milder involvement of the neuromuscular systems showed higher MLU (w) and MLU (m).

A comparison between the normal and cerebral palsied group on the MLU criterion revealed that MLU for words and morphemes was reduced in the cerebral palsy population when compared to age matched normal group. The test revealed difference to be significant at 0.01 levels.

To determine syntactic complexity of the utterances following were analyzed:

- a) The order and frequency of lexical/grammatical categories in the sample.

b) The arrangements of these categories within an utterance

In normals, nouns were always produced more frequently than verbs and verbs more than pronouns. The normals exhibited the following order arranged in decreasing frequency of occurrence in the sample:

Nouns, verbs, pronouns, adjectives, adverbs, kinship terms, conjunctions, negation, quotatives, interrogatives, reduplication, affirmation and onomatopoeia.

In cerebral palsied children also the nouns were produced more frequently than verbs and verbs were more abundant than pronouns. The order nouns, verbs, pronouns, adjectives, kinship terms, adverbs, negation, interrogation, conjunction, onomatopoeia, quotation, affirmation and reduplication, in decreasing frequency.

The most common pattern seen in normals was pronouns/nouns + adjective/adverb and compound verb. The use of single word utterances was rare compared to multiple words.

In cerebral palsied group, sentence pattern was pronoun/noun + adjective/adverb and verb, which differed minimally from normals. Single word utterances predominated and these were predominantly nouns and small percentage of negatives, affirmatives and kinship terms were also used singly. The compound verbs used by the cerebral palsied group consisted of fewer morphemes than normal group and inflections were also reduced compared to normals.

## **DISCUSSION**

The MLU (m) and MLU (w) did not show corresponding variation with increase in age. This finding shows good agreement with Miller and Chapman's (1981) conclusions that the variability in MLU increases after 5 years of age.

The t-test values showed significant difference between normals and cerebral palsied. This finding is in consonance with findings of Klee, Sehaferi, May, Membrino and Mougey (1989), where predicted MLU of the language-impaired group was lower than MLU of normal age-matched controls.

Cerebral palsy is a neuromuscular disorder, which results in affecting the movement of articulators. This may in turn result in uncoordinated movement and reduction in number of utterances.

In terms of order and frequency of lexical catalogues, there were quantitative and qualitative differences between normals and cerebral palsied. The qualitative difference was exhibited in terms of hierarchical order of lexical categories, which underwent slight modifications in the cerebral palsied. This could be attributed to articulatory insufficiency in cerebral palsied.

The quantitative difference was in terms of frequency of occurrence of these lexical categories in the speech of cerebral palsied. The cerebral palsied group showed less frequent occurrence as seen in reduced number of nouns, adverbs, conjunctions, quotatives and reduplication. The frequency of occurrence of verbs and adjectives were also slightly lowered when compared to the normal group.

The disordered group showed a greater frequency of occurrence of pronouns, kinship terms, negation, interrogatives, affirmation and onomatopoeia. Subjects in the normal and cerebral palsied group did not always follow the same hierarchical ordering of lexical categories. However, the general trend in both the groups remained unchanged. The individual variations were observed only for lexical categories occurring less frequently in their speech.

The ordering of lexical categories in both the groups were in keeping with the basic positional characteristics (SOV) pattern of the Kannada language (Schiffman 1979). No deviance was seen in the ordering of lexical categories except for absence of compound verbs in cerebral palsied speech. All of these findings concur with findings reported by Shyamala (1987).

## CONCLUSION

Results suggest that MLU proved to be useful as a gross indicator of the language disordered group as compared to the normals. It was especially useful when supplemented with information regarding syntactic description in both normal and cerebral palsied. Age does not emerge as a definite variable for the language skills in the cerebral palsied but may be the influence would have been more detrimental in terms of severity. A further controlled study would reveal the interaction between age and severity, as influencing factors.

This study reveals significant deviance in speech of cerebral palsied. Similar studies with larger samples could throw more light on the language acquisition in cerebral palsied.

---

---

## REFERENCES

- Anantha Murthy, H. S.** (1972). Speech problems in cerebral palsy: A critical analysis. *Journal of All India Institute of Speech and Hearing*, 3, 98-99.
- Beeghly, M. & Cicchetti, D.** (1987) cited by D. Thal, E. Bates, & V. Bellugi (1989) Language and Cognition in two children with William's Syndrome. *Journal of speech and hearing disorders*, 32, 489-500.
- Brown, R.** (1970). *Psycholinguistics - selected papers*. New York :The Free Press.
- Brown, R.** (1973). *A First Language*. Cambridge: Harvard University Press.



- Denhoff, E. & Holden, R. H.** (1951). Pediatric aspects of cerebral palsy. *Journal of Pediatrics*, 39, 363-373.
- Karlin, I. W. & Strazzulla, M.** (1952). Speech and Language problems of mentally deficient children. *Journal of Speech and Hearing Disorders*, 17, 286-294.
- Klee, T., Schaffer, M., May, S., Membrino, I., & Mougey, K.,** (1989). A comparison of the age MLU relation in normal and specifically language-impaired preschool children. *Journal of speech and hearing disorders*, 54, 226-233.
- Lenneberg, E. H.** (1968) cited in D. M. Moorehead & A. E. Moorehead (Eds) (1976). *Normal and Deficient Child Language*. Baltimore: University Press
- Menyuk, P.** (1971) cited in K. Nelson (Ed) (1980). *Children's Language*. Vol.2, New York: Gardner Press Inc.
- Miller, J. F.** (1981). *Assessing language production in children: Experimental Procedures*. Baltimore: Harvard University Press.
- Miller, J. F.** (1988) cited in D.Thal, E. Bates, & U. Bellugi (1989). Language and cognition in two children with William's Syndrome. *Journal of Speech and Hearing research*, 32, 489-500.
- Miller, J. F.,& Chapman, R.** (1979) cited by J. F. Miller (1981). *Assessing Language production in Children – Experimental Procedures*. Baltimore: University Park Press.
- Myers, F.** (1965). A study of language disabilities in cerebral palsied children. *Journal of Speech and hearing Research*, 8, 129-137.
- Ryan, J.** (1977) cited in J. G. deVilliers; P.A.deVilliers (1973). *Language Acquisition*. London: Harvard University Press.
- Schiefelbusch, R.** (1972) cited in R. Shiefelbusch, & D.D.Bricker (Eds) (1982). *Early Language intervention*. Baltimore: University Press.
- Semmel, M. I., Barritt, L.S., Bennett, S.W.** (1970) cited in J.G.DeVilliers & P.A. deVilliers (1978). *Language Acquisition*. London: Harvard University Press.
- Shyamala, K. C.** (1987). *Speech and language behaviours of the cerebral palsied*. Unpublished Doctoral Thesis. Mysore: University of Mysore.
- Singer, L.** (1976). Grammatical development in normal and cerebral palsied children in Raffles-Engel W.V. & Lebrun Y (Eds). *Baby Talk and Infant Speech*. London: Harvard University Press.
-

## APPENDIX-A

### RULES FOR COMPUTATION OF MEAN LENGTH OF UTTERANCE [MLU]

(Adaptation from Brown (1970))

1. The first 100 utterances were transcribed. Utterance during story narration was mandatorily included in the count.
  2. Unintelligible or partially intelligible utterances were omitted from the count.
  3. Stutterings (Marked by repeated effort at a single word) and all repetitions were counted as one word. Repetition for emphasis should be counted as two words.
  4. Fillers such as mm or oh are not counted, but no, yes, etc. was counted as words.
  5. All compound words were counted as two words if the child used the constituent morphemes separately in two different linguistic context – Eg. Birthday.
  6. All inflections (possession, plural, tenses) were counted as separate morphemes.
  7. Imitations and elliptical answers to questions which gave the impression that the utterance would have been more complete if there had been no eliciting questions (Eg. What is that? `My box`)  
were counted.
  8. Rote passages such as nursery rhymes, songs or prose passages which have been memorized and which may not be fully processed linguistically by the child were omitted.
  9. All partial utterances which are interrupted by outside events or shift in child's focus were excluded.
  10. MLU was calculated using the following formula:  
$$\text{MLU (W/M)} = \text{Number of words/morphemes}$$
- 
- 

Shyamala Chengappa, Ph.D.  
Department of Speech Pathology  
All India Institute of Speech and Hearing  
Mysore 570 006, India  
Email [shyamalakc@yahoo.com](mailto:shyamalakc@yahoo.com)

Sapna Bhat, Ph.D.  
Dept. of Speech Pathology  
M.V. Shetty College of Speech & Hearing  
Mangalore  
Karnataka State, India

Nandini Iyer, M.Sc. (Speech and Hearing)  
Department of Speech Pathology  
All India Institute of Speech and Hearing  
Mysore 570 006, India