

Agrammatism in Children with Mental Retardation

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Abstract

Children master the intricacies of their native language before they are able to tie a knot, jump rope, or draw a circle. This achievement is so expected that most people rarely give a second thought about how children accomplish this remarkable feat. The child must be aware of and use the rules of syntax before one can be said to have adequate command of language. One group of children in whom the development of language does not occur as expected are children with mental retardation. These children fail to acquire language in the normal course, are bound to be at disadvantage in many aspects of their living. The present study is on the grammatical structures used by children with mental retardation. Language samples of thirty typically developing children and language age matched children with mental retardation were analyzed using Index of Productive Syntax (Scarborough, 1990). While adapting the manual to Malayalam language few grammatical constructions were removed and few modifications were made based in the grammatical structure of Malayalam language. It could be concluded from the present study that in children with mental retardation a number of grammatical structures fail to emerge but develop in the same way as seen in typically developing peers. A period of agrammatic language production is evident in the spoken output of children with mental retardation.

Key words: agrammatism, Index of Productive Syntax, mental retardation

Language is so intricately woven in to human life that it is expected to be present throughout and we seldom think about its emergence and development. Language development is a process starting early in human life. Language starts off as recall of simple words without associated meaning, but as children grow, words acquire meaning, with connections between words being formed. As a person gets older, new meanings and new associations are created and vocabulary increases as more words are learned.

Children begin to combine words to create simple two word utterances, also called telegraphic speech. Gradually, children's sentences increase in length as they add more semantic and grammatical elements. This growth is measured in terms of child's mean length of utterances (MLU; Brown, 1973). At the early stages of language development, open class categories dominate the child's vocabulary (nouns, verbs, adjectives, adverbs) but as MLU grows, children use increasing closed-class terms such as pronouns, prepositions, conjunctions. At around 3 years, children engage in simple sentences, which are 3 word sentences. Simple sentences follow adult rules and get refined gradually. Grammatical morphemes get added as these simple sentences start to emerge. By 3-5 years, children continue to add grammatical morphemes and gradually produce complex grammatical structures. By 6-10 years, children refine the complex grammatical structures such as passive voice.

The current view of the language performance of retarded children holds that they acquire language in the same sequence as normal children but at a slower rate (Miller, Chapman & Bedrosian, 1977). The complexities of grammar tend to be difficult for mentally retarded children.

Given the complex nature of language and communication, there are a number of structural and functional aspects of the language system to be assessed. Language sample analysis is an appealing assessment tool since it has superior sensitivity and specificity in identifying children with language impairments (Aram, Morris & Hall, 1993).

Language sampling in natural situations and descriptive analysis of the same are yet to be attempted with disordered population like mental retardation. Various assessment methods have been used to account for grammar development in the English language. There is a dearth of such studies with regard to Malayalam language. This study will describe and try to account for the agrammatism in Malayalam speaking mentally retarded children. Hence the study was planned.

The first aim of the study was to adapt Index of Productive Syntax (Scarborough, 1990) into Malayalam and to use this broad descriptive analysis of the Index of Productive Syntax (Scarborough, 1990) to account for agrammatism in Malayalam speaking mentally retarded children in 3 different age groups: 3- 4 years, 4-5 years and 5-6 years. Also we compared the syntactic development seen in these children with their typically developing peers. This study also aimed at studying the correlation of Malayalam Language Test (MLT, Rukmini, 1994) and IPSyn (Scarborough, 1990).

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Method

Participants: Language samples were collected from thirty native Malayalam speaking typically developing children in the age range of 3-6 years and thirty language age matched children with mental retardation. The children were placed into three groups with 10 children in each group according to their language age. The groups were: Group 1: 3-4years, Group 2: 4-5 years and Group 3: 5-6 years.

The subject selection criteria followed for typically developing children was that they should have no sensori-motor deficits, no cognitive impairments, no social or emotional deficits, no history of any sort of speech and language disturbances and also non-incidence of dyslexia in their families. Language age matched thirty Malayalam speaking children with mental retardation constituted the other group. Only those children in whom the data on psychometric evaluation was available were selected. Children in this group had IQ between 70 to 35 based on standard scores of intelligence tests, no associated conditions like cerebral palsy, no neurologic problems and no impairment in vision and hearing.

Out of the thirty children with mental retardation, eighteen of them were diagnosed to have mild mental retardation while twelve children had moderate mental retardation. Thirteen children had attended therapy for more than one year while seventeen children attended therapy for less than a year.

Test material: MLT (Rukmini, 1994) was used to identify the language age of the participants. The test consists of two sections: semantics and syntax. Reception and expression of every item under each section could be estimated. The language sample was analysed using Index of Productive Syntax (Scarborough, 1990).

Procedure: The present study consisted of five different phases:

Phase 1: Data collection: A portable digital sound recorder (Sony Digital Recorder ICD- 320) was used to record the language sample. Few of the typically developing children were tested at schools in a classroom away from the noisy environment and few children were from the neighbourhood. Children with mental retardation were tested in the clinical settings. Once rapport was established the child was asked to narrate a familiar story. Children were then engaged in conversation about their family, interests and hobbies. Conversation was open ended and the interaction was not strictly adult directed.

Phase 2: Language sample transcription and analysis: Each utterance of the tester and the subject was transcribed verbatim within a few hours of recording on the same day. The clues which were provided during

recording sessions were noted. Within each transcript the language corpus to be analyzed was defined as the child's first 100 successive, intelligible utterance excluding imitations, self repetitions and routines.

Phase 3: Adaptation of the test material (IPSyn) to Malayalam: The 56 items in IPSyn were translated to Malayalam with the help of a Linguist. Several items in the IPSyn had to be modified according to Malayalam grammatical structure and few items which were not in accordance with the Malayalam grammar had to be removed. Changes were made for the following items: noun phrases: two word noun phrase after verb or preposition (N6), this is not in agreement with the Malayalam syntactic structure where the verb follows the object and not vice-versa, catenative (V5) the occurrence of which is rare and varies with different dialects, bitransitive predicate (S14) and fronted or centre embedded subordinate clause (S19). The occurrence of such kind of grammatical units are unusual and it was not included in the manual. The transcribed language sample was analyzed and scored following the scoring protocol outlined in Index of Productive Syntax (Scarborough, 1990). The IPSyn adapted to Malayalam consisted of 51 sub items under 4 sections:

Noun phrases: Proper, mass, or count noun, Pronoun or prolocative, (excluding modifiers), Modifier (including adjectives, possessives, and quantifiers), Two word noun phrase (nominal preceded by article or modifier), Article used before a noun, Plural suffix, Two word noun phrase before verb, Three word noun phrase (det/mod + Mod + N), Adverb modifying adjective or nominal, any other bound morpheme on N or adjective.

Verb phrases: Verb, Particle or preposition, Prepositional phrase (prep + NP), Copula linking two nominals, Auxiliary be, do, have in V5 VP, Progressive suffix, Adverb, Modal preceding verb, Third person singular present tense suffix, Past tense modal, Regular past tense suffix, Past tense auxiliary, Medial adverb, Copula, modal, or auxiliary for emphasis or ellipses (uncontractible context), Past tense copula.

Questions/ Negations: Intonationally marked question, Routine do/go or existence /name question or wh pronoun alone, Simple negation (neg + X) : neg = no(t), can't, don't ; X= NP, VP, PP, adj, Initial wh - pronoun followed by verb, Wh- question with inverted modal, copula, or auxiliary, Negation of copula, modal, or auxiliary, Yes/ no question with inverted modal, copula, or auxiliary, Why, when, which, whose, Tag question.

Sentence structures: Two word combination, Subject – verb sequence, Verb- object sequence, Subject – verb – object sequence, Conjunction, Sentence with two verb phrases, Conjoined phrases, Infinitive without catenative, marked with to Let/ make/help/

watch introducer, Adverbial conjunction, Propositional complement, conjoined sentences (except for imperatives, will usually have sub + predicate in each clause), Wh-clause, Sentence with three or more VPs, Relative clause, marked or unmarked, Infinitive clause : new subject, Gerund.

Phase 4: Grammatical analysis of the speech sample of the children with mental retardation: The transcribed samples were analyzed and scored using IPSyn. While scoring zero, one, or two points per item could be awarded, so that the total score become the sum of these points over all items. It was scored in such a way that if two examples of each from each item was encountered it will be given a score of two, one point if only one example is encountered and zero if it is absent. Then the sub items were totalled and sum of the sub items gave the total score of test for a particular sample. The IPSyn manual which was adapted to Malayalam was used for analyzing the language sample of children with mental retardation in the age range of 3- 6 years. The same scoring procedure which was used for normative samples was conducted.

Phase 5: Correlation of MLT and IPSyn scores: The total percentage scores of Malayalam Language Test and The Index of Productive Syntax was used to find out the correlation between the two tests.

Results and Discussion

Adaptation of IPSyn to Malayalam: As a part of adaptation of Index of Productive Syntax to Malayalam, the language sample elicited from the children with mental retardation were analyzed using Index of Productive Syntax under four main sections, Noun Phrase (NP), Verb Phrase (VP), Question / Negation (Q/N), and Sentence Structure (S) with a total of fifty one sub items. The total percentage score of the sub items for the three groups were calculated. Among this the items which scored less than 50% were removed from the manual. The following sub items were scored poorly by typically developing children: (N5) article, (N7) plural suffix, (N11) three word noun phrase, (V9) modal preceding verb, (V11) past tense modal, (V14) modal adverb, (V15) copula, modal/auxiliary/ellipses, (Q6) wh question with inverted modal, copula or auxiliary, (Q7) negation of copula, (Q8) yes/no question with inverted modal, copula or auxiliary, (Q10) why/when/whose/which questions, (S5) conjunction, (S9) introducer, (S11) propositional complement, (S13) wh clause, (S16) relative clause, (S17) infinitive clause, (S18) gerund. These sub items were not considered while analyzing IPSyn to children with mental retardation.

Account of agrammatism: In order to account for the agrammatism in orally trained Malayalam speaking children with mental retardation and typically developing children, descriptive statistics was used. The mean and standard deviation values were computed for each of the main sections (NP, VP, Q/N, and S) separately.

Following the descriptive statistics, non parametric tests Mann-Whitney test and Kruskal- Wallis test were employed to estimate the significant difference for each of the items for both groups and ages respectively. In this section, the following items were found to be significantly different across the two groups: modifiers, article used before nouns, plural suffix, adverb, particle or preposition, prepositional phrase, copula linking two nominals, progressive suffix, adverb, modal, third person singular present tense suffix, past tense modal, past tense auxiliary, medial adverb, copula, modal or auxiliary for emphasis or ellipsis, past tense copula, simple negation, initial wh- pronouns followed by verb, wh questions with inverted modal, sentence with two noun phrase, conjoined phrases, infinitive without catenative, let/make/help introducer, adverbial conjunction, propositional complement, conjoined sentences, sentence with three or more noun phrase and gerund.

Significant difference were not found for the following items: proper nouns, pronoun, two word noun phrase, two word noun phrase before verb, three word noun phrase and other bound morphemes, verbs (V1), auxiliary, regular past tense suffix, intonationally marked question, routine questions, negation of copula, yes/no question, why when which whose, tag questions, two word combination, subject verb sequence), verb object sequence, subject- verb- object sequence, conjunction, wh clause, relative clause, infinitive clause.

From Table 1, it is evident that in children with mental retardation three word noun phrases, bound morphemes, adverbs and plural suffixes are acquired at a later stage when compared to proper nouns, pronouns, modifiers and articles. Under verbs, they are found to acquire copula or modal auxiliaries for emphasis or ellipsis, third person singular forms, past tense modal, past tense auxiliary, medial adverb and past tense copula only at a later stage. Negation of copula, yes/no questions, wh- questions, tag questions were found to be more difficult for children with mental retardation when compared to intonationally marked questions and routine questions. Wh-clause, relative clause and infinitive clause conjunctions, adverbial conjunctions and gerunds were the difficult structures observed in children with mental retardation.

Table 1. Frequency of occurrence of items in decreasing order

Noun Phrase	Verb Phrase	Questions/ Negation	Sentences
Proper Noun , Pronoun	Verb, Particle, Auxillary	Intonationally marked questions and Routine questions	Two Word Combination, Subject Verb Sequence
Modifier, Two Word noun phrase, article	Prepositional Phrase, Progressive Suffix, Adverb, Modal Preceding Verb, Regular Past Tense Suffix, Past Tense Auxiliary	Simple negation, Initial Wh Pronoun, Wh- Question with Inverted Modal,.	Object –Verb sequence, S-O-V sequence, Conjoined Phrases, Conjunction
Three word noun phrase, Bound morphemes, Adverb, Plural Suffix	Copula or Modal Auxillaries for emphasis or ellipsis, Third Person Singular Forms Past Tense Modal, Past Tense Auxillary, Medial Adverb And Past Tense Copula	Negation of Copula, Yes/No Questions, Wh- Questions, Tag Questions	Wh- Clause, Relative Clause And Infinitive Clause Conjunctions, Adverbial conjunctions, Gerund

Several factors can be attributed to the above mentioned results. One such factor is the property of the input which includes: input frequency, perceptual salience and semantics of the functors. The results can also be due to the interaction between these factors. The increased frequency of occurrence of the items such as articles, adverbs, two word and three word noun phrases and other bound morphemes in normal children than children with mental retardation could be attributable to the properties of the input such as input frequency. This is supported by the studies conducted by Brown (1958) and Naigles and Hoff-Ginsberg (1998).

The second property of input could be the perceptual salience which involves several factors such as phonetic substance, susceptibility to heavy stress and pitch, possibility of occurring in utterance final position. Blandell and Jensen (1970) claimed that this may help in the imitation of children. Brown (1976) reported that in English the inflections such as plurals, possessives, regular past tense on verbs are not even fully syllabic and that there is a tendency for the above mentioned features to be lost. Thus the chances of occurrence of these items in their speech will be less. While in German, some of these inflections are syllabic. He also reported that there can be variations in these factors depending on the language of the child who is acquiring the grammar and the stage of the development. As Malayalam is a syllabic language, these parameters are stressed and thus there is a chance for early development of these in both the groups.

Brown and Fraser (1963) in their study of imitated morphemes in various syntactic classes showed that functors were more often omitted than

content words. Occurrence of proper nouns and pronouns in both the groups can be attributed to this.

In the verb section, the mean values were found to be more for the items V2 (particle or preposition), V14 (medial adverb) and V15 (copula, modal for emphasis or ellipsis) in children with mental retardation than typically developing children. Mean values for V3 (prepositional phrase), V4 (copula linking two nominals), V7 (progressive suffix), V8 (adverb), V9 (modal), V10 (third person singular), V11 (past tense modal), V13 (past tense auxillary) and V16 (past tense copula) were found to be more in the typically developing group. This can be attributed to the fact described by Tamar Keren- Portnoy (2005) as children practice the use of new verbs by repeated trial and occasional error they generate a large number of structure most of them which would be erroneous. These erroneous forms will be shaped into the correct form by parental and environmental input while children with developmental delays such as mental retardation do not receive adequate resources for language development through the natural process of trial and error. The same reason can be attributed to the absence of a significance difference in the other items such as verbs, auxiliary and regular past tense suffix for the two groups.

These findings were supported by Elber and Wijnen (1992) who suggested that language improves through practice. He also suggested two variables, intensive use and errors as the evidence for practice, which can be accounted for the difficulty and gradualness with which learning first occurs for most of the structures. Above mentioned findings were contradicted by Tamar Keren-Portnoy and Tamar Parush (2005). According to these authors the modern theories ignore the factors such as practice

and problem solving in the development of syntactic structures. They posit rote learning and learning triggered by innate knowledge as the major processes through which syntax is initially acquired. Rote learning could be attributed as a factor for the presence of the items particle or preposition, copula linking two nominals, copula or modal for emphasis or ellipsis in children with mental retardation when compared to that of the typically developing children.

In the question / negation section the item Q3, simple negation follows negation + sentence structure (IPSyn, Scarborough, 1990) which is not applicable to the syntactic structure of the Malayalam language. In Malayalam the structure used is sentence + negation which is an adult form and is hence developed at a later stage. This accounts for the decreased score of the item in the typically developing group. This is supported by Bloom (1970) and Bowerman (1973) who questioned the universality of acquisition of negation + sentence

structure reported by McNeill (1970). Formal training provided to the children with mental retardation probably facilitated the greater use of the adult form of negation.

Factors like personality type, environment, culture etc. may interfere with the performance of the children in both the groups. But in the group of children with mental retardation, the formal training given to this group facilitates their better performance. The reduced mean values of the other items such as Q4 (initial wh- pronoun) and Q6 (wh- question with inverted modal) in typically developing children may be because of the same reason.

In the study by Tamar Keren-Portnoy and Tamar Purush (2005) where they studied naturalistic production samples of six children, the order of acquisition of sentence structures are as follows: SV, VO and SVO. The similar order of acquisition is found in the present study.

Table 2. Age wise comparison of NP for typically developing (TD) and children with mental retardation (MR)

Groups	N1	N2	N3	N4	N5	N7	N8	N8	N9	N10	N11
TD	1.0	1.0	0.1	1.0	0.0*	0.08	0.0*	0.6	0.0*	0.5	1.0
MR	1.0	1.0	1.0	1.0	0.0*	0.0*	0.0*	0.1	0.0*	0.1	1.0

*p< 0.05

N1-proper noun; N2-pronoun, N3-modifier, N4-two word noun phrase, N5-article, N7- plural suffix, N8- two word noun phrase, N9- three word noun phrase, N10- adverb, N11- other bound morpheme.

Table 3. Age wise comparison of Verb Phrase for typically developing (TD) and children with mental retardation (MR)

Groups	V1	V2	V3	V4	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16
TD	1.00	0.00*	0.00*	0.00*	0.00*	0.03*	0.00*	0.04*	0.00*	0.00*	0.00*	0.00*	1.00	0.09	0.05
MR	1.00	1.00	0.00*	1.00*	0.00*	0.00*	0.20	1.00	0.00*	1.00	0.10	0.00*	0.03*	0.00*	1.00

*p< 0.05

V1-verb, V2- particle, V3- prepositional phrase, V4- copula, V6- auxiliary, V7- progressive suffix, V8- Adverb, V9- modal preceding verb, V10- third person singular present tense, V11- past tense modal, V12- regular past tense suffix, V13- past tense auxiliary, V14- medial adverb, V15- copula, modal or auxiliary for emphasis or ellipsis, V16- past tense copula.

Table 4. Age wise comparison of Questions / Negation for typically developing (TD) and children with mental retardation (MR)

Groups	Q1	Q2	Q3	Q4	Q6	Q7	Q8	Q9	Q10
TD	1.00	1.00	0.00*	0.04*	1.00	1.00	1.00	1.00	1.00
MR	1.00	1.00	0.00*	0.00*	0.01*	1.00	1.00	1.00	1.00

*p< 0.05

Q1: Intonationally marked questions, Q2: Routine questions, Q3: simple negation, Q4: initial wh pronoun, Q6: wh- question with inverted modal, Q7: negation of copula, Q8: yes/no questions, Q9: wh- questions, Q10: tag questions.

Table 5. Age wise comparison of Sentence structure for typically developing (TD) and children with mental retardation (MR)

Groups	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S15	S16	S17	S18
TD	1.00	1.00	0.10	0.50	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	1.00	0.00*	1.00	1.00	0.09
MR	1.00	1.00	0.04	0.01	0.00*	0.72	0.00*	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

*p<0.05

S1- two word combination, S2- subject verb sequence, S3- verb object sequence, S4- subject verb object sequence, S5- conjunctions, S6- sentences with two verb phrases, S7- conjoined phrases, S8- infinitive, S9- introducer, S10- adverbial conjunction, S11- propositional complement, S12- conjoined sentences, S13- Wh- clause, S15- sentence with three or more verb phrases, S16- relative clause, S17- infinitive clause, S18- gerund.

Kruskal-Wallis test was employed for the age wise comparison of the two groups (TD and children with mental retardation) separately. Following the Kruskal Wallis, Mann Whitney test was carried out for those subitems which are significantly different to see which age group is significantly different from the other for both the groups. When typically developing children were compared across age groups 3-4 years and 4-5 significant difference were found for the following items: N5 (article before noun), N8 (two word noun phrase before verb), N9 (three word noun phrase), V2 (particle or preposition), V3 (prepositional phrase), V4 (copula linking two nominals), V8 (adverb), V10 (third person singular), V11 (past tense modal), V13 (past tense auxiliary), V12, S6, (sentence with two noun phrase), S7 (conjoined phrases), S8 (infinitive without catenative), S9 (let/make/help introducer), S10 (adverbial conjunction), S11 (propositional complement), S12 (conjoined sentences), S15 (sentence with three or more noun phrase ($Z=2.3$, $p<0.05$), S6 (sentences with two verb phrases), S7 (conjoined phrases), S8 (infinitive), S9 (introducer), S10 (adverbial conjunction), S11 (propositional complement), S12 (conjoined sentences), S15 (sentence with three or more verb phrases).

Across 3-4 years and 5-6 years significant difference were found for the following items: N5- article, N8- two word noun phrase, N9- three word noun phrase, V2- particle, V3- prepositional phrase, V4- copula, V6- auxiliary, V7- progressive suffix, V8- Adverb, V9- modal preceding verb, V10- third person singular present tense, V11- past tense modal, V12- regular past tense suffix, V13- past tense auxiliary, Q3: simple negation, Q4: initial wh pronoun followed by verb S5- conjunctions, S6- sentences with two verb phrases, S7- conjoined phrases, S8- infinitive, S9- introducer, S10- adverbial conjunction, S11- propositional complement, S12- conjoined sentences, S15- sentence with three or more verb phrases. Between 4-5 and 5-6 years the following items were found to be significantly different: V10 (third person singular present tense), V11 (past tense modal), V12 (regular past tense suffix), V13 (past tense auxiliary), Q3 (simple negation), S5 (conjunction), S10 (adverbial conjunction) and S11 (propositional complement).

In the case of children with mental retardation, between ages 3-4 and 4-5 the following items were significantly different: three word noun phrase, auxiliary, conjoined phrases, progressive suffix, past tense auxiliary, simple negation, initial wh pronoun, conjunctions. Between 3-4 and 5-6 the significantly different items were: article, plural suffix, two word noun phrase, three word noun phrase, prepositional phrase, auxiliary, progressive suffix, third person singular present tense, past tense auxiliary, simple negation, initial wh pronoun followed by verb conjoined phrases. Between 4-5 and 5-6 years, article, plural suffix, prepositional phrase, third person singular present tense, past tense auxiliary, medial adverb, questions with initial wh pronoun, wh- question with inverted modal, conjunctions and conjoined phrases were significantly different.

In above findings it is clear that, the age group 4-5 years was significantly different from 3-4 and 5-6 years in most of the items and the significant difference noted between the age groups 4-5 and 5-6 years is very less when compared with that of 3-4 years. This pattern of development was seen in the group of children with mental retardation also. That is, the performance was better for the children of 4-5 years compared to the other age groups. This can be explained by the reason that most of the major linguistic development is occurring in the age range of 4-5 years and above. According to Tunmer and Bowey (1984) this age period is called as the middle childhood (the period from 4-8 years). He suggested that there is continuation of earlier development, besides an emergence of a new kind of linguistic functions evident in this period. He referred this new kind of linguistic functions as metalinguistic development. This was also supported by Hakes (1980). This finding holds good for both the groups, but there will be delay in case of children with, as suggested by Quigley, Power and Steinkamp (1977) and Geffner and Freeman (1980).

Mann Whitney test and Kruskal Wallis was conducted to check for the significant difference of the total scores of sub items and overall score of IPSyn with respect to the variables which can affect the performance of the children with mental retardation such as severity of retardation and the duration of therapy taken. The mean and standard

deviation scores for the IPSyn items are given in the table.

Comparison of the syntactic development in children with mental retardation and their typically developing peers: The mean score percentage of the overall total of IPSyn was used to compare across the groups with respect to age groups. The differences are shown in the Figure 1. It is evident from the graph that, the performance of children with mental retardation was below the performance of typically developing children across all the age groups but follows the similar trend. In longitudinal research, the order of mastery of syntactic structures closely parallels the patterns observed in the normal case (Tager-Flusberg & Calkins, 1990).

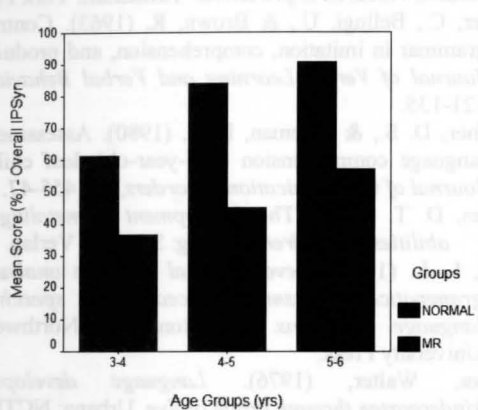


Figure 1. Comparison of IPSyn scores across ages for children with mental retardation and typically developing peers.

From the above discussion it can be concluded that retarded children acquire syntactic and morphological knowledge in the same way as the typically developing children but at a later stage. There is also a generally acceptable increasing trend in the performance with increasing age which is applicable to both the groups. Independent t test was conducted to test for the significant difference of the total scores of the subitems and overall score of IPSyn with respect to the variables which can affect the performance of the children with mental retardation such as IQ, duration of therapy taken. The other variables which can affect the performance such as age of identification and age at which intervention began etc. has not been considered in the study. The result showed that there was no significant difference for the variables of severity and duration of therapy on the items. This could be due to the interaction of various factors such as age of identification and age at which intervention began.

Table 6. Mean (M) and Standard Deviation (SD) of the total score of NP, VP, Q/N, SS and overall total across the variables IQ and duration of therapy taken

Variable		M / SD	NT	VT	QT	ST	IPST
IQ	Mild	M	12.68	12.22	7.47	9.84	40.78
		SD	2.33	4.44	2.34	2.43	10.86
	Moderate	M	13.36	14.18	7.45	10.18	45.54
		SD	2.15	2.56	2.16	1.53	7.62
Duration	<1 year	M	12.88	12.76	7.64	10.05	42.35
		SD	2.36	4.50	2.31	2.33	1.09
	1-2 years	M	13.00	13.23	7.23	9.8	42.76
		SD	2.1	3.16	2.35	1.86	8.9

Correlation between IPSyn and MLT: The correlation between IPSyn and MLT for the two groups (typically developing children and children with mental retardation) was estimated using Pearson correlation after the score was converted into percentage scores. The results revealed a high correlation between IPSyn and MLT for both the groups.

The scatter plot given in Figure 2 reveals high correlation between IPSyn and MLT. As the IPSyn scores increased, there was an almost equivalent increase in the MLT scores. The typically developing children were found to have higher scores while lower scores were evident for children with mental retardation.

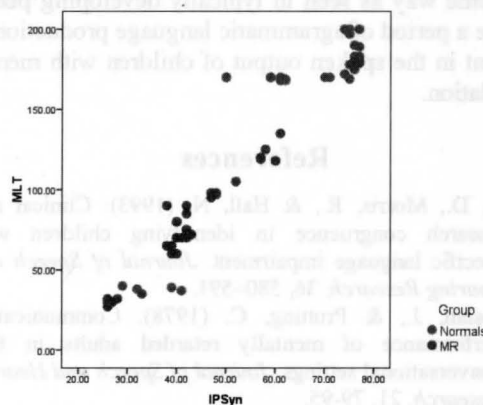


Figure 2. Scatter plot depicting correlation between IPSyn and MLT.

Conclusions

The present study intended to study the grammatical structures used by children with mental retardation. Language samples of thirty typically developing children and language age matched children with mental retardation were analyzed using Index of Productive Syntax (Scarborough, 1990). While adapting the manual to Malayalam language few grammatical constructions were removed and few modifications were made based in the grammatical structure of Malayalam language. From

the statistical measures carried out, it was evident that the children with mental retardation exhibit difficulty in the following grammatical structures: bound morphemes, articles, copula, modal auxiliaries, third person singular forms, past tense modal, past tense auxiliary, medial adverb and past tense copula. In the question and negation section only intonationally marked questions and routine questions were correctly produced by children with mental retardation. In sentence structure section, only two word combination, subject verb sequence, conjunction, wh- clause, relative clause and infinitive clause were seen to be produced similar to the language age matched typically developing children. Other forms including sentences with two noun phrases, conjoined phrases, adverbial conjunctions and gerunds were found to be poorly developed in children with mental retardation.

The performance of children with mental retardation was below the performance of typically developing children across all the age groups but followed a similar trend. As age increased, the performance on both MLT and IPSyn increased. There was also high correlation between IPSyn and MLT for both the groups of children.

It could be concluded from the present study that in children with mental retardation a number of grammatical structures fail to emerge but develop in the same way as seen in typically developing peers. Hence a period of agrammatic language production is evident in the spoken output of children with mental retardation.

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