

Some Aspects of Syntax in 4-7 Year Old Typically Developing Malayalam Speaking Children: A Computerized Approach

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Abstract

The study was designed to investigate the developmental pattern of certain aspects of syntax of Malayalam speaking children in the age range of 4 to 7 years and to find the relationship between Mean Length of Utterance (MLU) and the syntactic development. Three groups of Malayalam speaking children in the age range of 4-7 years with equal age intervals were considered for the study. Using the SALT Software the speech samples elicited through story retell task and conversation task were analyzed for the MLU in words(w) and MLU in morphemes(m), Type Token Ratio (TTR) and other grammatical structures. The results revealed a developmental trend across age groups in MLU. Although MLU did not correlate with age, it correlated with the other grammatical structures studied such as plurals, causatives, Person-Noun-Gender (PNG) markers, tenses, case markers, conditionals, conjunctives, adjectives, adverbs, nouns, verbs, causatives, auxiliaries, interrogatives and negatives. Amongst these structures, adjectives, tense markers and PNG markers showed a significant developmental trend. In addition there was no gender difference in the acquisition of grammatical structures. These findings have implications in the assessment and intervention of children with developmental language disorders.

Key words: syntax, mean length of utterance, SALT software

Although we use it every day, and even if we all have strong opinions about its proper form and appropriate use, we rarely stop to think about the wonder of language. Language is a psychological or cognitive property of humans. That is, there is some set of neurons in the head firing away that allows producing a set of letters, and there is some other set of neurons in the head firing away that allows translating these squiggles into coherent ideas and thoughts. There are many subsystems working simultaneously. Language consists of several components which are interrelated and linked with each other, amongst which the 'syntax' studies the level of language that lies between words and the meaning of utterances: sentences. The study of syntax is the aspect of how we subconsciously get from sounds to meaning. Syntax is the central component of human language which is a rule system that governs the structure of sentences. It specifies the order that the words must take and the organization of different sentence types.

The learning of language by a child is not just the imitation of an adult model but is an insightful progressive discovery of grammatical structures by the child. This process of acquisition is dependent on the ability of the child to perceive and organize the environment and the language that is part of the environment; in addition the child must relate these two. The development of language and speech, use of rules appropriately occurs over the first few years of life of the child. Children acquire syntax and

morphology from its very beginning until the end of pre-school years. During these few years children develop an extremely rich and intricate linguistic system. They go from expressing just a few simple meanings in two words in a systematic manner to expressing abstract and complex ideas in multiword sentences. Brown (1973) introduced the Mean Length of Utterance (MLU) as measure of syntactic development. The addition of each morpheme reflects the acquisition of new linguistic knowledge.

Speech-language pathologists have been involved in the assessment of children's language since 1950s. The intervening years have brought diversity in the theories and practices of language assessment. Changing views of the nature of language have spawned new procedures for sampling and describing language and for categorizing deviations from normal language. MLU is one such procedure that has been used for language acquisition studies. Mean Length of Utterance in words-MLU (w) and Mean Length of Utterance in Morpheme-MLU (m) are being used for language analysis. MLU was reported by many authors as a measure that indicates the syntactic complexity and that it correlates with age (Bowerman, 1970; Devilliers & Devilliers, 1973; Miller & Chapman, 1981; Rondal, Ghiotti, Bredart & Bachelet, 1987; Blake, Quotaro & Onorati, 1993). Deepak, Karanth and Deepak (2009) reported that higher the MLU, higher was the percentage of usage of the grammatical forms.

But this viewpoint was contradicted by many who stated that MLU does not have a linear

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relationship with age (Klee & Fitzgerald, 1985; Conant, 1987; Chan, McAllister & Wilson, 1998). Scarborough, Wyckoff and Davidson (1986) and Rollins, Snow and Willet (1996) cautioned in using MLU as a language match. Chabon, Kent-Udolf and Egolf (1982) stated that beyond the age of five years MLU does not correlate well with age. Though lot of research has gone into the field of MLU, studies still need to be conducted to confirm the reliability of MLU. Of late, language sample analysis using computer software is becoming popular in the field as they are time efficient.

Several studies have been carried out in different parts of the world on typically developing children to study the acquisition of various grammatical categories such as negation (Bellugi, 1967; Vijayalakshmi, 1981; Prema & Rangan, 2002; Sreedevi & Thirumalai, 2002), 'wh' questions (Smith, 1933; Erwin-Tripp, 1970; McGrath & Kunze, 1973; Quigley, Wilbur & Montanelli, 1975; Sreedevi & Thirumalai, 2002), 'tense' markers (Berko, 1958; Vijayalakshmi, 1981; Sreedevi & Thirumalai, 2002) etc. These studies throw light into the process of learning several aspects of language by a child. Further, other language acquisition studies have shown regularities in linguistic performance and acquisition in typically developing children. Popular belief and scholarly opinion have generally maintained that girls are more advanced in language development than boys (Templin, 1957). However studies have also reported of no gender differences in the acquisition of language (O'Donnell, Griffin & Norris, 1967).

Although there are many studies catering to the needs of speech-language pathologists and language teachers in Western countries in terms of studying the various aspects of morphology and syntax, developing norms for aspects of language development etc., one cannot blindly follow the patterns and norms established for a set of population. Here, though the question of universality in language development presents itself for argument, there is necessity to test this question of universality. To test the above issue, studies have to be conducted on different sets of population of children speaking different languages.

Studies of language development in typically developing children are essential to understand the delays in development and to provide effective and efficient methods of rehabilitation. Moreover, due to the tremendous increase in literacy rate among the general public especially in the females and the early exposure of the children to a wide variety of environment and technology, they develop many language aspects at a much earlier age than previously reported. Hence to understand and study the

development of language, especially in the present day population is crucial.

Several studies have been conducted in the past to investigate a wide range of aspects in language acquisition viz. the development of grammatical structures and syntax, assess whether a linear relationship exists between age, MLU (m) and the grammatical development etc. The results of such studies are mixed as mentioned in the review, in that some studies report of a linear relationship while others deny the existence of such a relationship. Since the relationship between these aspects are inconsistent which is revealed through several studies, further research is required to study the association between these in different languages and age groups.

In the Indian context, in the recent past, although there have been studies conducted on typically developing children to explore the different developmental aspects of grammar, such studies are limited. Further, there is a dearth of research in India with respect to studying the pattern of language development in different Indian languages and analyzing the data through the use of computer software programs specifically developed for the purpose. India offers a highly challenging and interesting ground for studying language acquisition because of her multilingual environment.

Considering that language development may vary across culture and the data with respect to language acquisition is limited in the Indian context, there is a dire need to carry out detailed studies examining language acquisition. Hence this study was planned which to certain extent will help in overcoming this dearth of information regarding the developmental pattern of syntax. Thus the specific objectives considered were (1) to examine the pattern of development of syntax of Malayalam speaking children in the age range of 4 to 7 years (2) to determine whether there is a relationship between MLU and the acquisition of aspects of syntax in Malayalam speaking children and (3) to analyze gender differences, if any, in the acquisition of syntax.

Method

Participants: Three groups of native Malayalam speakers in the age range of 4-7 years with 10 subjects each in the three age ranges of 4-5, 5-6, 6-7 were considered for the study. The subjects considered were matched for their socio-economic status. Equal number of males and females were selected in each age group. It was made sure that the subjects had no obvious medical history, no history of any sensory deficits or

any sort of speech and language disturbances, no oromotor weakness or deficits and no evident emotional or behavioural disturbance. The WHO Ten-question disability screening checklist (Singhi, Kumar, Malhi & Kumar, 2007) was used to rule out any disability.

Ethical procedures were used to select the participants. The parents were explained about the purpose and the procedures of the study through the phone or in person and an informal verbal and written consent was taken.

Test material: The speech samples were collected using two tasks-Story retell and conversation tasks.

Task 1: Story retell task: The examiner showed the child a sequence of five pictures that illustrate the critical events in a single-episode story that the examiner narrated. The story that was selected here was "The Thirsty Crow."

Task 2: Conversation task: The subjects were asked simple questions about general information pertaining to themselves such as, "How do you come to school every day?", "What all games do you play at school?" etc. The examiner also used toys to elicit speech sample from the subjects.

Procedure: The children were tested at schools where they were studying. A classroom which was away from noisy environment of the school was selected. The data was collected after building rapport with the child and only when the child was comfortable with the investigator. Positive reinforcement was given whenever necessary. The child was made to sit on a chair and the investigator sat opposite to the child. A portable digital sound recorder was (Sony Digital Recorder ICD-320) was used to record the speech sample. Language samples with approx. 150 utterances were collected.

Analysis

Transcription: The examiner listened to the audio recording and transcribed verbatim. The middle 100 utterances were considered for the analysis so as to avoid introductory or closing conversation effects that might bias results, such as shyness or problems focusing on the task at hand. Transcription reliability was conducted on a random 30% of the transcripts and was found to be 98% for individual morphemes.

Segmentation: The language samples were formatted to comply with SALT (Systematic Analysis of Language Transcripts) (Miller & Chapman, 2008) transcription conventions and guidelines. Each utterance was given a speaker code, and inflectional morphemes within words were divided by using a slash. All the grammatical structures were coded

according to the conventions for obtaining the code summary option provided in the SALT Software. The definitions of utterance segmentation provided in the SALT manual were used in the present study. According to the SALT manual (Miller & Chapman, 2004), a P-unit represents documentation of a complete thought. Thought completion is generally characterized by a rise or fall in intonation and the presence of a pause. When conjoined and complex sentences do not contain pauses or changing intonation, then thought completion is determined by independent and dependent clauses. In these instances, P-units are separated after two conjoined independent clauses. In the present study the samples were segmented using the P-units.

Analysis using SALT Software: The segmented transcripts were fed into the computer using SALT conventions specified in the software. The SALT (Miller & Chapman, 1985) software (2008) was used to analyze the transcripts for Mean Length of Utterance (MLU) in words (w) and MLU in morphemes (m) and other various grammatical structures. During the analysis disfluencies such as repetitions, fillers, interjections were not considered. Compound words, yes/no responses to questions, abandoned and interrupted utterances, non-verbal utterances, and imitative utterances were not considered. The standard measures option was used to obtain the Type Token Ratio (TTR), MLU (w) and MLU (m) and code summary option was utilized to obtain the scores of other grammatical structures.

Statistical analysis: The raw data was tabulated and further suggested to quantitative analyses. SPSS version 16.0 was used for detailed analyses. The statistical mean scores were obtained and other statistical procedures were applied for further analysis.

Results and Discussion

The results have been presented and discussed under different sections.

I. Development of syntactic aspects: The mean scores of Type Token Ratio (TTR), MLU (w), and MLU (m) were computed and compared across the three age groups. The comparison revealed that these were higher for the 6-7 year age group compared to the 4-5 year and 5-6 year age group. The mean and standard deviation values for these parameters and other aspects of syntax have been depicted in Table 1.

The results of MANOVA revealed that there was no significant difference in the three parameters TTR, MLU (w) and MLU (m) considered across the three age groups. No significant difference in the

scores of TTR across age groups found in this study is in consonance with the study by Klee (1992) who also found similar results. Further Karl Pearson's correlation coefficient was carried to find the relationship between age and MLU. The results revealed that there was no significant correlation between the two ($r = 0.22$, $p > 0.05$). These results are in consonance with the finding by Brown (1973), Scarborough et al. (1986) and Chabon et al. (1982) who found that the relationship between age and MLU was nonlinear beyond the age of 4 years. Further Miller and Chapman (1981) added that beyond the MLU of 4 years, the children would have control over diverse sentence structures and that MLU would probably depend more on the nature of the interaction rather than on the limits of children's grammatical knowledge.

Muma (1986) suggested that when MLU exceeds 4.0, knowledge of formal grammatical mechanisms can no longer be indexed by increments in MLU and contends that the sequence of acquisition and use of grammatical structures is a more useful measure.

A detailed analysis of the language sample revealed the presence of the grammatical structures

such as nouns, verbs, adverbs, auxiliaries, adjectives, conjunctions, tenses, PNG markers, case markers, conditionals, causatives, interrogatives, and negatives and these were analyzed and subjected to statistical analysis.

In the first set, the grammatical structures such as nouns, verbs, adverbs, auxiliaries, adjectives and conjunctions were studied to examine differences in these across age groups. On comparing the mean values of these structures across the age groups, depicted in Table 1, it was seen that 6-7 year old group had higher mean values for all the structures except auxiliaries. The results of MANOVA revealed that there was no significant difference in all the parameters except for the category of adjectives across age groups [$F(2, 27) = 5.89$, $p < 0.05$]. The Table 2 depicts the F-values across the grammatical structures. The Duncan Post Hoc analysis revealed that the 6-7 year old age group was significantly different from the 4-5 year old group and 5-6 year group at 5% level of significance. This shows that there was a significant increase in the usage of adjectives as a function of age.

Table 1. Mean and standard deviation (SD) scores obtained for Type Token Ratio (TTR), Mean Length of Utterance in words and morphemes {MLU (w), and MLU (m)} and the different aspects of syntax across age groups

Aspects of syntax	4-5 years		5-6 years		6-7 years		Total	
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
TTR	1.48	0.13	1.44	0.21	1.44	0.13	1.42	0.16
MLU (w)	7.38	1.55	7.00	0.83	8.142	1.25	7.46	1.27
MLU (m)	12.88	2.20	12.22	1.35	13.61	2.28	12.87	2.01
Nouns	49.80	18.34	47.50	11.53	56.70	12.83	51.33	14.58
Verbs	35.20	10.81	36.70	10.85	41.30	8.52	37.73	10.11
Adjectives	13.10	5.40	11.60	5.87	19.50	5.08	14.73	6.31
Adverb	11.50	5.56	10.80	4.80	16.30	5.57	12.86	5.68
Auxiliaries	12.30	6.44	10.80	6.59	10.70	3.71	11.26	5.58
Conjunctions	9.60	3.94	11.30	7.33	11.00	5.83	10.50	5.70
Past tense	28.10	13.0	17.50	5.87	22.40	5.83	22.66	9.65
Present tense	6.10	5.60	6.90	5.98	5.80	2.65	6.36	4.82
Future tense	3.30	1.70	7.60	4.22	11.50	2.87	7.56	4.53
PNG Person	17.90	6.31	9.90	5.04	14.80	7.06	14.20	6.85
PNG Number	4.50	2.50	3.70	3.97	4.80	2.44	4.33	2.95
PNG Gender	7.40	2.22	12.40	2.17	13.70	1.76	11.16	3.40
Case markers	16.00	9.53	17.30	8.19	21.80	8.38	18.36	8.78
Conditionals	1.50	0.83	3.50	4.56	3.30	1.33	2.50	2.80
Causatives	1.00	0.00	1.00	0.00	1.16	0.40	1.08	0.28
Negations	2.88	1.70	4.20	2.44	4.5	1.87	3.53	2.04
Interrogations	3.16	2.71	2.14	1.34	1.85	1.21	2.35	1.81

Table 2. *F values for the six grammatical structures*

Grammatical structures	F(2,27)
Nouns	1.08
Verbs	0.98
Adjectives	5.89*
Adverbs	3.20
Auxiliaries	0.24
Conjunctions	0.21

* $p < 0.05$

The mean values of the auxiliaries were higher in the younger group (Table 1) possibly because of the widely varying rates of language acquisition (Brown, 1973). Moreover, the lack of developmental trend with respect to auxiliaries in the current study could also be due to the task's sensitivity to the contextual variables such as the nature of the interaction, rapport between the examiner and the child, the person with whom the child is interacting and the child's intent to communicate (Miller & Chapman, 1981). Yet another factor that could have possibly influenced the responses was the task used in eliciting the speech sample. Since it was a story retell task it could be that it underestimated the grammatical capabilities of the older group. Similar finding was also reported in a study by Slobin and Welsh (1973).

Following this the mean values of past, present and future tense were compared and it was seen that the mean values of the future tense showed a developmental trend with higher mean values for the higher age group, however the past tense usage in the younger group was higher. MANOVA revealed a significant difference in the usage of only past tense [$F(2, 27) = 3.55$, $p < 0.05$] and future tense [$F(2, 27) = 17.40$, $p < 0.05$]. The Table 3 depicts the F values for all the three tense markers. The Duncan Post Hoc analysis revealed that for the usage of past tense markers there was a significant difference between 4-5 year old group and 5-6 year old group and for future tense markers, there was a significant difference among all the three age groups at 5% level of significance.

The poorer scores obtained by the older group with respect to the usage of past tense could be because of the nature of the response given. For example, when questions regarding what they liked to do were asked to the older group, they provided with appropriate answers using future tense, however the younger groups often described what they did and what they saw. Hence the speech sample consisted mostly of past tense than the other tenses. According to George and Krantz (1981), young children bring in more utterances from their topic of interest and it has been seen that fewer than 20 percent of the preschooler's responses

may be relevant to the partner's previous utterance. DeThorne, Johnson and Loeb (2005) also stated that variables such as pragmatics influence the linguistic output.

Table 3. *F values of the tense markers*

Tense markers	F(2,29)
Past tense	3.55*
Present tense	0.13
Future tense	17.40*

* $p < 0.05$

The PNG markers were compared for their means across age groups and it was found that among the three markers, the person marker was used maximally by the 4-5 year age group. The number markers were used almost equally by all the three age groups and the gender marker usage increased with the increase in age. The application of MANOVA for PNG markers revealed that there was a significant difference between age groups for person marker [$F(2, 27) = 4.23$, $p < 0.05$] and for gender marker [$F(2, 27) = 25.9$, $p < 0.05$]. The Table 4 depicts the F-values for the PNG markers. The Duncan Post Hoc analysis revealed that there was a significant difference in the usage of person marker between the 4-5 year old and 5-6 year old groups and a significant difference was seen for the gender marker between all the three age groups at 5% level of significance.

Table 4. *The F values of the PNG markers*

PNG markers	F(2,29)
PNG person	4.24*
PNG number	0.36
PNG gender	25.99*

* $p < 0.05$

A developmental trend was seen in the usage of gender marker while the same was not seen in the person marker across age groups. This could be attributed to the fact that the younger group used more person markers to describe an event within an utterance (marked on the basis of P-unit as per the SALT guidelines) compared to the older group as their MLU was higher.

Case markers were then considered for analysis. For case markers the mean values showed a developmental trend, that is the usage of these increased with age. However, the results of MANOVA revealed that there was no significant difference between the three age groups.

A non-parametric test was applied for the structures namely conditionals, causatives,

interrogatives and negatives due to their lesser occurrence in speech samples in all the three age groups. The mean value of all the four structures revealed that the usage of all the three categories increased with age except for the category of interrogatives. This could be attributed to the inquisitive nature of preschoolers (4-6 year group). Kruskal Wallis test revealed that there was no significant difference in all the four structures. Such findings could be attributed to the elicitation task used and the task's sensitivity to the nature of interaction and the material presented. This could also be attributed to the highly varying rates of acquisition. On the whole, it was seen that the causatives were used the least by children in all the age groups and the highest occurring grammatical structures were the nouns followed by the verbs.

II Relationship between MLU and the grammatical structures: Karl Pearson's correlation coefficient was applied to examine the relationship between the MLU and the usage of grammatical structures and the results revealed that there was a significant correlation between MLU(w) ($r = 0.48$) and MLU(m) ($r = 0.49$) and the usage of different grammatical structures at 5% level of significance. Figure 1 represents the correlation between MLU (w) and MLU (m) and grammatical structures through scatter plot.

Thus the results of the present study revealed that the acquisition of different aspects of syntax was directly proportional to the MLU measures. This is in consonance with the study by Devilliers and Devilliers (1973) and DeThorne et al., (2005) who documented that MLU (m) in the English language correlated with the development of morphological and syntactic skills in young children. Deepak et al., (2009) also found that acquisition of syntax was directly proportional to the MLU in Konkani speaking children between 3 and 5 years of age.

Karl Pearson's correlation coefficient was also applied to examine the relationship between MLU (w) and MLU (m). The results revealed that there was a significant correlation between MLU (w) and MLU (m) ($r = 0.92$ $p < 0.05$). The findings are in consonance with similar studies carried out in other language too.

Researchers in Dutch, Irish, Icelandic and English languages have found correlations of 0.98–0.99 between MLU (m) and MLU (w) (Arlman-Rupp, de Haan & Van de Sandt-Koenderman, 1976; Hickey, 1991; Thordardottir & Weismer, 1998; Parker & Brorson, 2005).

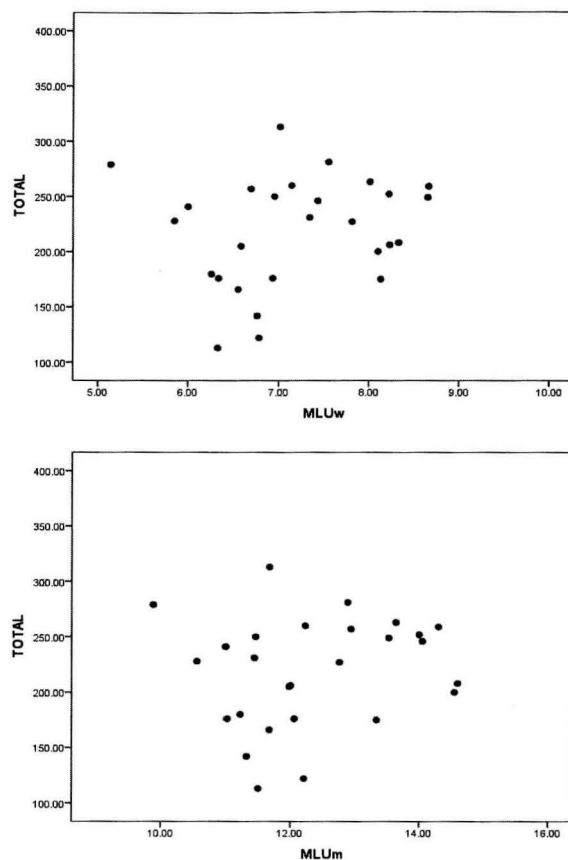


Figure 1. Scatter plot of the correlation between MLU(w), MLU (m) and grammatical structures.

This finding suggested that MLU (w) can be used as effectively as MLU (m) as a measurement of a child's gross language development. Though the current study supports the finding that MLU (w) is also a good measure as MLU (m), to know the development in inflections it is important to analyze the MLU in terms of morphemes. Further MLU (m) would allow the comparison of development between languages of different types, thereby assisting in cross linguistic studies.

III. Gender differences in the acquisition of syntax: Mann Whitney test revealed that there was no significant difference between males and females in all the age groups. This is in consonance with the study by O'Donnell, Griffin and Norris (1967). Though Deepak et al., (2009) found differences in MLU in words as well as in morphemes and in the range and variety in the usage of grammatical structures between males and females, such findings were not observed in the present study. This study supports the view of Macaulay (1977) who stated that the female superiority of language might be more of an apparent nature than a

real one. If any difference exists it is only of transient nature in language acquisition.

Conclusions

The results of the present study revealed that there was a developmental trend across age groups in MLU, although not significant. A positive correlation was found between MLU and other grammatical structures. That is, with increase in MLU (w) as well as MLU (m) the usage of other grammatical structures also increased. The results also revealed that MLU did not correlate with age. Among the grammatical structures occurrence of structures like plurals, causatives, PNG markers, tenses, case markers, conditionals, conjunctives, adjectives, adverbs, nouns, verbs, causatives, auxiliaries, interrogatives, negatives were seen. Amongst these structures, adjectives, tense markers and PNG markers showed a significant developmental trend. The structures that were most commonly used by the children in the age range of 4-7 were nouns followed by verbs and the least frequently used were the causatives. In addition, that there was no gender difference in the acquisition of grammatical structures.

This study provides an insight into the development of language especially the syntax in the Malayalam speaking children. However, caution must be taken while drawing inferences from this study given the small number of participants. Nevertheless, this study has important implications for early childhood assessment and intervention. The results suggest that it is crucial to examine several aspects of language particularly the morphosyntax since only then can the relationships can be revealed. The knowledge of the language acquisition in typically developing children speaking different languages belonging to different cultures would further help in the early identification and assessment of children with developmental language disorders and will help speech-language pathologists to arrive at an accurate and appropriate diagnosis. This would in turn contribute to the provision of early intervention services.

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