SPEECH OF MENTALLY DISABLED CHILDREN

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The linguistic and neurological analyses of dysfunctions of language provide one of the topics of current interest in neurolinguistics. At the present time the status of knowledge concerning language dysfunctions is based primarily on data from adults who have acquired language and subsequently lost a portion of it. It is readily observable that many of the people classified as 'mentally retarded' also exhibit language dysfunctions. For a number of reasons the mentally disabled child has not often been the subject of linguistic research. There has been a need to conduct basic research with children to determine how a first language is acquired. There is a need, also, to determine how central processing dysfunctions can affect the acquisition of a first language in children.

In his book The Biological Foundations of Language Eric Lenneberg states that:

> a comparison of language in retarded children with language development of normal children indicates that there is a 'natural language-learning strategy' that cannot be altered by training programs. Language unfolds lawfully and in regular stages. Language progress in the retarded appears to be primarily controlled by their biological maturation and their development of organizational principles rather than intelligent insight. The pathologically lowered IQ of the retarded does not result in bizarre use of language but merely in 'frozen' but normal primitive language stages.[1]

The critical portions of Lenneberg's statement are first, the claim that mentally disabled children undergo a 'delayed' language development and have internalized a linguistic system which corresponds to a younger normal child, and second, that there is a developmental plateau beyond which these children do not progress. In the remainder of this paper I will look at these two claims about the speech of the mentally disabled child.

The clinical procedure which I am using to analyze the spontaneous speech of children is that developed by Laura Lee in her 1974 book Developmental Sentence Analysis. Lee's normative data

is based upon the speech samples of two hundred children, five girls and five boys at each three month age interval between ages 2-0 and 6-11. All of the children were from monolingual homes where standard English was spoken. All except two were from middle-income homes, as judged by the father's occupations. Only the children who obtained IQ scores between 85 and 115 on the Peabody Picture Vocabulary Test were included in Lee's study. The analysis is designed to assess developmental progression in children's language by means of scoring eight grammatical categories. These categories are (1) indefinite pronoun, (2) personal pronoun, (3) main verb, (4) secondary verb, (5) negative, (6) conjunction, (7) interrogative reversal in questions, and (8) Wh-questions. Weighted values within each of these categories make it possible to compare syntactic development not only in that category, but also across categories. A developmental sentence score is obtained for each child by dividing the total number of points scored by the number of sentences in the sample. This score provides a measure of sentence complexity for each child and it represents the child's spontaneous use of grammatical rules at a particular time in a particular setting. Figure 1 shows the norms for the children in Lee's study.

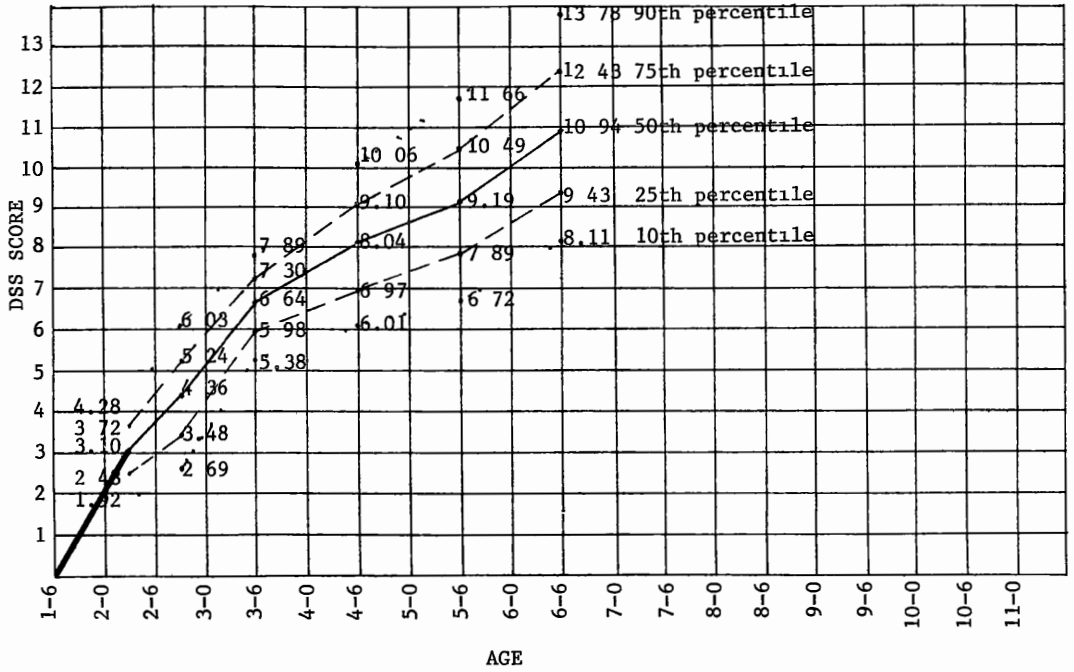
The subjects used in my study were 110 noninstitutionalized children, 65 boys and 45 girls.[2] All were classified as educable mentally disabled (having an IQ range of 50-80). The children were placed in three chronological age groups (7 years, 9 years, and 11 years) with each age group subdivided into three IQ groups (50-59, 60-69, and 70-79). All of the children were tested and recorded within two months of the seventh, ninth, or eleventh birthday. The children were all singleton Caucasians and none demonstrated any clinically significant neuromuscular or structural deficits of the oral mechanism. The majority of the subjects came from families classified as upper-lower class by the Warner index of Status Characteristics (1949).

The responses were elicited from the children by showing them pictures of situations which they were asked to 'tell about' or to tell 'a story about the picture'. Fifty to sixty of the child's responses were tape recorded and later transcribed verbatim. Each language sample was transcribed by at least two listeners to ensure accuracy of transcription. The responses were transcribed consecutively when possible. Occasionally some responses were too unintelligible to record.

The developmental sentence analysis was conducted on each language sample and a developmental sentence score was determined

Figure 1

Norms for Developmental Sentence Scoring (reweighted) Lee, 1974



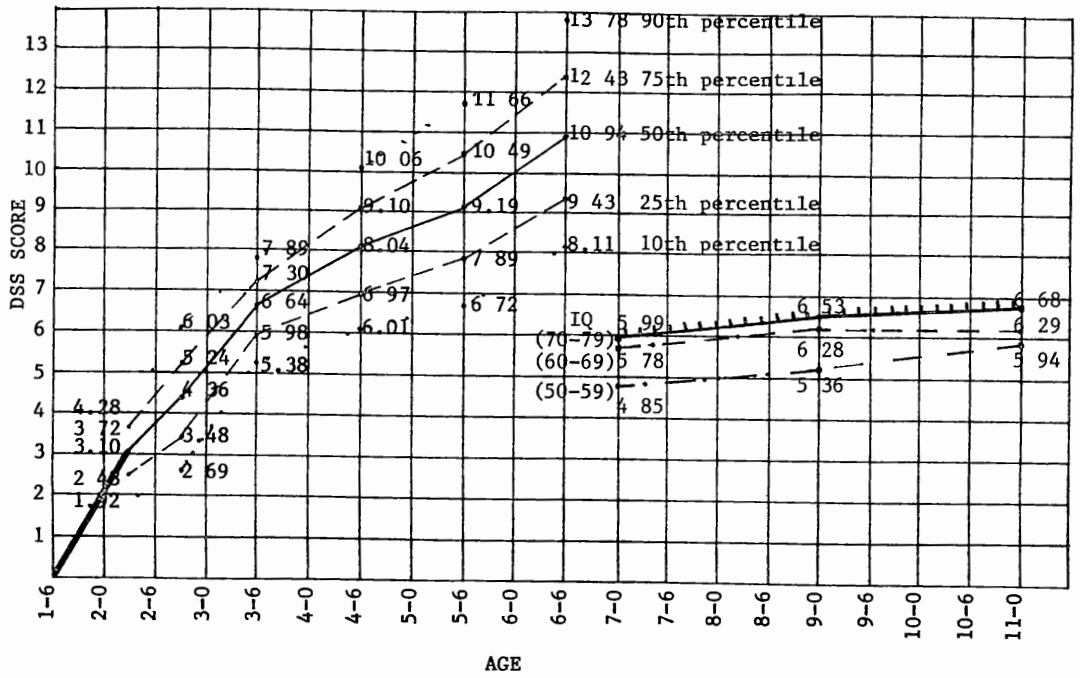
for each child. The mean of each of the three IQ ranges in each age group is represented in Figure 2. A language delay can be estimated by using this chart. From the mentally disabled child's performance one extends a line horizontally to meet the 50th percentile line, and, thus, determines that the child's performance was equivalent to the mean of another chronological age. In this study a mentally disabled child with an IQ in the 70's at age seven has a mean developmental sentence score of 5.99 which is equivalent to a normal child of three years three months. There is a delay of three years nine months. At age eleven a child with an IQ in the 70's has a mean developmental sentence score of 6.68, equivalent to a child of approximately three years six months. The 'delay' in this case is seven years six months. It is to be noted that almost all of the means of the mentally disabled group correspond to the normative scale range of three to four years of age.

The question now arises as to how much alike is the speech of a younger normal speaker and older mentally disabled speakers. Lee has conducted exhaustive statistical analyses to determine the discriminating power among the eight grammatical categories. The most useful feature of the procedure is that it determined a rank order of the DSS (Developmental Sentence Scoring) categories from the most discriminating between adjacent age levels to the least discriminating. Overall for the two hundred subjects in Lee's study the rank order of the DSS categories from most discriminating to the least was: (1) Main verbs, (2) Conjunction, (3) Indefinite pronouns, (4) Personal pronouns, (5) Secondary verbs, (6) Negatives, (7) Sentence points, (8) Wh-questions, and (9) Interrogative reversals.

The graphs of Figures 3, 4, and 5 depict a comparison of the component grammatical categories of the mentally disabled group to the same categories of normally developing children between the ages of three years zero months and three years eleven months. This is the age group to which the mentally disabled child is often equated. In comparing the three most discriminating categories of Main verbs, Conjunction, and Indefinite pronouns we note significant differences. The mentally disabled child is consistently lower in the category of Main verbs and with only one exception the mentally disabled child is lower in Indefinite pronouns. In the Conjunction category the mentally disabled group is consistently higher than the normal child, often more than doubling the percentage that this category contributes to the total developmental score. Thus, it appears that even though a mentally disabled child may have a developmental sentence score equivalent to a younger normal child, the internal factors

Figure 2

Comparison of Means of DSS Scores of Mentally Disabled Children (N=110)



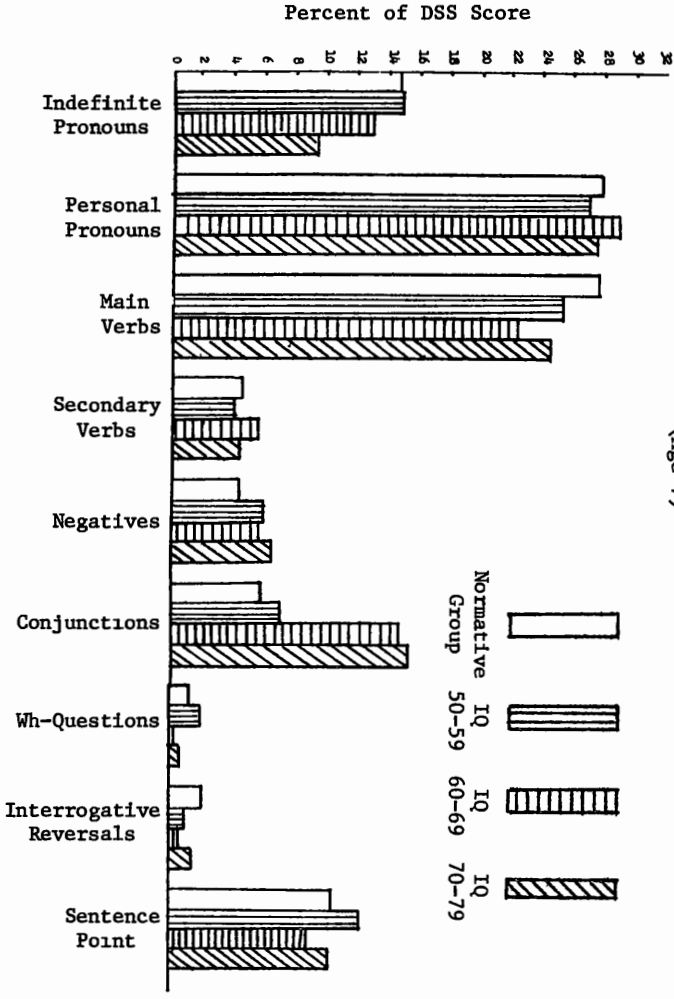


Figure 3
Comparison of the Component Grammatical Categories in their Percentage of the DSS (Age 7)

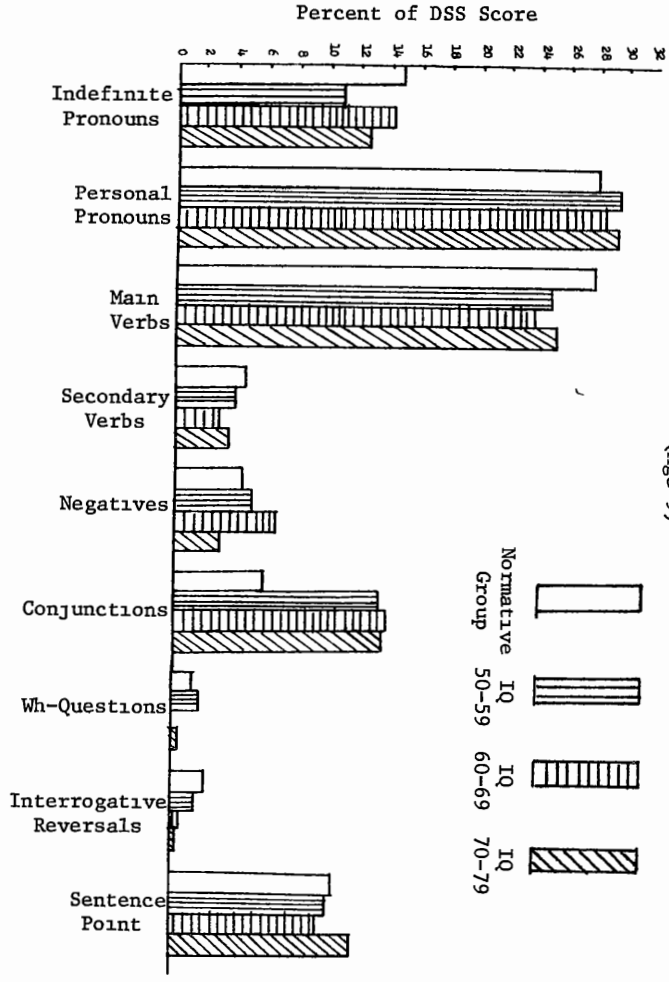


Figure 4
Comparison of the Component Grammatical Categories in their Percentage of the DSS (Age 9)

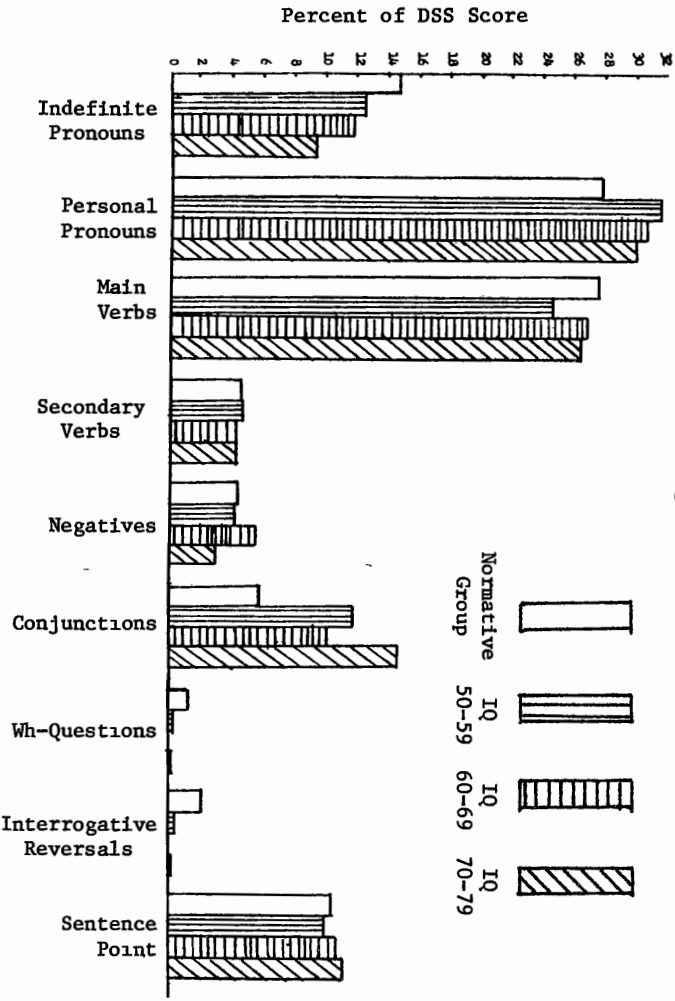


Figure 5
Comparison of the Component Grammatical Categories in their Percentage of the DSS (Age 11)

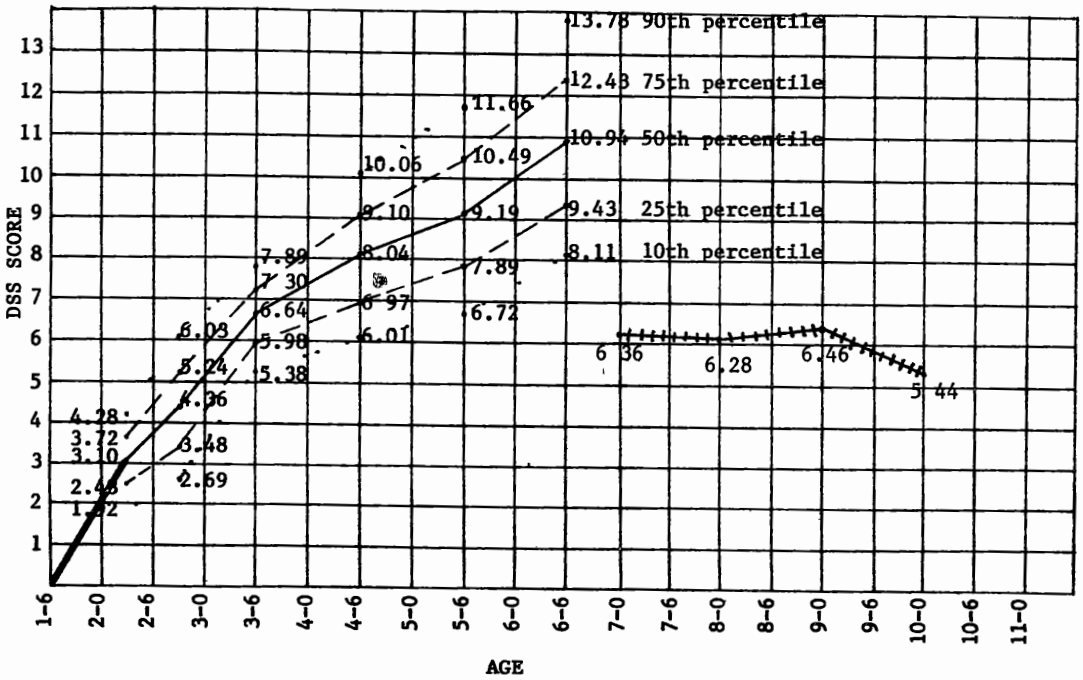
which constitute that score exhibit significant differences.

Let us now turn our attention to the second portion of Lenneberg's statement, that the retarded child has his grammar frozen at some normal primitive stage. For this aspect of the study five subjects in the educable mentally disabled range were tested annually for four years (ages seven, eight, nine, and ten) The mean DSS score for these children was calculated and is recorded on Figure 6. The lack of progress in the DSS is readily apparent. In Lee's study across all age groupings normal children scored significantly higher on the important Main verb and Conjunction categories at each successive age level. For example, the Conjunction category percentage to total points scored is calsulated in one year intervals from age two to age seven at 3.5%, 6.1%, 9.1%, 13.4%, and 18.4%. In the group of disabled children the percentage of the Conjunction score runs from 17.3% to 14.6% to 17.7% to 11.8% for the years shown. In the Main verb category one of the children had lost all agreement in the verb between testing at age seven and again at age ten. The detailed analysis of the longitudinal study cannot be presented in the time alloted for these papers, but from the data one can see that the retarded child does indeed reach a plateau in development beyond which he does not progress. In fact, the group might regress under certain conditions. In any case, the speech of the disabled in this 'frozen' stage is unlike the normal child at any primitive stage.

In the remainder of the paper I would like to make a few general comments on the nature of this type of study and speculate on the possible neuroanatomy of the mentally disabled child. As many researchers have already pointed out, fifty responses are restrictive in providing an adequate sample for language analysis. This type of sample may also be inadequate because of the limitations of the stimulus items and the method of presentation. For example, the number of negative sentences and Wh-questions is very low. Responding to pictures does not prompt these particular constructions in the child's speech. Many of the objects and situations illustrated in the stimulus pictures, although they are recognizable to the children, were not true representations of the daily experiences of the children. The stimulus task of telling a story or interpreting a picture is not the same as a task which requires a child to relate to a more concrete occurence which he or she has recently experienced, or as a task which requires the children to describe what they need or how they feel about something. The intensity of personal situations and involvement in stimulating verbal behavior is certainly greater than that provided by colorful pictures.

Figure 6

Means of Four Year DSS Scores of one group of Mentally Disabled Children
(Longitudinal Group Mean IQ=70 8, N=5)



An earlier researcher working with these same language protocols made the following statement

> In general, one is not struck so much by the way the children express themselves, as by what they have to say about the pictures. In short, the children are remiss in their perceptions more than in the structures they use to express those perceptions. The occurence of interpretive statements was very small. The children do not, on the whole, perceive the nature of the conflicts represented in the pictures. They note and recognize particular objects in the pictures, but they are often unable to relate those objects to each other, or to see that, taken as a whole, they depict a situation or emotion, or tell a story.[3]

One is very tempted to begin to analyze the speech of disabled children not with a strict structural view such as the one presented in this paper, but with an approach such as a SCENES-AND-FRAMES-SEMANTICS analysis which has been suggested by Charles Fillmore and others. The potential contribution of the mentally disabled child to this theoretical notion should be investigated.

A final note on the neuroanatomy of the mentally disabled child. Recent work by Dominick Purpura[4] demonstrates two types of dendritic spine abnormalities in retarded children dendritic spine loss and the presence of very long, thin spines that resemble the developing spines of primitive neurons. The functional significance of these abnormalities is not known presently. However, it is reasonable to expect that spine loss and alterations in the dendritic spine geometry exert significant effects on the integrative operations of the dendritic systems which act as receptor surfaces for synaptic inputs to cortical neurons. If this is indeed the case then it is not surprising that the non-normal speaking child may be forming hypotheses about the structure of the language which are different from those of the normal speaking population. These invalid hypotheses may lead not only to incorrect conclusions but they may also be dead ends which are a deterrent to subsequent grammatical development. This abnormal dendritic spine development may possibly be an explanation for the apparent difference between the speech of disabled children and younger normal children and it could offer a partial account for the apparent plateau these children reach in their linguistic development.

It may well be that future research with mentally disabled children will be a fruitful area for the neurolinguist.

NOTES

[1]Eric Lenneberg, Biological Foundations of Language (New York. 1967), p. 326.

[2]I am indebted to Dr. Carl Betts, Director of State Services for Crippled Children, and to his staff for making the language protocols available.

[3]From the CLINICAL RESEARCH STUDY AND DEMONSTRATION PROJECT IN SPEECH AND LANGUAGE SKILLS OF MENTALLY RETARDED CHILDREN, Iowa State Services for Crippled Children, (1971), pp. 112-113.

[4]Dominick Purpura, "Dendritic spine 'dysgenesis' and mental retardation", Science, V. 186: (1974).

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