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A Comparative Analysis of the Language of Mentally Retarded and Non-Retarded Children

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A COMPARATIVE ANALYSIS OF THE LANGUAGE OF MENTALLY RETARDED AND NON-RETARDED CHILDREN

by

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INTRODUCTION

Language and mental retardation have been closely related as indicated by the considerable research in these areas. Inasmuch as intellectual activity usually is assumed to be mediated with the help of language, it is not surprising that mental retardation, intelligence and language should be conceived of as closely related; and high intercorrelations that exist among measures of these phenomena support the presumed relationship among the phenomena. In fact, Binet and Simon (1914) classified degrees of mental retardation in terms of communicative disorders. Other students of language have suggested that mental age is more closely related to the level of language functioning than intelligence (Ainsworth, 1958). And Jordan (1967) writes, "The connection which has been posited most consistently is that [which exists] between retardation and language defects as independent entities which are connected by a causal relationship." (p.22) Reasons given for this statement are consistent reports in the literature of a delay in speech in the retarded child, usefulness of mental age as a predictor of articulatory proficiency, possibility of relating language disorders to developmental disorders of early origin, and language seen as having a high mediating value in the cognitive and behavioral process.

The fact that there are high intercorrelations between these different phenomena means just that -- and says little about their causal relationship. Regardless of the nature of the relationship,

the presence of a qualitative difference between the retarded and the non-retarded is undeniable when one considers the end-product of language development. It remains unclear, however, whether observed differences are due to the operation of a different process of language development for the retarded persons or due to the same process operating at a much slower rate. Further, it is not clear whether these differences are due entirely to mental retardation or whether they are due, at least in part, to an "arrest" in language development produced by a failure of the environment to provide an appropriate setting for language development.

Semmel (1967) hypothesizes that children first process language by means of primitive sequential skills based on "associative bonds" between linguistic units; once abstract grammatical skills are developed, language is processed according to allowable relations between linguistic units. Semmel proceeds from the above rationale to assume that retarded children primarily use sequential strategies in processing language, while non-retarded children primarily use grammatical strategies. Semmel, Barritt, Bennett and Perfetti (1967) and Semmel, Lifson, and Sitko (1967) conducted a series of studies that seem to support the hypothesis and the assumptions derived from it. One might infer from Semmel's work that the process of language development is the same for both but that it is simply incomplete or arrested for the retarded. Lenneberg (1964a, 1964b) believes that development is slower and is ultimately arrested in the retarded; i.e., that what is learned by the retarded child is of the same quality as that learned by normal children in comparable

stages up to a certain point in the developmental process. The data of Semmel et al. seem consistent with this hypothesis also.

The central question seems to be whether differences in the end product of language development for the two groups are the result of the operation of two different processes of language development. If a uniform process of language development is operating for all, language samples of children with the same mental age would be of similar linguistic quality regardless of chronological age (or IQ); differences should be expected in the advanced stages of development -- this would reflect an arrest in the language development process rather than a difference in process altogether.

This problem might be approached through a longitudinal study involving retarded and non-retarded children over a number of years. Another approach would be cross-sectional, i.e., language samples obtained from retarded and non-retarded children of different chronological and mental ages might be compared on some qualitative basis. The latter approach is taken in this study.

METHOD

Subjects

A total of 30 male children were used as Ss. Seventeen of the Ss were from the Trainable Program at the Fort Custer State Home, a residential home for the retarded in Augusta, Michigan. Thirteen of the Ss were from either the Lake Side Boys and Girls Residence in Kalamazoo, Michigan; or from the Veterans of Foreign Wars National Home in Eaton Rapids, Michigan. Both of these latter facilities provide residential care for children of presumable normal intelligence. Relevant additional data for all Ss are given in Appendix A.

Stimulus Material

The Wechsler Preschool and Primary Scale of Intelligence (WPPSI) and the Verbal Expression subtest of the Illinois Test of Psycholinguistic Abilities (ITPA) were used as stimulus material with which to evoke verbal responses from the Ss.

Procedure

Presentation of stimulus material

The stimulus material was presented to the Ss, one at a time, in a fairly quiet environment with little distracting stimulation. The sessions lasted for approximately one hour each; and all sessions were tape-recorded. The retarded children were told that they would be playing some games, that they would be asked some questions, and

that they would hear themselves later on the tape-recorder. The normal children were told that the experimenter would talk to them and record on the tape what they were saying.

Classification of data

All verbal responses made by the Ss during the administration of the WPPSI as well as the verbal responses made to the Verbal Expression subtest of the ITPA were subjected to linguistic analysis. All intelligible responses of two words or more were transcribed from the tape recordings of the sessions and classified (a) according to the stimulus material used to evoke them and (b) according to Lee's (1966) Developmental Sentence Type (DST) scheme as modified by Kent, Falk, Günther and Klein (1970).

Lee distinguishes three elementary levels of verbal performance; (a) the level of two word responses, (b) the level of "telegraphic" constructions consisting of three or four words, and (c) the level of simple sentences consisting of three to five words. The level of three or four word telegraphic constructions is noted in the literature (Brown and Frazer, 1964; Brown and Bellugi, 1964). The level of simple sentences is not by any means fully grammatical by adult standards, but does include auxiliary devices such as copula and signs of tense and number. It is the omission of these auxiliary devices that is so characteristic of telegraphic style.

In addition, Lee hypothesizes the existence of four developmental sentence types: (a) noun phrase, (b) designative phrase, (c) predicative phrase, and (d) verb phrase. The development of the

sentence type is assumed to be traceable through each of the three levels of verbal performance; each sentence type is assumed to possess a distinguishable developmental history. A scheme for classifying the utterances of Ss based on the above description of Lee's theoretical construct is presented in Figure 1.

The following are linguistic descriptions of the levels of verbal performance within the different developmental sentence types.

	1. noun phrase	2. designative phrase	3. predicative phrase	4. verbal phrase
.1 two word level	1.1	2.1	3.1	4.1
.2 telegraphic level	1.2	2.2	3.2	4.2
.3 sentence level	--	2.3	3.3	4.3

Figure 1: Chart of Developmental Sentence Types

1. Noun Phrase

Since almost all development of designative and predicative sentences occurs by the progressive elaboration of noun phrases, Lee has included the development of the noun phrase in her chart.

1.1 Two Word Level:

article
possessive
interjection + noun
quantifier
adjective

1.2 Telegraphic Level:

article
possessive
post determiner + adjective + noun
quantifier

noun + prepositional phrase

pre-article quantifier + article + noun
possessive

pre-determiner quantifier "of" + noun

interjective phrase + noun

Further elaboration of the noun phrase occurs in the context of sentences, thus no third level is given for noun phrases.

2. Designative Phrase

The designative phrase is marked by a "pointing" word in the position of the subject. It develops by expansion of the noun phrase in predicative position and by introduction of the copula.

2.1 Two Word Level:

locator demonstrator identifier	+	noun

2.2 Telegraphic Level:

locator demonstrator identifier	+	noun phrase

2.3 Sentence Level:

locator demonstrator identifier	+	be	+	noun	+	(adverb)

3. Predicative Phrase

The predicative phrase is marked mainly by the noun phrase in the subject position, and develops by expansion of the noun phrase and also by an increase in the variety of constructions found in the predicative, and by the introduction of the copula.

3.1 Two Word Level:

noun demonstrator	adjective locator

3.2 Telegraphic Level:

noun phrase	+	adjective locator prepositional phrase noun phrase

3.3 Sentence Level:

noun phrase	+	be	+	adjective locator prepositional phrase noun phrase

4. Verb Phrase

In the verbal sequence, the use of verbs develops. First, there is the development of the verb phrase by elaborating the constructions found in the final position, and by distinguishing transitive from intransitive verbs by different constructions which follow them. A second strand of development is the gradual elaboration of noun-verb combinations. These two strands of development come together at the third level. All these descriptions should be interpreted as restricted to relatively few words.

4.1 Two Word Level:

a) noun + verb

b) verb + noun / particle / adverb

4.2 Telegraphic Level:

a) noun phrase + verb + (particle)

b) 1) intransitive v. + (particle) + locator prepositional phrase

2) transitive v. + (particle) + noun phrase + (+ locator prepositional phrase)

4.3 Sentence Level:

noun phrase + intransitive v. / transitive v. + (particle) + (+ noun phrase + adverb / prepositional phrase)

Analysis of Data

The scored results of the WPPSI provided a measure of mental age for all Ss. Since the WPPSI is standardized for four through six and one-half year old children only, the raw scores were converted with the table of norms of the six and one-half year old children. In this manner "scaled equivalents for six and one-half year old children" (SE) were obtained for each S; these SE scores were used to rank Ss in terms of mental age. When the SE was divided by age expressed in number of month -- a procedure somewhat analogous to that used for computing IQ's -- the resultant ratio and the IQ score of Ss for whom IQ scores were available yielded a Spearman rank correlation (Siegel, 1956) of .99 (n=23).

The response frequency in each DST category and the proportion of responses in each DST category was determined for each Ss for the two types of stimulus material (P+V) and (V). (P+V) refers to the responses made to the Verbal Expression subtest of the ITPA and the performance subtests of the WPPSI: Animal House Picture Completion, Maze, Geometric Design and Block Design. (V) refers to the responses made to the verbal subtests of the WPPSI: Information, Vocabulary, Arithmetic, Analogies and Comprehension. This distinction was made to avoid a possible biased language sample due to the different nature of the stimulus material. To score on the intelligence test aspect of the interview, certain verbal responses are necessary, and thus certain types of responses may become predominant in the verbal

subtests. No verbal responses were necessary to score in the performance subtests, and any verbal response in this part would not be determined by the stimulus material. The responses to the Verbal Expression subtest asked all Ss in the same manner to talk about a few simple objects and did not enter into the SE-score. The relative distribution of a S's responses in the DST-categories was considered more relevant information than absolute frequencies. Thus the computation of means for various groupings was also done on the basis of proportions, rather than with absolute numbers to avoid weighing a given category due to one Ss abundance of responses in a given category.

Comparisons are made between the profiles of mean response proportions of retarded and non-retarded children, between (P+V) and (V), and then, most importantly, between groups of Ss being on the same SE-level but being of different age.

RESULTS

The number of responses made by each S in each of the DST categories to the performance subtests of the WPPSI and to the Verbal Expression subtest of the ITPA (P+V) are presented in Appendix B; the number of responses made by each S in each of the DST categories to the verbal subtests of the WPPSI (V) are presented in Appendix C. The proportions of the responses made by each S to (P+V) are given in Appendix D; and those for (V) are given in Appendix E.

The mean proportions of responses for all Ss in each DST category to (P+V) are compared with those to (V) in Figure 2. The same data are presented in Figures 3a and 3b except that a comparison between the data for the retarded and the non-retarded Ss is included. As can be seen in Figures 2, 3a and 3b, there are differences in the profile of mean response proportions to (P+V) versus the profile of mean response proportions to (V) which justify the further analysis of responses to (P+V) only.

The pattern of response distribution over the DST categories shows a consistent profile for the normal Ss. In the noun phrase DST there is a higher proportion of two word than telegraphic responses. In the other sentence types the proportion classified telegraphic is greater than that classified two word; and the proportion classified sentence is greater than that telegraphic.

Figure 2: Mean proportions of responses to (P+V) and to (V)

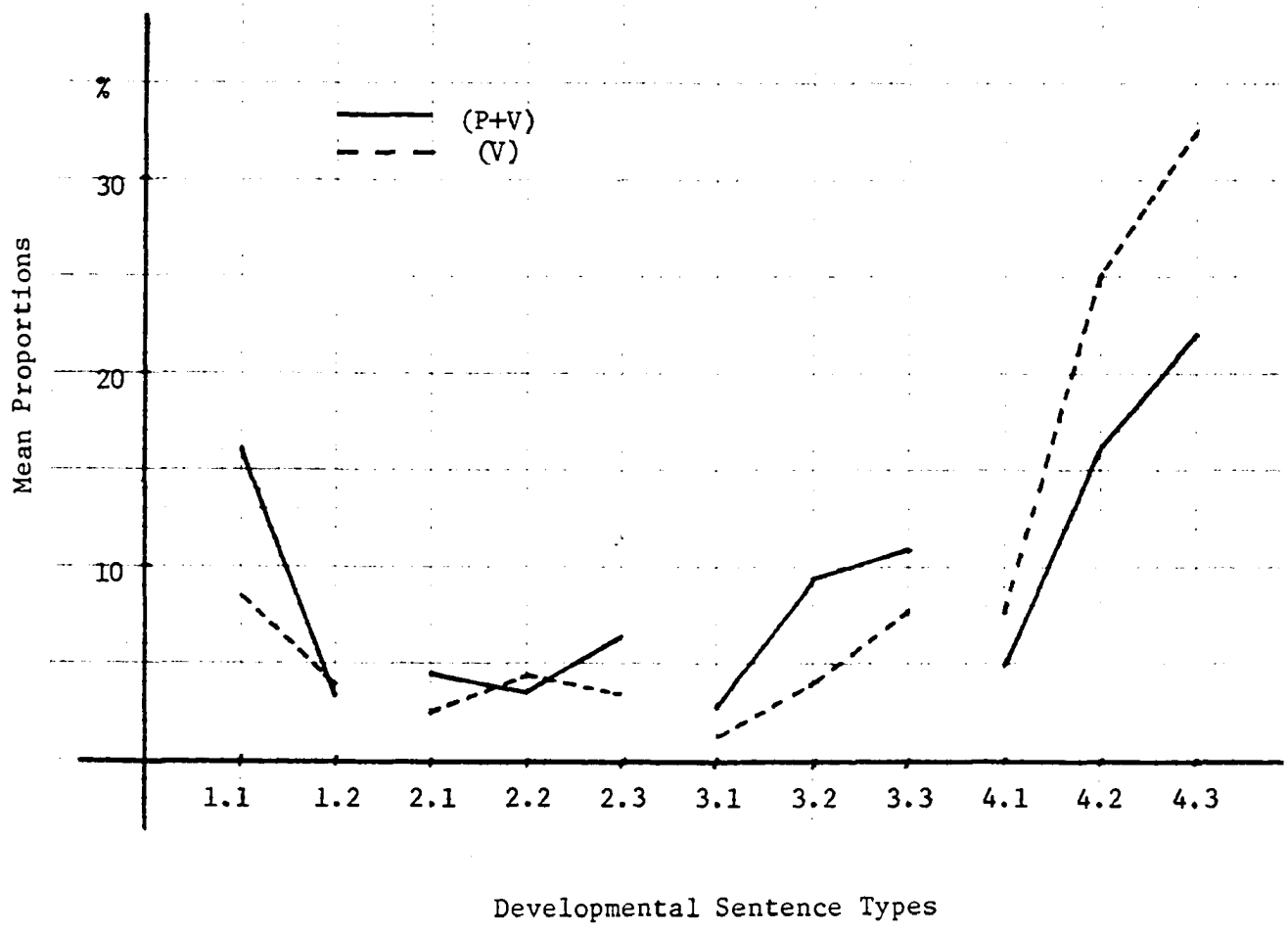
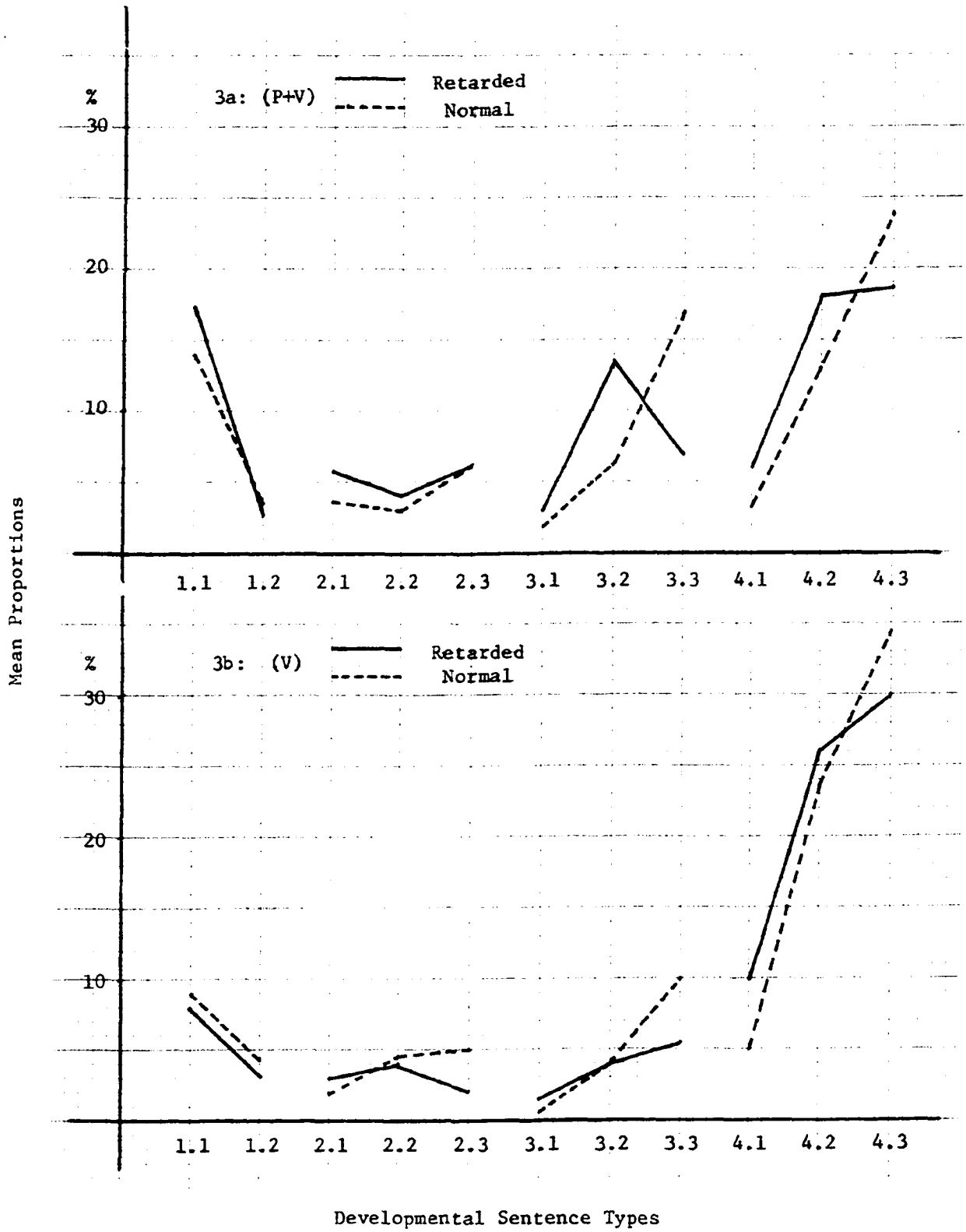


Figure 3a: Mean proportions of responses to (P+V) by normal and retarded children

3b: Mean proportions of responses to (V) by normal and retarded children



The pattern of the response distribution over the DST categories is similar for the retarded Ss in the noun phrases. In the other sentence types however, there is little if any increase from the proportions for the telegraphic level to the sentence level; and in some cases the proportion classified telegraphic is greater than the proportion classified sentence.

Whether this apparent difference between the distribution of proportions across the DST categories is consistent for all three stages of development or mental age groups (as determined on the basis of SE-scores) represented in this study is explored in a further analysis presented below.

The Ss were divided on the basis of SE, analogous to MA, into three groups. The resultant groupings along with SE-scores and CA are presented in Appendix F. Some idea of the distribution of CA and SE-scores within subject groups can be obtained from Figure 4.

The hypothesis stated in the first chapter was that if there is a uniform language development, language samples of children with the same mental age should be of similar quality regardless of their chronological age. To test this hypothesis, only (P+V) data are used, as these "free" productions are presumed to be more representative of the S's abilities.

Figure 5 presents the mean proportions of responses to (P+V) in each DST category for the three SE-levels (as grouped in Table 1) irrespective of age. No distinct progress in language development can be seen here over the SE-levels. Whether this may be due to the fact that no distinction of age was made will be explored next.

Figure 4: Distribution of Ss according to SE-scores and chronological age. The number in the upper right hand corner of each section indicates the number of Ss in that section

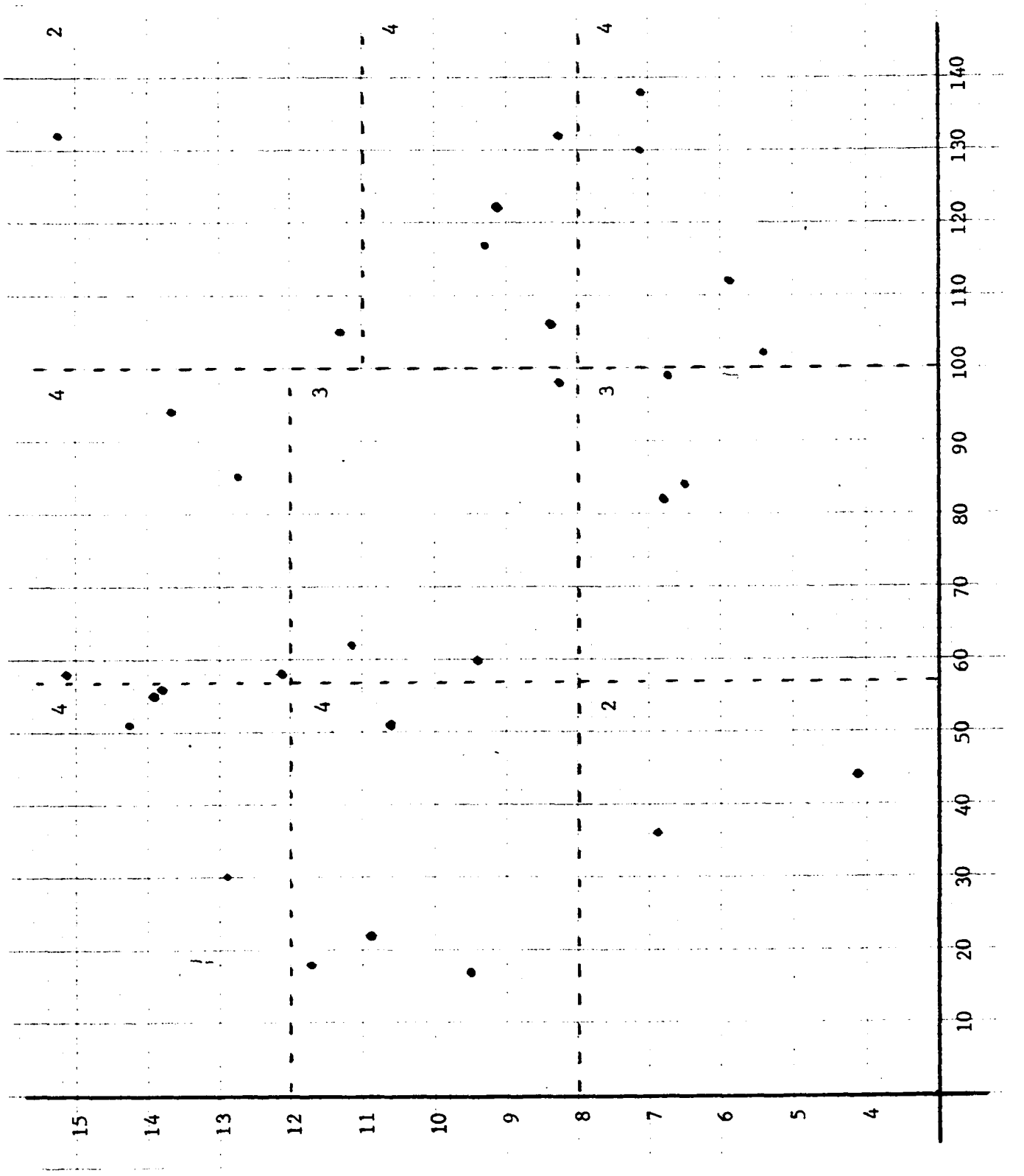
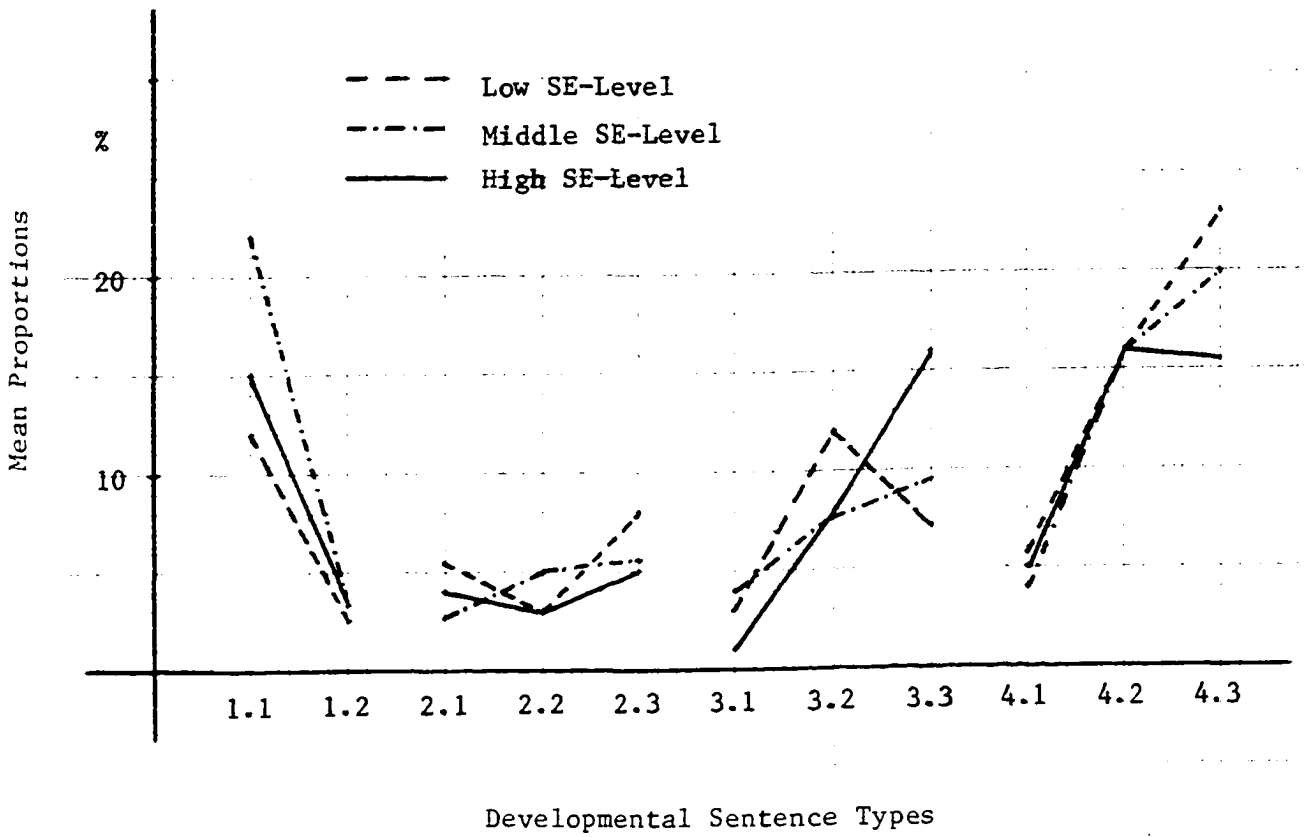


Figure 5: Mean proportions of responses in each DST category for all Ss



Figures 6, 7 and 8 present the mean proportions of responses in each DST category for the three age groups for each of the subject groupings, low, middle and high SE-level respectively.

In all cases there is a higher proportion of two word noun phrases than telegraphic noun phrases, the rest of the description will concern itself only with the designative, predicative and verbal sentence type.

On the low SE-level, as depicted in Figure 6, the profile of mean response proportions is basically the same, i.e., the relative increases and decreases follow the same trend, except for the middle age group, which shows a higher proportion of two word designative responses.

On the middle SE-level, as depicted in Figure 7, the profiles begin to differ, especially that of the oldest Ss, which show higher proportions of telegraphic than sentences level phrase, while the other age groups show more responses in the sentence level than in the telegraphic phrase.

On the high SE-level, as depicted in Figure 8, the profiles of the old Ss and the profiles of the other two age groups differ markedly. The old Ss constantly show more telegraphic phrases than two word or sentence level phrase. The middle age group and the young Ss display the trend of higher proportions of telegraphic phrases than two word phrases and in turn a higher proportion of sentence level phrases than either telegraphic or two word phrases.

Figure 6: Mean proportions of responses in each DST category on the low SE-level for three age groups

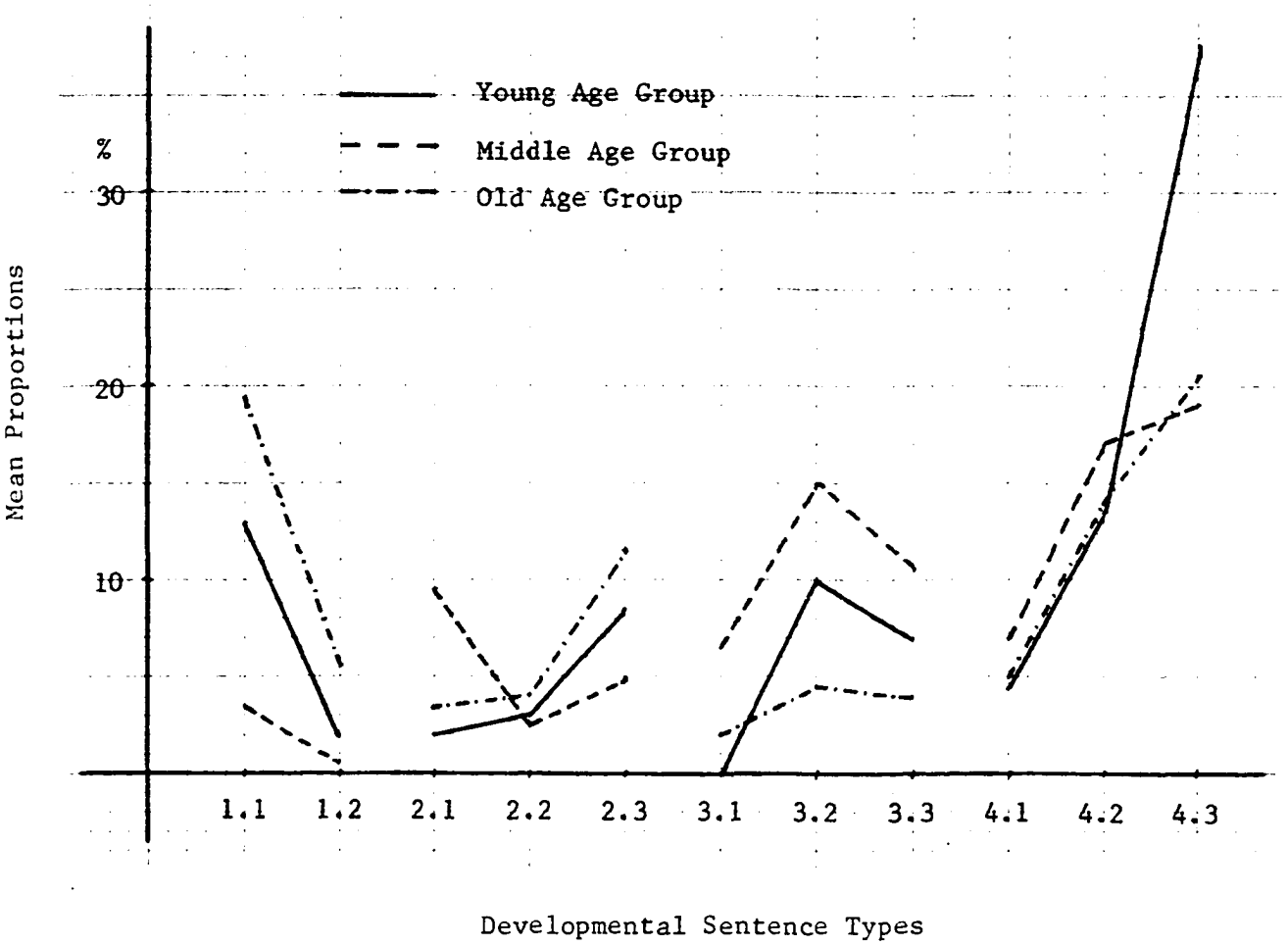


Figure 7: Mean proportions of responses in each DST category on the middle SE-level for three age groups

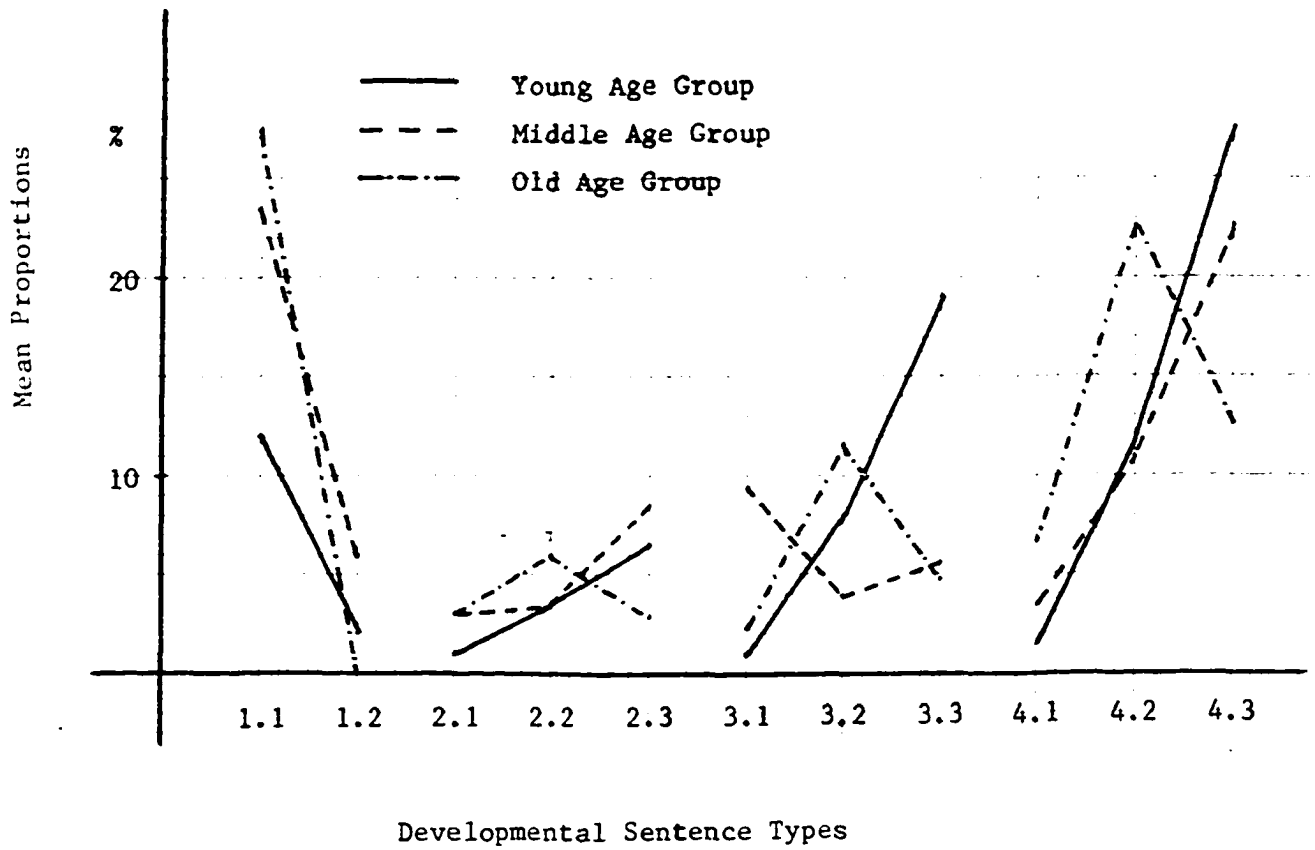
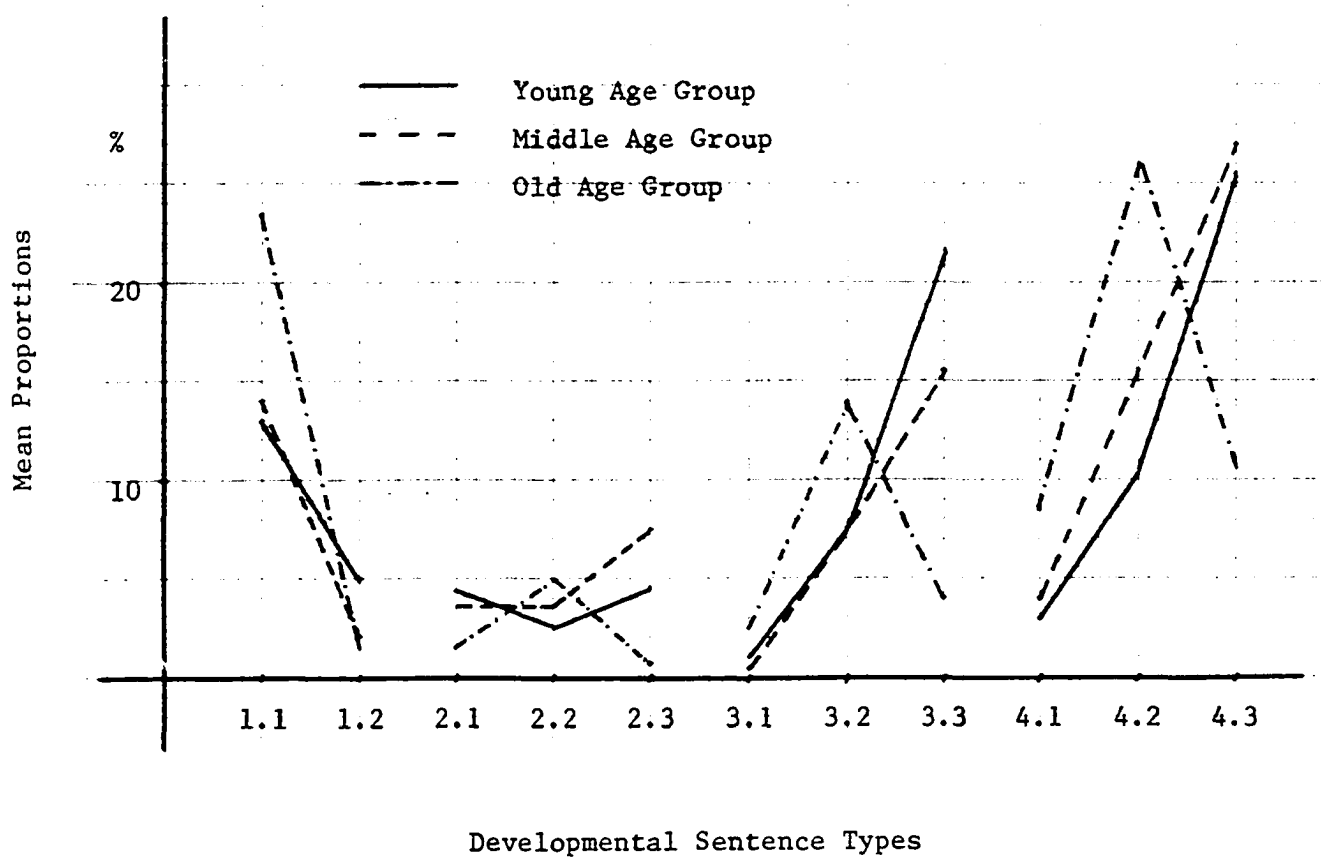


Figure 8: Mean proportions of responses in each DST category on the high SE-level for three age groups



Earlier it was stated that the SE-levels are an analogue to mental age; therefore the younger the child is on a given SE-level, the brighter he probably is, as the correlation in the Method section indicates. With this in mind, the data above indicate that at the lowest level of development, the lowest SE-level, the profiles of response proportions are basically similar for all age groups, or up to this point, language has developed in a similar manner. On the middle and high SE-levels, i.e. the middle and higher levels of development, the older Ss, i.e. the less bright ones, begin to differ markedly from the other Ss; While the old Ss show the highest proportion of responses on the telegraphic level, the young and middle age group show the highest proportion of responses on the sentence level.

DISCUSSION

Studies dealing with language samples seem to be subject to criticism on a variety of counts. In an effort to obtain samples representative of the child's linguistic repertoire, some investigators fail to control the nature of the stimulus material (see Bloom's, 1967, criticism of Lee, 1966). This problem was avoided in the present study inasmuch as the same stimulus material was used for all Ss. However, since the stimulus material consisted of an intelligence scale, the ceiling or cut-off after a given number of incorrect responses was observed to avoid too many questions that a S would have been unable to answer. This was done, rather than expose all Ss equally to all test items and thus risk a discouragement of a less successful S on account of his inability to answer the more difficult questions. A Spearman rank correlation (Siegel, 1956) of .27 (n=30) between the total number of responses and the SE-score indicates that the observance of the ceiling probably did not have a biasing influence on the language sampling.

Another feature of language samples subject to criticism is their representativeness. Some investigators, in an effort to control other variables, have obtained samples which are unlikely to be representative of a child's linguistic repertoire. (see Griffith's, 1970, criticism of Wilson, 1969). In the present study, the samples were obtained in response to diversified stimulus material; and, in addition, the responses which composed the samples were obtained over about one hour's time with the child. The samples involved

"free" responses as well as responses subject to influences due to the nature of the stimulus material as in the verbal subtests of the WPPSI. By finally attending to the "free" responses only, a fairly representative sample may have been analyzed in the final process.

Another criticism by Bloom of Lee's (1966) study was that apparently the kernel sentence does not develop completely before transformations occur in the language of children observed. The manner in which Lee had presented her DST-scheme had suggested that transformations do not occur before kernel sentences have completely developed. In a previous study (Kent, Falk, Günther and Klein, 1970) further evidence is given that transformations indeed occur before kernel sentences have developed. For this reason, any transformation that occurred on any level has been treated as belonging to that level. One could probably conceive of a three-dimensional scheme of developmental sentence types: one dimension covering sentence types, another level of development, and a third the degree of sophistication of transformation. It is doubtful at best, however, whether such an intricate system of DST would have produced better results at this point. In improving the DST-scheme, however, some attention should be given to making sure that all categories are mutually exclusive. This is true for all categories except 4.1, two word verbals. There is some ambiguity as to whether to classify, e.g. the utterance "I run", as a two word response or as a sentence level response. In this study any such

two word utterance was consistently classified as a two word response rather than sentence level responses.

Still another aspect of studies dealing with language samples that is often questioned is the relative merit of the cross-sectional approach versus the longitudinal methods. The present study is clearly of the former variety and must accept whatever criticism is due on this account. Although it is difficult to generalize from cross-sectional data, a longitudinal study would have required an extended period of time, and a much larger number of Ss since the MA would be free to vary.

The results of the present study suggest several avenues for further research. One that is immediately apparent is the longitudinal study to secure further evidence as found in this study. Another possible avenue of research is in the clinical area -- it is apparent from the data presented that the language development of institutionalized retarded children is arrested as compared to non-retarded children. The proportion of responses classified as telegraphic rather than as sentence would appear to be too high in the retarded sample. This was seen in the different development over the SE-levels of the profiles of mean response proportions of the older Ss as compared with the middle age and young Ss. This suggests that the institutionalized retarded individuals fail to progress linguistically from the telegraphic to the sentence level. If one assumes that the process of language development is no different than that for normals, one must assume that mental retardation, per se, places no constraints on language development other

than time. It is possible that the institutionalized environment fails rather than the child. In order to test this hypothesis one might direct clinical efforts at a group of retarded children whose language development appears to be arrested at the telegraphic level, and compare the results with children receiving no specific training. Another way to test this last hypothesis is to compare language samples of retarded children living in institutions and of those living at home.

CONCLUSIONS

Part of the literature concerning language development in the retarded supported the view that the development in the retarded is qualitatively different on the ground of comparing end products of language development (Jordan, 1967). Semmel's (1967) and Lenneberg's (1964) presented evidence for assuming a qualitatively similar process up to a certain point at which the retarded's language development becomes arrested. This latter position received further support in the present study.

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APPENDIX A

S#	Residence	Reported I.Q.	C.A.	S.E.Score	# of Responses
1	FCSH*	61	11- 2	62	145
2	FCSH	66	6-11	36	159
3	FCSH	20	14- 3	51	34
4	FCSH	--	10- 7	51	64
5	FCSH	--	9- 6	17	104
6	FCSH	57	12- 1	58	122
7	FCSH	44	13-10	56	65
8	FCSH	38	12-11	30	107
9	FCSH	30	10-11	22	91
10	FCSH	65	12- 9	85	149
11	Lake**	--	8- 5	106	228
12	Lake	--	9- 4	117	151
13	Lake	--	8- 3	98	158
14	FCSH	68	15- 3	132	105
15	FCSH	48	9- 5	60	115
16	FCSH	70	11- 4	105	161
17	VFW***	95	6- 9	99	241
18	VFW	104	5-11	112	208
19	VFW	--	7- 1	130	202
20	VFW	--	6-10	82	191
21	VFW	106	8- 4	132	157
22	VFW	120	5- 5	102	205
23	VFW	101	7- 1	138	194
24	VFW	90	4- 2	44	166
25	VFW	88	6- 6	84	190
26	VFW	91	9- 2	122	203
27	FCSH	28	13-11	55	178
28	FCSH	30	11- 9	18	95
29	FCSH	44	13- 8	94	47
30	FCSH	49	15- 2	58	103

*FCSH: Fort Custer State Home
**Lake: Lake Side Boys and Girls Residence
*** VFW: Veterans of Foreign War National Home

APPENDIX B

Number of responses in each DST-Category in reply to performance subtests and verbal expression subtest.

S#	NOUN		DESIGNATIVE			PREDICATIVE			VERBAL			SUM
	1.1	1.2	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	
1	10	2	0	0	7	2	3	5	4	6	18	57
2	7	0	1	4	8	0	16	5	4	12	27	84
3	0	1	6	0	4	1	2	2	0	4	5	25
4	1	0	3	0	0	4	13	8	5	3	1	36
5	1	0	13	2	2	1	1	2	3	15	14	56
6	18	0	1	4	0	3	18	3	8	15	3	73
7	8	4	1	0	0	0	1	0	4	7	6	31
8	18	2	0	5	8	1	2	0	2	4	8	50
9	1	0	0	2	3	2	13	3	0	7	3	34
10	6	1	1	2	9	1	10	8	2	28	16	84
11	11	1	5	4	2	1	14	17	3	16	38	112
12	20	3	3	2	9	1	5	8	3	12	13	79
13	21	2	4	4	3	19	5	2	2	7	9	78
14	4	1	1	1	0	1	7	0	4	7	4	30
15	14	6	2	3	5	0	0	3	0	7	13	53
16	25	2	2	5	1	1	3	6	3	21	6	75
17	14	4	1	7	7	1	22	26	1	20	38	141
18	19	6	7	3	1	2	11	11	5	15	15	95
19	9	6	1	0	4	0	6	17	3	7	25	78
20	16	6	3	3	7	1	6	11	2	15	20	90
21	12	0	2	1	9	0	5	14	4	9	21	77
22	14	4	6	5	5	1	3	25	2	8	34	107
23	4	2	3	2	7	1	5	28	2	11	23	88
24	22	5	3	2	9	0	1	10	5	17	55	129
25	6	3	2	2	5	1	2	21	1	10	25	78
26	5	2	4	7	6	0	2	21	5	23	32	107
27	20	2	10	8	16	1	3	11	4	12	30	117
28	4	1	4	0	4	4	1	4	6	8	23	59
29	17	0	1	4	0	0	2	0	3	5	1	33
30	18	1	4	3	0	2	2	3	3	13	15	64
TOTAL:	345	67	94	85	141	52	184	274	93	344	541	2220

* Residents at Lake Side Boys and Girls Residence
** Residents at Veterans of Foreign War National Home
Others: Residents of Fort Custer State Home

APPENDIX C

Number of responses in each DST-Category in reply to verbal subtests.

S#	NOUN		DESIGNATIVE			PREDICATIVE			VERBAL			SUM
	1.1	1.2	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	
1	1	4	2	1	5	2	1	5	4	4	20	40
2	5	1	0	2	1	1	0	2	10	24	27	73
3	3	0	0	0	0	0	0	0	0	0	6	9
4	0	3	2	0	2	1	1	0	5	12	2	28
5	3	4	1	3	4	0	5	5	6	11	6	48
6	6	2	3	0	0	1	4	1	5	15	12	49
7	6	1	1	0	0	1	1	2	2	7	13	34
8	4	4	5	2	1	1	4	16	3	5	12	57
9	4	3	0	1	0	1	3	2	2	15	26	57
10	2	0	0	4	1	0	3	5	6	19	25	65
*11	15	4	5	1	3	1	5	9	1	27	45	116
*12	4	9	0	0	8	1	5	6	3	11	25	72
*13	17	0	0	2	1	1	1	2	9	32	15	80
14	4	0	2	3	0	0	7	10	6	23	20	75
15	6	3	1	4	2	0	3	4	2	19	18	62
16	4	3	1	3	0	0	0	10	7	38	20	86
**17	9	3	0	12	12	0	1	8	7	22	26	100
**18	14	9	0	2	6	1	4	5	13	31	27	113
**19	8	5	1	4	7	2	7	20	1	30	39	124
**20	7	3	4	3	3	0	0	6	2	18	55	101
**21	3	2	0	4	1	0	2	7	6	22	33	80
**22	7	2	1	6	5	1	1	5	3	27	40	98
**23	7	2	0	7	2	0	1	28	2	19	38	106
**24	3	2	0	2	3	0	0	3	1	8	15	37
**25	14	9	3	4	4	0	3	14	7	19	35	112
**26	4	5	4	7	4	0	0	13	3	24	32	96
27	7	1	1	4	6	1	0	3	7	14	17	61
28	1	1	1	3	0	0	0	1	8	4	17	36
29	0	0	2	1	0	1	0	0	4	5	2	15
30	4	0	0	3	0	0	4	0	1	15	12	39
TOTAL:	175	83	39	92	78	16	70	192	136	536	700	2117

*Residents at Lake Side Boys and Girls Residence
** Residents at Veterans of Foreign War National Home
Others: Residents of Fort Custer State Home

APPENDIX D

Proportions of responses in each DST-Category in reply to performance subtests and the WPPSI and to the verbal expression subtest of the ITPA.

S#	NOUN		DESIGNATIVE			PREDICATIVE			VERBAL		
	1.1	1.2	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3
1	17.5	3.5	-	-	12.3	3.5	5.3	8.8	7.0	10.5	31.6
2	8.3	-	1.2	4.7	9.5	-	19.1	6.0	4.7	14.3	32.2
3	-	4.0	24.0	-	16.0	4.0	8.0	8.0	-	16.0	20.0
4	2.8	-	8.3	-	-	11.1	36.1	22.2	8.3	8.3	2.8
5	1.8	-	23.2	3.6	3.6	1.8	1.8	3.6	8.9	26.8	25.0
6	24.6	-	1.4	5.5	-	4.1	24.6	4.1	11.0	20.3	4.1
7	25.8	12.9	3.2	-	-	-	3.2	-	12.9	22.6	19.4
8	36.0	4.0	-	10.5	16.0	2.0	4.0	-	4.0	8.0	16.0
9	2.9	-	-	5.9	8.8	5.9	38.2	8.8	-	20.6	8.8
10	7.1	1.2	1.2	2.4	10.7	1.2	11.9	9.5	2.4	33.3	19.0
11	9.8	.9	4.5	3.6	1.8	.9	12.5	15.2	2.7	14.3	33.9
12	25.3	3.8	3.8	2.5	11.4	1.3	6.3	10.1	3.8	15.2	16.5
13	26.9	2.6	5.1	5.1	3.8	24.4	6.4	2.6	2.6	9.0	11.5
14	13.3	3.3	3.3	3.3	-	3.3	23.3	-	13.3	23.3	13.3
15	26.4	11.3	3.8	5.7	9.4	-	-	5.7	-	13.2	24.5
16	33.3	2.7	2.7	6.7	1.3	1.3	4.0	8.0	4.0	28.0	8.0
17	9.9	2.8	.7	5.0	5.0	.7	15.6	18.4	.7	14.2	26.9
18	20.0	6.3	7.4	3.2	1.1	2.1	11.6	11.6	5.3	15.8	15.8
19	11.5	7.7	1.3	-	5.1	-	7.2	21.8	3.8	9.0	32.1
20	17.8	6.7	3.3	3.3	7.8	1.1	6.7	12.2	2.2	16.7	22.2
21	15.6	-	2.6	1.3	11.7	-	6.5	18.2	5.2	11.7	27.2
22	13.1	3.7	5.6	4.7	4.7	.9	2.8	23.4	1.9	7.5	31.8
23	4.5	2.3	3.4	2.3	8.0	1.1	5.7	31.8	2.3	12.5	22.2
24	17.1	3.9	2.3	1.6	7.0	-	.8	7.8	3.9	13.2	42.6
25	7.7	3.8	2.6	2.6	6.4	1.3	2.6	26.9	1.3	12.8	32.1
26	4.7	1.9	3.7	6.5	5.6	-	1.9	19.6	4.7	21.5	29.9
27	17.1	1.7	8.6	6.8	13.7	.9	2.6	9.4	3.4	11.2	25.6
28	6.8	1.7	6.8	-	6.8	6.8	1.7	6.8	10.2	13.6	39.0
29	51.5	-	3.0	12.1	-	-	6.1	-	9.1	15.2	3.0
30	28.1	1.6	6.3	4.7	-	3.1	3.1	4.7	4.7	20.3	23.4
MEANS:											
TOTAL	16.2	3.1	4.8	3.8	6.3	2.8	9.3	10.8	4.8	16.0	22.1
FCSH	17.8	2.8	5.7	4.2	6.4	1.6	13.5	6.2	6.1	18.0	18.6
Others	14.1	3.6	3.6	3.2	6.1	2.6	6.7	16.9	3.1	13.3	26.8

*: Residents at Lake Side Boys and Girls Residence
**: Residents at the Veterans of Foreign Wars National Home
Others: Residents at Fort Custer State Home

APPENDIX E

Proportions of responses in each DST-Category in reply to the verbal subtests of the WPPSI

S#	NOUN		DESIGNATIVE			PREDICATIVE			VERBAL		
	1.1	1.2	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3
1	4.5	2.3	1.1	5.7	2.3	1.1	5.7	4.5	4.5	22.7	45.4
2	6.8	1.4	-	2.7	1.4	1.4	-	2.7	13.7	32.9	37.0
3	33.3	-	-	-	-	-	-	-	-	-	66.6
4	-	10.7	7.1	-	7.1	3.6	3.6	-	17.8	42.9	7.1
5	6.3	8.3	2.1	6.3	8.3	-	10.4	10.4	12.5	22.9	12.5
6	12.3	4.1	6.1	-	-	2.0	8.2	2.0	10.2	30.6	24.5
7	17.6	2.9	2.9	-	-	2.9	2.9	5.9	5.9	20.6	28.2
8	7.0	7.0	8.8	3.5	1.8	1.8	7.0	28.0	5.3	8.8	21.0
9	7.0	5.3	-	1.8	-	1.8	5.3	3.5	3.5	26.3	36.8
10	3.1	-	-	6.2	-	1.5	4.6	7.7	9.2	29.2	38.4
11	12.9	3.4	4.3	.9	2.6	.9	4.3	7.8	.9	23.2	38.8
12	5.6	12.5	-	-	11.1	1.4	6.9	8.3	4.2	15.3	34.7
13	21.2	-	-	2.5	1.3	1.3	1.3	2.5	11.3	40.0	18.8
14	5.3	-	2.7	4.0	-	-	9.3	13.3	8.0	30.7	27.6
15	9.7	4.8	1.6	6.4	3.2	-	4.8	6.4	3.2	30.6	29.0
16	4.7	3.5	1.2	3.5	-	-	-	11.6	8.1	42.2	23.2
17	9.0	3.0	-	12.0	12.0	-	1.0	8.0	7.0	22.0	26.0
18	12.4	8.0	-	1.8	5.3	.9	3.5	5.3	11.5	27.4	23.9
19	6.5	4.0	.8	3.2	5.6	1.6	5.6	16.1	.8	24.2	31.4
20	6.9	3.0	4.0	3.0	3.0	-	-	5.9	2.0	17.8	54.5
21	3.8	2.5	-	5.0	1.3	-	25.0	8.8	7.5	27.5	41.3
22	7.1	2.0	1.0	6.1	5.1	1.0	1.0	5.1	3.1	27.6	40.8
23	6.6	1.9	-	6.6	1.9	-	.9	26.4	1.9	17.9	35.8
24	8.1	5.4	-	5.4	8.1	-	-	8.1	2.7	21.6	40.6
25	12.5	8.0	2.7	3.6	3.6	-	2.7	12.5	6.3	17.0	31.2
26	4.2	5.2	4.2	7.3	4.2	-	-	13.5	3.1	25.0	33.3
27	11.5	1.6	1.6	6.6	9.8	1.6	-	4.9	11.5	22.9	27.8
28	2.8	2.8	2.8	8.3	-	-	-	2.8	22.2	11.1	47.2
29	-	-	13.3	6.7	-	6.7	-	-	26.6	33.3	13.3
30	10.3	-	-	7.7	-	-	10.3	-	2.6	38.4	30.8
Means											
TOTAL	8.6	3.8	2.3	4.2	3.3	1.1	4.1	7.7	7.6	25.1	32.3
FCSH	8.4	3.2	3.0	4.1	2.0	1.4	4.2	6.1	9.7	26.2	30.4
Others	9.0	4.5	1.3	4.4	5.0	.5	4.0	9.9	4.8	23.6	34.7

*: Residents at Lake Side Boys and Girls Residence
**: Residents at the Veterans of Foreign Wars National Home
Others: Residents at Fort Custer State Home

APPENDIX F

Subject Grouping with Respect to SE-Level

Low Group			Middle Group			High Group		
Subject #	SE	CA	Subject #	SE	CA	Subject #	SE	CA
3	51	14- 3	6	58	12- 1	14	132	15- 3
7	56	13-10	10	85	12- 9	16	105	11- 4
8	30	12-11	29	94	13- 8	11	106	8- 5
27	55	13-11	30	58	15- 2	12	117	9- 4
4	51	10- 7	1	62	11- 2	21	132	8- 4
5	17	9- 6	13	98	8- 3	26	122	9- 2
9	22	10-11	15	60	9- 5	18	112	5-11
28	18	11- 9	17	99	6- 9	19	130	7- 1
2	36	6-11	20	82	9- 5	22	102	5- 5
24	44	4- 2	25	84	6- 6	23	138	7- 1