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AN INVESTIGATION OF THE DEVELOPMENT OF THE SENTENCE
AND
THE EXTENT OF VOCABULARY IN YOUNG CHILDREN

by

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FOREWORD

As a rule, few children have been observed in the numerous vocabulary studies on young children. In this investigation by Dr. Smith on the development of the sentence and the extent of vocabulary, two hundred seventy-three children between the ages of eight months and six years were observed individually.

In order to analyze the development of the sentence, all the words used by eighty-eight children were recorded during an hour of free active play with other children with a view to determining the number of words per sentence, the number per hour, the types of sentences used and their frequency, the parts of speech and their frequency, and the words used most frequently.

For the purpose of determining the extent of vocabulary, a special vocabulary test based on seventy-seven vocabularies of children was formulated and applied in order to discover the number of words in the individual vocabularies. The average size of the vocabulary was determined for age and sex for the number of children observed, and studied in relation to the mental age, social status, order of birth, sex, and length of sentence.

The study, which is a dissertation presented in partial fulfillment of the requirements for the degree of doctor of philosophy in child psychology, summarizes the literature of the special field, offers practical suggestions for further studies in the vocabulary of young children, and includes sample conversations and lists of words most frequently used by young children.

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Office of the Director
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CONTENTS

CHAPTER I

STUDIES IN THE DEVELOPMENT OF VOCABULARY

In a study of the development of language in children, some of the important questions that arise are: How does the child learn to speak? At what age may we expect him to begin to talk? At what rate does his vocabulary increase? What are the factors that determine the rapidity of this increase? How does he learn to construct sentences? These and so many other questions arise that one investigation can not attempt to answer them all.

This study is concerned primarily with two of the questions, the sentence structure and the rate of increase of vocabulary. It was necessary to evolve a method that makes it possible to follow the progress of a child in constructing sentences and some means by which to measure the extent of a child's vocabulary in order to determine its rate of increase.

Many studies have been published on the development of language in children, the majority of which are based on the observation of a very few cases. The most significant of these are given in the list of references. But since this problem concerns only sentence structure and extent of vocabulary, the review is confined to investigations in these fields; all the work on the period before the child actually uses words, all the discussion on theories of the origin of language, and all literature dealing with pronunciation and the pathology of speech of children are omitted.

BRIEF SURVEY OF PUBLISHED INVESTIGATIONS

This survey includes a study of (1) first words, (2) combinations of words, (3) parts of speech, (4) factors determining the rapidity of language development, (5) methods of measuring vocabulary, and (6) determination of the most common words.

First Words

It is often difficult to determine the day on which the child first uses a word with meaning, for his babbling sounds frequently take on the form of words although they still do not have meaning for him. Stern[68] and others call these first words "word sentences" for they have for the child the same purpose as whole sentences for

adults. Bloch[10] stresses the verbal quality of these words, and others have noted their emotional-volitional character.

The age of beginning to talk has been reported for individual children[32,33] by several observers, and on groups of normal children by a few investigators, Feldman,[27] Mead,[48] Bateman,[6] and Gesell.[31] The medians reported for normal children vary from twelve to sixteen months, with the girls slightly younger than the boys.

For a time the first words are added to slowly. Sometimes there is a period of some months during which practically no progress is made. The Sterns[68] found that their children began to ask for the names of objects at eighteen and nineteen months. Stern believes that at this time the child makes the discovery that everything has a name, such a discovery as Helen Keller[43] has so vividly described in the story of her life. The word then changes from a word sentence with a wish or emotional coloring to a true substantive stage.

Combinations of Words

Along with the single words a child learns, phrases are often learned as wholes when the child has no idea of the meaning of the separate words. Such combinations of words may be learned almost as soon as single words: but an examination of the data reported appears to indicate that true sentence forming rarely occurs before the child knows one or two hundred words. It is probable that the time of the appearance of sentences is about the time of the appearance of interest in the names of things. As the child grows older, his sentences gradually become longer and more complex.

Parts of Speech

The literature that concerns the various parts of speech shows that, although the first words, strictly speaking, may not be classified under parts of speech, the words most commonly found at first are those that in adult usage are interjections and nouns. A little later come verbs, then modifiers, and lastly connectives.

Factors Determining the Rapidity of Language Development

A variety of factors has been suggested as determining the rapidity of language development.

No positive sex difference has been established, but there is a suggestion that while girls learn to talk earlier than boys, boys surpass girls in size of vocabulary after reaching school age.

The order of birth has been considered a possible factor affecting development of language, the younger child being supposed to have an advantage over his older brothers and sisters, but the authors who report on two or more children in the same family offer conflicting evidence.

Some data have been collected showing that there is a positive relationship between size of vocabulary and intelligence. Terman[69] declares that the vocabulary test in his scale of mental tests is of "higher value than any other three tests" in the scale. It seems fairly well established that although there is great variability, the normal child begins to talk much earlier than the feebleminded child, and the greater the degree of mental defect, the greater is the delay in learning to talk. Other investigators have found positive correlations between class records and size of vocabulary.

It is natural to suppose that a richer, more stimulating environment results in a rapid development of language, and that the children of higher social classes are in advance of those of the lower classes. Drever's[25] study of free kindergarten children shows much lower vocabularies than are shown by other investigators studying their own children; but Drever's period of observation was comparatively short. Descoeudres[21] found so striking a difference in the results of her tests of children of different social classes that she gave separate norms for the two groups she used.

The studies of Pavlovitch[58] and Ronjat[60] on children learning two languages at once do not indicate any handicap to the child from bilingualism. On the other hand, Saer[62,63] and Smith[65] studying bilingualism in Welsh school children found that in mental tests the monoglot children had an advantage over the bilingual children.

Methods of Measuring Vocabulary

The determination of the actual number of words in a child's vocabulary has, for the most part, followed two methods. The obvious method is to record each word, on the occasion of its first intelligent use by the child, and thus keep a continuous record of his vocabulary. But this involves such close and continuous observation that only one investigator, Moyer,[51] has carried it beyond the third year. Many variations of this method have been used in order to lessen the labor, such as recording all words used during varying periods of time, with or without a check made by using a dictionary to suggest other words known but not used during the

interval of observation. But even with such devices the work of collecting complete vocabularies in this way is excessive and becomes increasingly difficult with the child's increase in age.

There are difficulties, too, in comparing the data of various observers. In the first place, there is a serious error in sampling, because the observers are likely to belong to the professional classes, and they use their own children as subjects. Another difficulty lies in the fact that each observer makes his own rules with regard to the words included. Gale,[28] for example, includes not only words but also phrases that are used as separate words; Whipple[72] includes every possible grammatical variant; others include only special variants; and some count a word only once, while others count it once for every part of speech for which it is used. Finally, there is a great variability in the interpretation of "intelligent use of a word." Taking all these factors into consideration, it must be granted that, when this method of determining the actual number of words in a child's vocabulary is used, the great variability in number is a function not only of individual differences in the children but also of the differences in the methods of securing and recording the words.

The second method for determining the extent of vocabulary does not attempt to get the exact words used, but only the number of words. This method is to list the first word on every page of the dictionary, check those known, and multiply this number by the average number of words on a page. Lists made up in a way similar to this have been prepared by Doran,[23] Kirkpatrick,[44] Starch,[67] and Gerlach.[30] The subject checked the words he knew on the list, or defined the words, or chose one definition from several for each word. This method, however, is not applicable to young children whose ability to define words is very limited, nor does such an approximation of total vocabulary mean very much when the child is so young that the words known are still to be counted in the hundreds while the constant to be used in multiplying known words is 180, as it is in the Terman list.

Descoeudres[21] has attempted to overcome the difficulties pertaining to both these methods with her *Complete and Partial Tests of Language,* which make it possible in a few hours, or even less, to obtain a reasonably accurate idea of the child's vocabulary. Her method is to use a series of questions, actions, filling in of gaps,

and naming of opposites, colors and objects for determining the words known; the constant she uses for calculating the complete vocabulary is relatively small. Her test was prepared for French children; her constant was determined by comparisons of the test results and total vocabularies of three children.

Determination of the Most Common Words

The determination of the most common words in the spoken vocabulary of children has also been tried. In the *Twenty-fourth Year-Book of the National Society for the Study of Education*[52] is a report of three investigations, by E. Horn, M. Horn, and Packer which have been combined to give the most common words in the spoken vocabulary of children up to and including six years of age.

SCOPE OF THE PRESENT INVESTIGATION

Purpose

The survey of the literature shows that (1) although several investigators have traced the development of sentences of one child or two or three children, no one has dealt with more than a few children, nor is the entire number of children studied altogether very large; (2) there is much evidence that is contradictory regarding all suggested factors of speech development; and (3) the methods available for determining the extent of vocabulary either require an excessive amount of work when more than a few children are tested or are too dependent on ability to define words, an ability beyond the power of a young child.

This study was planned to add to the knowledge of the development of vocabulary in young children by tracing sentence development in a fairly large number of children, presenting evidence with regard to various factors in the development of vocabulary, and evolving a test not hampered by the difficulties presented by the tests hitherto reported.

Subjects

For the entire study 273 children varying from eight months to six years were observed. Most of the children were secured from the Baby Examining and Preschool Laboratories of the Iowa Child Welfare Research Station and the Junior Primary Group of the University Elementary School, State University of Iowa, from the Day Nursery maintained by the Sunshine Mission, Cedar Rapids, Iowa, and from the Home of the Friendless, Cedar Rapids, Iowa.

The largest group of children, 100, were those observed at the Baby Examining Laboratory; these children were brought by parents of all social groups, but their interest in their children's mental development shows them to be above the average. The ninety-five children from the Preschool Laboratory and the Junior Primary Group, whose play environments are similar, represent a somewhat select group of superior mentality. The thirty children from the Day Nursery come from a class in which the mothers are obliged to work by the day. The group from the Home of the Friendless, nineteen, were mainly children of the laboring class, who had either one or both parents living who paid their board. The few remaining children were from miscellaneous sources.

As a group the children were fairly representative and of about average mentality, although there were more at the upper and lower ends of the mental scale than would be found in a normal distribution.

CHAPTER II

THE DEVELOPMENT OF THE SENTENCE

This study of the development of the sentence did not demand the devising of a new method, since satisfactory methods had already been used, but rather the accumulation of material under a standardized situation so that the results obtained from different children might be comparable.

SUBJECTS OF THIS STUDY

For this first part of the investigation only the children from two to five years were included for two reasons; it was difficult to secure a sufficiently large number of older or younger children under comparable situations, since it was desired to observe the children during free play periods with other children, and the time from about two to five years is for most children the most crucial in the development of the sentence. Eighty-eight children were observed, twenty-five of these more than once. Almost all were from the Preschool Laboratory, the Day Nursery, and the Home of the Friendless.

METHOD OF OBTAINING MATERIAL

The aim was to obtain the child's spontaneous chatter. The plan was that each subject should be under observation for an hour while at play with other children. Every word he spoke was taken down as unobtrusively as possible and he was not addressed at any time while the record was being taken. Children who talked most plainly and whose articulation was best were selected for the first records; those who were more difficult to understand were not observed until better acquaintance made it possible to secure more accurate records. A few quiet children were observed for several days before their remarks were sufficient for recording and, even with that precaution, some records contain only a few sentences. Only one child's conversation was recorded at a time unless two children who talked little happened to play together so much that it was possible to record for both at once. A system of abbreviations was used in order to keep up with the fluent speakers. On the whole, very few

words or sentences were lost in transcribing. All records were taken by the writer with the exception of two, the two earliest records of Girl 5, which were recorded, under similar conditions, by the child's mother.

The records of children from the Preschool Laboratory were taken during the hour devoted almost entirely to free play. Here each child observed was in a group of ten or twelve. Occasionally, with the older group, a word or sentence was lost on account of the noise of the games or activities in progress at the time, but this did not occur frequently.

The few conversations taken in the child's home were recorded under comparable situations while the child was playing with other children.

At the Home of the Friendless the children were observed in a group of ten or twelve. Here, as in the Day Nursery, the presence of a visitor was more of an event than in the Preschool Laboratory. The children were almost too friendly to make it possible to obtain complete records, and addressed the observer frequently, although most of their remarks were addressed to their playfellows.

At the Day Nursery, the group was small and testing and observation were possible at any time during the day, except the lunch and nap and story periods. However, the mothers' time for calling for the children was uncertain, so that a record was sometimes broken into, and, as it was so difficult to secure enough children at two years of age, the records of some of those who were available for only half an hour were included.

Only one child appeared to be cognizant of the interest centered upon himself, and that was shown in his remark, "You have to watch me today, don't you?" It was difficult to regulate exactly, in a few cases, the amount of conversation the child carried on voluntarily with the observer. In the case of one boy who prefers adult to child companionship, the mere fact of the observer's approaching near enough to hear his remarks led him to begin a series of questions and statements addressed to her. But there were very few such cases. Another child, upon seeing the pencil, began to demand to have pictures drawn for her.

Various samples of the conversations recorded are given in the Appendix (page 84), including the conversations of a little boy at

half-year intervals from three to four and one-half years of age, and of children at three different levels of mental ability at two, three and one-half, and five years of age.

ANALYSIS OF CONVERSATIONS

Number of Words and Sentences

First, the number of words and of sentences was counted and the average length of sentence was calculated for each conversation for each child. Next, the number of different words used by each child was determined, and the ratio of different words to the total words used was also determined. The average length of sentence, the average number of all words used, the average number of different words, and the ratios of different words used to the total number of words were calculated for children of two, three, four, and five years. (An age group includes all children within six months of their birthdays; for example, age two includes all children from one year and six months to two years and five months.) The number of repetitions made by each child was listed, and the number of "babbling series" counted for each child. In cases in which several conversations of the same child at various ages were recorded they were tabulated separately.

Types of Sentences

The conversations were analyzed into types of sentences. Various classifications were used for this analysis.

The first division concerned the structure of the sentence, whether it was complete, incomplete, or just a single word. All of the conversations were divided according to these classes and the averages were calculated for the various years.

Next, the ordinary grammatical classification of simple, complex, and compound sentences was used; the compound sentences that included "yes" or "no" as a whole phrase were listed separately. Each conversation was divided according to this criterion and the averages calculated for the various ages.

The sentence analysis adapted by Snyder[66] was next tried out, but since her classification was used only for the conversation of a child of two and one-half years, it was necessary to modify it and to amplify it for use with the conversations of children of other ages.

The classification used in this study was as follows:

Types of sentences (adapted from Snyder)
- Declarative
  - Variations of imperative
  - Declarative in function
    - Personal
    - Impersonal
- Imperative
- Interrogative
  - Variations of imperative
  - Request for permission
  - Request for approbation or corroboration
  - Questions of fact
    - Half question, half exclamation
    - Interrogative words
- Exclamatory

Negative sentences were given special study as negative imperative, negative statements, and negative questions.

In applying this classification, there was some difficulty with certain sentences. For example, sentences such as "I want some more" and "Will you hold this?" which are respectively declarative or interrogative in form, were listed under a variety of imperative because of their imperative meaning. A slight change had to be made from the method of Snyder, "requests for corroboration" such as "We have peas and corn when we are at home, don't we?" and "We do all dance around the circle, don't we?" being included under "requests for approbation."

Each conversation was analyzed into parts of speech. Dewey[22] has shown that it is almost futile to endeavor to classify the speech of a child just beginning to talk into grammatical parts of speech because he uses one word expressive of a whole sentence. This difficulty was apparent in dealing with the most immature children, but the attempt was made nevertheless. The classification of words used into parts of speech followed the usual grammatical rules, Webster's dictionary being the criterion in cases of doubt. It was not always easy to determine under which part of speech to classify some words that are used as more than one part of speech or were used erroneously by the child. In cases in which it was impossible to determine the part of speech from the context the word was classified under its most common use. It must be noted that the classification is of the total, not the different words, used by the child. The various parts of speech used by each child were tabulated and averages of percentages calculated for the various years.

RESULTS OF STUDY

Number of Words and Sentences

Table 1 shows the number of children for every half year from two to five years, the averages of the number of words to the sentence, the number of words to the hour, and the average intelligence quotient for each age group, with the exception of the children of two years, since the Stanford-Binet scale is inapplicable to children this young.

TABLE 1
Average Accomplishment in Words of 124 Children in One-Hour Conversations

Number of children	Age group		I. Q.	Words	
	Years	Months		Total number	Number to the sentence
11	2—	0		78	1.7
18	2—	6	109	118	2.4
17	3—	0	106	223	3.3
23	3—	6	109	344	4.0
17	4—	0	107	400	4.3
22	4—	6	109	415	4.7
16	5—	0	105	400	4.6

The average total number of words used to the hour shows a regular increase with age; but the variability is too great from child to child, and with the same child, for it to be an adequate criterion. In fact, this number ranges from 0 to 1,100 words for the entire group studied. The length of sentence, that is, the number of words to the sentence, seems to be a much better measure. There is a steady increase up to four and one-half years, with only small increments of gain after three and one-half years. The length of the sentence of the average of all children and of two boys and two girls at different ages is shown by the curves in Figure 1. The individual curves also show little or no gain after four years. This failure to gain after four years and the extreme variability in the older children of the same mental ability make it seem probable that the sentence length as a measure of sentence development has no significance after four or four and one-half years. Further, there are indications that there is a considerable alteration in length according to the activity of the child, his state of excitement, and

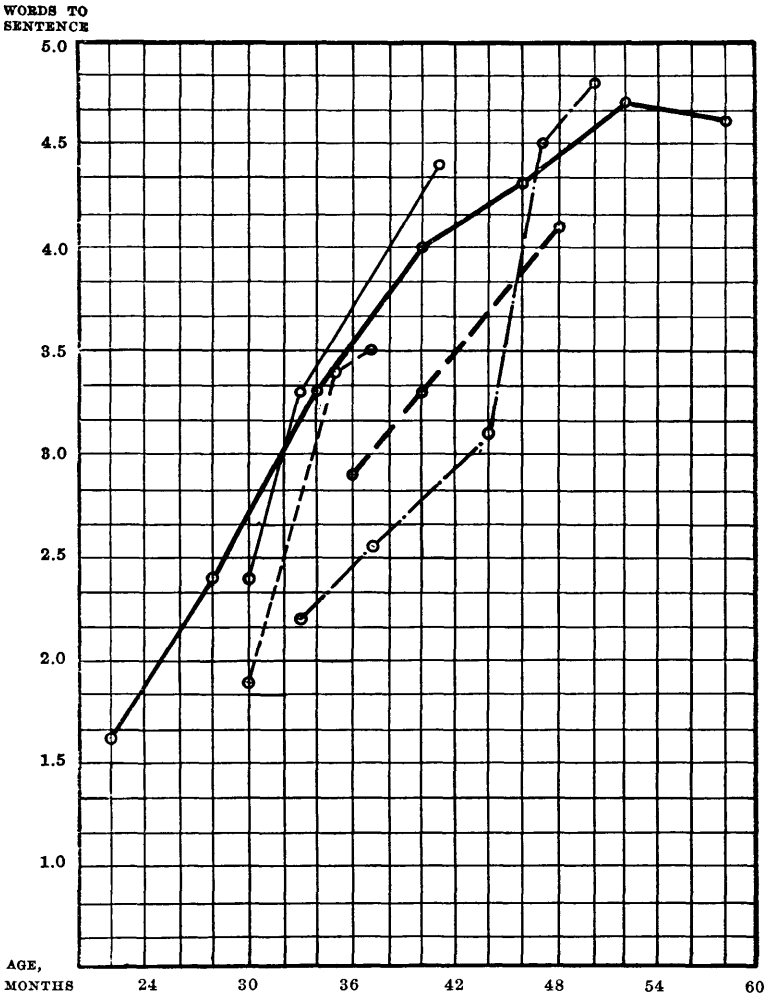

Fig. 1. Number of words to the sentence at various ages

(——) Average of all children
(——) Girl 25, from the Preschool Laboratory, of superior mentality
(– – –) Girl 152, from the Preschool Laboratory, of average mentality
(– – –) Boy 27, from the Day Nursery, dull
(—·—) Boy 38, from the miscellaneous group, somewhat backward

the subjects he is addressing. This makes it evident that it is necessary, if sentence length is to be considered, that the children be

in comparable situations, for example, engaged in reasonably active play with their fellows, with very little adult attention.

The average length of sentence found is less than that obtained by previous investigators; but the tendency would be toward a higher average when selected sentences are used, as by Boyd,[14] or when all-day conversations, as Nice[55] describes, are used. In the latter case, it seems, from this study, that two factors tend towards lengthening the child's sentences, periods of lessened activity and conversations with adults.

Since there were many repetitions of identical sentences, the average number of repetitions to the word used were calculated for each age:

Age, Years	Repetitions per word used
2	.114
3	.045
4	.022
5	.017

These repetitions were not included in the count of total words, however, as in such short periods of observation a repeated phrase tends to be overweighted. In a few cases the repetition was due to stuttering, but more often it was due to failure to secure the desired attention or to the fact that the child was repeating the same act and so repeated his accompanying remarks.

The repetitions of identical phrases or sentences are more frequent among the younger children, but they occur in large numbers among older children, especially when the children are interested in repeating an act while telling what they are doing. Rather frequently partial repetitions occur; the change is in the subject or object; these are not listed separately. For example, Girl 20 said of herself, "Aunt Dora's peetheart. Gamma's peetheart. Aunt Bert's peetheart. Daddy's peetheart. Mamma's peetheart," and then, having reached the limit of her known relatives, began over again.

In Table 2 are recorded the one-hour conversations of twenty-five children. It will be noted that of the fifty-three comparable records, all but four show a longer sentence on the second than on the first record, although the interval often is only three months. The average interval is 4.6 months and the average gain 0.63 word per

TABLE 2
Average Length of Sentences in Conversations of Twenty-Five Children at Different Ages

Child's number	First test		Second test		Third test		Fourth test		Fifth test	
	Age	Words to the sentence	Age	Words to the sentence	Age	Words to the sentence	Age	Words to the sentence	Age	Words to the sentence
	Years Months		Years Months		Years Months		Years Months		Years Months	
Boys										
13	2— 1	0.0	2— 6	1.2						
8	2— 3	1.1	2— 6	2.2						
14	2— 5	2.8	3— 5	3.7						
26	2— 8	3.2	2—11	4.0						
27	2— 8	1.9	3— 1	3.4	3— 3	3.5				
38	2—11	2.2	3— 3	2.6	3—10	3.1	4— 1	4.5	4— 4	4.8
30	2—11	2.9	2— 2	3.2						
31	2—11	3.1	3— 2	3.6						
33	3— 2	3.8	3— 6	4.1						
50	3— 5	4.7	3—10	5.1						
43	3— 8	3.7	4— 4	4.1						
90	3— 9	4.8	4— 1	4.7	4—10	4.6				
94	4— 8	5.5	4—11	4.5						
49*	3— 4	5.6	3— 7	5.8	4— 3	4.6				
Girls										
1	1—11	2.4	2— 5	3.7						
20	2— 3	2.3	3— 3	4.0						
6	2— 2	1.8	2— 5	2.8						
25	2— 8	2.4	2—11	3.2	3— 7	4.4				
41	3— 1	4.1	3—10	4.3						
152	3— 2	2.9	3— 6	3.3	4— 2	4.1				
32	3— 2	3.5	3— 5	4.6						
80	4— 7	3.8	4— 9	3.8						
89	4— 8	4.4	5— 0	4.6						
91	4— 8	4.0	4—10	4.4						
5*	2— 0	2.8	2— 5	3.5	3— 2	3.8	3— 4	3.8	3— 7	3.6

* Not included in averages.

sentence for this interval, or a yearly average gain of 1.7 words. It will be noted that Boy 90 and Boy 94, whose records show a decline, had at the time of the first observation attained a longer sentence than the highest half-yearly average found. The records of Girl 5 are not comparable because her earlier records were obtained by her mother and the records of Boy 49 because his earlier records were of conversations with adults and his later records of conversations with children.

In looking over the conversations collected it is evident that, in the strictest use of the word, very little of the younger children's talk is conversation. It rather approaches monologue, being a running commentary on the child's own actions, as in the case of Boy 30, aged two years, eleven months: "I am making cake . . . . I'm going. No, I got. I got. I got. My finger can get in. Just fell. I make something out of sand. Some splashed out," or, as an expression of his desires, when the same child goes on, "Let me pat. I want some more blocks. Can I have that track? Won't go. That's enough. I want some. I want some more. I want vinegar jar." This manner of talking is characteristic even of many of the older children, although with them there is true interchange of ideas, narration of experiences, real or imaginary, with expectation of response other than mere giving of what is wanted. For example, Boy 49, aged three years, four months, said, "Sometimes I smoke a cigar. I smoke a cigar sometimes when I'm upstairs. I go get a book. Tobacco smoke in my mouth, doesn't it? Look at here. I got a scratch. That's when I put my hand in a bucket full of paint. It was, it was healed. I went down to the doctor and he put some bandage on and some pin." Even this type of talking is quite one-sided. Part of the record of Girl 105, at five years, is illustrated by a conversation that is not so egocentric: "I bringed something. I got one for you and one for Miss S. I'll give them. What is it? I mean right on there. Down there. That takes the paint off, doesn't it? How did you hurt yourself there?"

Babbling, by which is meant voice play that is no attempt at communication and that does not involve the use of meaningful groups of words, seems to occur more frequently among the younger children, although instances are found even in the oldest group. Girl 20, at two years, three months, interlarded her conversation

frequently with such meaningless phrases as "O bo da" and "Dirre dirre, dirre oh" with apparently no idea of communicating thought, for she used them when quite alone, although she talked quite plainly, using correct words, when she talked with others. She also used many repetitions. It was quite evident that she and several others found a distinct pleasure in the mere use of sounds and words. But some quiet, placid babies indulged in no such voice play at all. The babbling of the older children was, as a rule, a little more meaningful, sometimes being the repetition, up to scores of times, of "choo choo" or "too too" as they pushed about a make-believe train.

Types of Sentences

Table 3 gives a summary of the results of the analysis of the sentences during one-hour conversations. The percentages were calculated for the various ages and the probable errors[1] of the percentages found.

In order to determine the degree of significance of the differences in percentages at the different ages the probable errors of these

TABLE 3

Frequency of Various Types of Sentences in One-Hour Conversations of 101 Children

Age group, years	2	3	4	5
Number of children	19	28	32	22
Type of sentence	Frequency			
	Per cent			
Complete	37 ± 7	68 ± 6	84 ± 4	87 ± 5
Simple	98 ± 2	91 ± 4	88 ± 4	85 ± 5
Declarative	54 ± 8	61 ± 6	62 ± 6	59 ± 7
Imperative	22.5 ± 7	19 ± 5	22 ± 5	20 ± 6
Imperative and variations of imperative	30 ± 7	31 ± 6	29 ± 5	28 ± 6
Interrogative	6 ± 4	9 ± 4	11 ± 4	15 ± 5
Exclamatory	13 ± 5	5 ± 3	3 ± 2	3 ± 2
"Yes" and "No" only	4 ± 3	6 ± 3	3 ± 2	3 ± 2

1. The formula used in finding the probable error was:

$$P.E._p = \sqrt{\frac{.6745\ P.Q.}{N}}$$

where P = proportion
P + Q = 1
N = population

Kelley, T. L.: *Statistical Method.* New York, Macmillan, 1923, Pp. 390 (p. 90).

differences[2] were found. The difference is considered to be a significant one if it is at least three times as great as its probable error.

It was thought that the ratios of complete sentences (that is, such sentences as are grammatically complete and do not lack subject, predicate, or object, if such are required for good usage) to incomplete sentences might prove to be a useful measure of the improvement in sentence structure from year to year, although a phrase alone is often adequate for making a thought clear and sentences are often left incomplete because of interruptions or distractions of interest. It was found that the ratio of complete sentences to incomplete sentences is significantly greater at three years and four years than at two, although the difference between four and three years may not be significant, and between five years and four years is not significant.

The proportion of simple sentences to complex and compound is another criterion for indicating improvement in sentence structure. Here the decrease in proportion from year to year is not significant, although the decrease from two to five years probably is significant.

Classification of sentences into types according to use gives no significant increase or decrease in any one type in the percentage used from year to year or from the youngest group to the oldest group, although as the child grows older there seems to be a possible trend towards increase in the number of questions asked and towards decrease in the number of exclamatory sentences. On the other hand, there are significant differences between the percentages when one type of sentence is compared with another. Thus there are more declarative sentences, at all ages, than any other type. Also the proportion of imperative sentences, including variations, is probably significantly greater than the proportion of questions at two, three, and four years. The only further significant difference seems to be the greater percentage of imperative sentences than "Yes" and "No" only.

Parts of Speech

Table 4 is a summary of the individual records showing the number of times the various parts of speech were used. In this table

2. The formula used for the probable error of the difference for uncorrelated measures was:

$$\text{P.E.}_{\text{Diff.}} = \sqrt{\text{P.E.}_1^2 + \text{P.E.}_2^2},$$

where P.E._1 = P.E. of one percentage
P.E._2 = P.E. of the other percentage

TABLE 4

Frequency of Various Parts of Speech in One-Hour Conversations of 101 Children

Age group, years	2	3	4	5
Number of children	19	28	32	22
Part of speech	Frequency			
	Per cent			
Nouns	22 ± 6	16 ± 5	15 ± 4	15 ± 5
Pronouns	16 ± 6	25 ± 6	24 ± 5	25 ± 6
Verbs	26 ± 7	27 ± 6	26 ± 5	27 ± 6
Adjectives and articles	5 ± 3	7 ± 3	11 ± 4	12 ± 5
Articles	1 ± 1	2 ± 2	5 ± 3	5 ± 3
Adverbs	21 ± 6	15 ± 5	13 ± 4	11 ± 4
Prepositions	2 ± 2	5 ± 3	7 ± 3	6 ± 3
Conjunctions	0.5 ±	1.5 ± 1.5	2 ± 2	2.5 ± 2
Interjections	7 ± 4	3 ± 2	2 ± 2	2 ± 2

the parts of speech are not subdivided so finely as in the original individual records. In order to complete the table, two more sets of percentages were calculated: the percentage of the nouns used that were abstract in type was found to be 3 ± 2, 6 ± 4, 12 ± 6, and 24 ± 7 at the ages two, three, four, and five respectively, and the percentage of the adverbs used that were place and modal in type, was found to be 91 ±4, 73 ± 8, 72 ± 8, and 65 ± 10 at the ages two, three, four, and five.

It is evident that if the differences in the percentages are judged by taking the probable errors of these differences—and it is necessary to do this since the number of cases included is comparatively small—there are no really significant differences from year to year in the use of any particular part of speech. There may be a tendency towards a greater use of pronouns and adjectives, but it is not considered significant because the populations are small.

When the frequency of the various parts of speech used is considered it is found that at two years, verbs, nouns, and adverbs are the parts more frequently used; and at three, four, and five years, verbs and pronouns. Judging from the slight increase in the use of adjectives from two to five years together with the slight decrease in the use of adverbs from two to five years, there seems to be a tendency for a greater use of adjectives and a lessened use of adverbs as the child grows older, but the number of cases used does not warrant saying more than that there may be such a tendency.

There was such a marked increase with age in the use of one group of nouns that their percentages were calculated. This is a

group including indefinite nouns, such as somebody, anything, and nouns expressive of ideas of time, position, quantity, and other strictly abstract ideas. As would be expected, these are very infrequent at two years of age, when only a very few children of markedly accelerated development use any of them. The 3 per cent of this type of the total number of nouns at two years doubles each year up to and including the last year studied, but on account of the small number of cases the difference is not significant from year to year, although probably the total from two to five years is significant.

In contrast to this group of nouns, the percentages of adverbs that are place and modal show a truly significant decrease from two to five years. At two years almost all the adverbs used were either place or modal, and these were almost entirely confined to such words as here, there, down, up, no, and yes. The only other adverb used commonly at that age was "more."

There were other differences noticed in individual conversations, but percentages were not calculated on these. There seemed to be very infrequent use of comparative and superlative forms before four years. The older children showed a tendency toward a greater use of copula and auxiliary verbs than the younger ones. Finally, there were but few errors in tense. So concerned were the babies with the present that they did not need to refer to the past or to the future. Of verbal forms, the participle seemed to be the first used correctly, then came the infinitive, then the past tense, and, finally, the future tense.

Common Words in Conversations

In Table 5 are listed all words that occurred more than one hundred times in the conversations collected. Under each verb listed are included all contractions and other forms of that verb. The predominance of pronouns, especially those of the first person, and of verbs will be noticed. The high frequency of "no" and "not" is another point of interest. Very few nouns and adjectives occurred a sufficient number of times to be included. This fewness of nouns in the list is due more to their greater variability than to their true infrequency, since they varied more than other parts of speech according to the immediate interests of the child.

TABLE 5
Words Occurring More Than 100 Times in 124 One-Hour Conversations

Word	Frequency + 601	Word	Frequency 401 to 600	Word	Frequency 201 to 400	Word	Frequency 101 to 200
I	2,543	my	569	got (has)	398	yes	200
is	1,611	want	542	no	370	all	188
it	1,041	go	518	and	343	where	188
you	955	have	481	one	334	big	171
that	790	me	469	look	324	mine	170
do	787	see	459	up	320	he	162
a, an	748	on	442	make	317	too (also)	148
this	712	oh	429	in	317	baby	147
not (n't)	674	there	428	now	316	train	145
the	664	get	422	will	315	take	145
here	632	can	401	let (let's)	312	your	143
to (inf.)	627			down	301	out	142
				going (to)	284	play	140
				we	275	mama	137
				come	268	at	135
				what	267	her	130
				put	243	to (prep.)	130
				some	208	she	128
						of	120
						know	115
						sit	114
						little	110
						for	109
						way (noun)	106
						with	104
						over	101

SUMMARY

The analysis of the conversations obtained by recording the spontaneous chatter of a group of eighty-eight children from two to five years during an hour of free play with their fellows shows several differences at the various ages studied:

The average total number of words per hour increased with age, but the variability was so great that some other factor must be more important than chronological age in determining the amount of conversation.

The most significant trend in the development of the sentence with increase of age was an increasing tendency toward the use of longer and more complete sentences.

There were significant decreases from two to five years in the amount of repetition and the percentages of adverbs that are place and modal.

Declarative sentences predominated at all ages.

At two years, verbs, nouns, and adverbs were the parts of speech more frequently used; at three, four, and five years, verbs and pronouns.

Other trends that may be significant were a decrease with age in the proportion of simple sentences to complex and compound sentences, an increase in the number of questions, and a decrease with age in exclamatory sentences. There was also a slight increase in the use of pronouns, adjectives, and abstract nouns.

The ten words that were used most frequently by this group of children were I, is, it, you, that, do, a, this, not, and the.

CHAPTER III

STUDY OF THE EXTENT OF VOCABULARY

The second part of this investigation deals with the extent of vocabulary. The main problem in this connection was to devise a test to use in determining the size of a child's vocabulary, after which the study of the results obtained from testing a number of children could be used in a study of the factors involved in the increase of vocabulary.

DEVELOPMENT OF TEST

Requirements of a Test for Young Children

In the survey of the literature on the determination of the actual number of words in a child's vocabulary, it was found that there are two methods in current use. In the first method the actual words used are recorded. In the second method a certain proportion of words from a dictionary is tried out, and the number of these words known by the subject multiplied by a constant, which depends on the proportion of words tried to the total number. The first method requires an excessive amount of labor; the second seems to be the more practicable approach, especially the variation of it adopted by Descoeudres.[21] But Descoeudres' test was prepared for French children, and her constants were based on the vocabularies of only three children.

It was decided to develop a test for this investigation that would meet these requirements:

1. It must be applicable to very small children.
2. It must hold the child's interest.
3. The intelligence factor should not preponderate.
4. The constant used should be small enough not to lose small differences in vocabulary, yet large enough not to be too time consuming.
5. The score on the test should be a reliable index of the child's approximate vocabulary.

Selection of Words for Test

Every twentieth word in the Thorndike[70] list of the 10,000 most common words in the English language was selected. For ease in

counting, however, the actual selection was made by taking the first and twenty-first words in each of the two columns of the 126 pages of the main list and discarding at random the four words in excess of the 500 needed.

In order to determine which words are commonly used by young children, fifty-five published vocabularies of twenty-nine different children at various ages from eighteen months to six years, and twenty-two similar, unpublished, vocabularies were analyzed. The list of 500 words was checked with these, and the frequency of occurrence of each word in the seventy-seven vocabularies was determined. All of the words that occurred once or more than once in any vocabulary were rearranged in four lists of as nearly equal difficulty as possible. This reduced the list from 500 to 203 words. After sixty-one children from two and one-half to six years of age had been tested with all four lists, the words were rearranged in one list according to the new order of difficulty found by combining the frequency of occurrence of the words in the seventy-seven vocabularies with the frequency of their knowledge by the sixty-one children. After this, it was not necessary to go through the entire list with each child, for the older children could be credited with knowing the easy words, and the more difficult words could be omitted after a long series of failures with the less difficult words. A final rearrangement of the list according to order of difficulty was made after all of the testing was finished; this is the arrangement of the vocabulary test in this study.

It should be mentioned that this vocabulary test does not include proper names. At first such words were included in the lists, but later it was decided to omit them because several of the lists checked did not include them.

Materials for Test

The object or a picture representing each word was used whenever the word was sufficiently concrete to make this possible. The objects were kept in a box and produced as needed. The pictures were cut from catalogs or the advertising pages of magazines and mounted on sheets of heavy wrapping paper.

Objects.—The objects found to be practicable for the test were:

button
gloves
toothpicks
clips
toy taxi
receptacle with sand

sheets of thin paper
piece of heavy wrapping paper
small piece of velvet
pebble
scraps of paper
strips of paper
pieces of blue, gray, and scarlet paper
check book
postal card
string
good sized piece of cloth
funnel
piece of fringe
notebook

Pictures.—Pictures that were selected to illustrate words or elicit responses that demand use of the test words represented were of:

cake
fish
child's bib
gun
children with a sled
strawberries (colored)
watermelon (colored)
lion
flash lights
freight train
bumble bees
turnips (colored)
cogwheel
witch
crown
drawings to elicit the words across and shape
set of dishes
ear of corn (colored)
fountain
steep hill
gas stove
kettle
cane
soldiers
glass of lemonade (colored)
cedar chest
shovels and a spade
open camera
different kinds of plows
brownie
pictures, described in the test to elicit the words hold, paint, woke, caught, storm, six, race, icy, wife, ugly, sailor, pillar, polite, shingles, necklace

Form of Questions

Before beginning the actual testing, the lists of words were tried out on six children of from three to eight years, in order to determine the most workable form of question to use. When the testing was begun the older and brighter children were used first; the test was then given the younger children until it proved inapplicable, which was at two and a half years, unless they were of superior mental ability. When objects or pictures could not be used, two types of questions were employed for determining the child's knowledge of the words. One form of question, designated "a" in the test, is intended to elicit the word itself from the child; the other form, designated "b," uses the word in a question that can not be answered correctly unless the child actually knows the word. For many words towards the end of the list the child is asked merely

for a definition, since these words are more readily defined than used in answer to questions and if the child is familiar with these less frequently known words, definition of words is not difficult for him.

The vocabularies of the younger children were secured from lists of known words from a number of mothers who are reasonably accurate observers of their children, and in almost all cases the accuracy of the reported list was checked by observation of the child.

Method of Testing

In giving the test, the words which are represented by objects and pictures are presented to the child first and appropriate questions asked; thus an idea of the desirable range of testing is obtained. Next, beginning about twenty words before the first pictured word failed, the questions designated "a" are asked, using as many of the suggested questions for each word as are necessary and continuing until twenty words in succession are failed. Then, the words failed are repeated, with the questions of series "b" and continuing until there are at least twenty consecutive failures at the end of the range; shorter testing range may omit some known words, and a longer range becomes tedious to most children.

It may happen that the season of the year or the child's environment is such that he may know words pertaining to them that are outside the range. Such words are tried. Examples of such words depending on environment are sailor, ocean, pebble, ashore, west, plow, orchard, colt, hornet, taxi, cylinder, mahogany, fringe, brownie, cardboard, cider, liver, gingerbread, crate, timber, notebook, burr, starch, dynamite, and shingle, while examples of seasonal words are witch, sled, icy, watermelon, lilac, cowslip, mosquito, lion, kangaroo (circus), and ornament (Christmas).

Method of Scoring

For all questions of series "a" and all words intended to be elicited by the use of pictures or objects the word itself must be used by the child in his answer. No synonym passes nor will an erroneous form of the verb pass when the word is given in the past tense in the test list. Samples of passing answers are given for the questions of series "b." For this series any answer showing clearly that the child is able to comprehend and use the word with reasonable correctness suffices. As the basis for the test is every twentieth word in the Thorndike list the final score of the child is obtained by multiplying by 20 the number of words passed.

Vocabulary Test

1. **Button** — a. Show the child a common button with two holes in it, and ask, "What is this?"
2. **Pocket** — a. Point to a pocket, preferably on the child's clothes, asking, "What is this, that you put your handkerchief in?"
3. **Hot** — a. Ask, (1) "When your dinner is not cold, it is ....., what?" (2) "Mother puts things on the stove so they will get ....., what?" (3) "You must not touch the stove (or fire) because it is ....." If the answer is "Burns," say, "Yes it burns because it is ....., what?"
4. **Cake** — a. Show a picture of a cake from which a slice has been cut and ask the child what it is. [The picture used in this test is from a large colored advertisement of baking powder.]
5. **Hurt** — a. Show a picture of a man falling from a ladder and a picture [an advertisement] showing a mother putting some remedy on a child's arm. For the first picture say, "See the poor man has fallen from the ladder. What happened to him? Why doesn't he get up?" For the second picture say, "See here is a mother putting some medicine on the little girl's arm because she fell down. What did she do to her arm?"
6. **Take** — a. Hand the child a pencil and then take it away, saying as you do so, "Now I give you a pencil for a while and now ....., what do I do?" If necessary, repeat several times.
7. **Away** — a. "When the big dog came on the porch, Baby was frightened and told it to go ....., where?" If there is no answer or if "away" is not used, ask, "When you want somebody, you say, 'Come here'; if you do not want him, you say, 'Go a.....'"
8. **Mine** — a. Touch the child's hair, asking, "Whose is this?" If there is no response, ask, "Is it mine or yours?"
9. **Window** — a. Point to a window in the room; if the window is covered by a curtain, touch the frame, and say, "What is this, this that you can see out of?"
10. **Dish** — a. Show a picture of a set of dishes and ask the child, "What are these?" If he begins to name each dish, say, "Yes, and when Mother has to wash the plates and cups, she says she must wash the ....., what?"

11. **Love**
   a. "Mothers kiss and hug their little children because they ....."
   b. "Whom do you love?" Passed if child names some relative or some appropriate person. If he names some one else, continue asking, "And whom else do you love?"

12. **Too**
   a. Try to put a pencil in a small box. Ask, "Why won't the pencil go in? Because the pencil is .....?" "Because the box is .....?"
   b. "Daddy was going down town. Mary said, 'I want to go too.' Baby said, 'I want to .....?' "

13. **Tired**
   a. Show a picture such as that of two children playing tag while a third child, evidently tired out, is sitting on the porch with his mother. Point out objects in the picture, saying, "This little boy played so hard with the other children that he had to stop and rest because he was so .....?" If the answer is not elicited, wait until the end of the test and ask, "What do you do when you are tired?" Passed if the child makes any sensible answer, such as, "Rest," "Go to bed," "Stop playing."

14. **Hold**
   a. Show a picture of a mother holding a child on her lap. No other detail in the picture is used. Ask, "What is the mother doing?" Or, holding a pencil, say, "I am not writing with my pencil now, am I? I am just ....., doing what with it?"

15. **A**
   Listen for the use of this article as the child talks.

16. **Fish**
   a Show an uncolored but clear picture of a common fish. Ask what it is.

17. **Say**
   a. If the child is a girl, ask, "Have you a mama-doll?" If she says she has none or if the child is a boy, say, "You know somebody who has a mama-doll, don't you? You have seen one. What does it do if you tip it this way [illustrating], or, if you spank it?" If the child says, "It cries," say, "But it talks, too, doesn't it? What does it say if it cries?" Passed if the child then answers, "It says 'mama.' "

18. **Dry**
   a. "When your dress [or suit, if the child is a boy] is wet, Mother hangs it up outdoors so that it will get ....."
   b "When clothes are dry, they are not ....."

19. **Didn't**
   a "Rover, the doggy, knocked down a vase and broke it. When Mother saw the vase, she asked Johnny, 'Did you break the vase?' Johnny said, 'No, I .....' " If there is no answer, repeat the question, adding, "Did Johnny break it?"

20. **It's**
   a. If the child talks freely he will usually use this word

without the examiner's asking for it. If he does not use the word, point to various objects in the room, saying, "Do you see that thing? Tell me what it is."

21. **Corn**
   a. Show a picture of a large ear of yellow corn and ask what it is.

22. **Bib**
   a. Show a picture of a bib. Ask, "What is this? Something to wear when you eat dinner?"
   b. "What is a bib for?" Passed if the child replies, "To wear when you eat," "To keep your dress clean at dinner," or some such answer.

23. **Any**
   a. Hand the child three toothpicks. Ask, "How many have you?" Take one away. Ask, "How many have you now?" Take away the rest and ask, "Now how many have you left?" If the child simply answers "None," say, "Tell me all about it. Tell me, 'I haven't .....'" Also passed if the child uses the word at any other time during the test.

24. **Mud**
   a. "When it rains, the dirt in the road becomes ....., what?" Or, "When it rains and you come into the house, what must you wipe off your shoes?"

25. **The**
   Listen for the use of this article as the child talks.

26. **Paint**
   a. Use advertisements or pictures of paints. In one used in this test a woman is painting chairs; in the other a man is painting a house. Ask the child what they are doing.

27. **Wear**
   a. "What are clothes for?" If the answer is "To put on," later ask,
   b. "What do you wear?" Passed if any logical answer is given.

28. **Gravy**
   a. "What do you put on your potatoes?"
   b. "What is gravy for?" Passed if the answer is "To eat" or "To put on potatoes."

29. **Gun**
   a. Show a colored picture of a small boy carrying a gun. Ask, "What has the little boy in his hand?" If it is not recognized, say, "He's playing he's going to shoot the lions. What has he got to shoot them with?"
   b. "What do you do with a gun?"

30. **Glove**
   a. Show gloves, or a picture of gloves. Ask what they are.
   b. "What are gloves for?" Passed if the child says, "To wear on our hands."

31. **Across**
   a. On a piece of paper 2 by 4 inches, draw two lines, crossing each other near the center of paper. Say [drawing finger along the lengthwise line], "Here is where the car went along the street and here [drawing finger along horizontal line] is where the little boy ran a....." "Where did the little boy go?" Sometimes child says, "The car ran over the boy;" then say,

"Yes, because he didn't stay on the sidewalk but ran ....., where? A....."

32. **Closet**
   a. "Mother hangs the clean clothes you are not wearing in the ....., where?" If the answer is "On the line," say, "Yes, when they are wet she hangs them there, but after they're dry she hangs the coats and other clothes up in the ....., in what little room?"
   b. "What is a closet for?"

33. **Hill**
   a. Show a picture of a steep hill. "What is this? Here is something you can slide down in winter."
   b. "What do you do on a hill?" Passed if the answer is, "Go up," "Slide down," "Climb," or a similar answer.

34. **Quick**
   a. "When Johnny climbed the tall tree, he started to fall and was frightened so he called, 'Oh Mother, come .....' " If the answer is not given, continue, "How did he want mother to come, slowly?"
   b. "When you come quickly, do you go fast or slow?"

35. **Sled**
   a. Show a picture of a little girl on a sled with an older boy pushing her. Say, "Here is a picture of a big brother giving his little sister a ride on his ....., what is it?"

36. **Sometime**
   a. "Mother said you can't go this time, Mary, but you can go some....."

37. **Change**
   a. "If you're going to Sunday School [or down town] and your suit [or dress] is dirty, what must you do before you go?"
   b. What do you do when you change your clothes?

38. **Gas**
   a. Show a picture of a gas stove. Ask what it is; if necessary, tell the child that it is a stove, then point to the handle saying, "Here is the handle. What is it for? To turn on the ....."
   b. "What is gas for?" Passed if the child says "To burn," "For the stove," or "To put in the car."

39. **Herself**
   a. "Mary didn't want her mother to help her put on her coat. She wanted to do it all by her....."

40. **Strawberry**
   a. Show a colored picture of strawberries. Ask, "What are these?"

41. **Told**
   a. "Mary wanted Mother to tell her a story. She said, 'Mother, please tell me a story.' What did her mother do?" The past tense of the verb must be used by the child.

42. **Woke**
   a. Show two pictures, one of a baby asleep in a crib, the other of a baby toddling along. Say, while pointing, "Here baby is fast asleep, but when Johnny came home from school, he made so much noice that baby ..... What did baby do?" If there is no answer,

say, "Here she is asleep, but here the baby is not asleep, she ....., did what?"

43. **Caught**
a. Show a picture of two small boys, one holding a big ball. Say, "See these little boys were playing ball. This little boy [pointing to the empty-handed one] threw the ball, and this little boy, ...what did he do?" This boy threw it and this one....." If there is no answer, toss any small object to the child, saying, "See, I threw it to you, what did you do?" "Throw it back to me. Now you threw it and what did I do?" Failed if the child says "catched" instead of "caught."

44. **Splash**
a. "When you throw stones in the water, what does the water do?" or "When baby takes a bath, what does baby do with the water?"
b. "What splashes?"

45. **Those**
a. Take four toothpicks. Say, "Johnny's daddy gave him some candy and told him to give some to Mary. So Johnny took two pieces of candy [Lay two toothpicks down close to the child.] and put them here and put two pieces there. [Lay the other two toothpicks far from the child.] He said, 'Mary, you can have these pieces [Point to the toothpicks near the child.] and I'll take .....' " [Point to the others.]

46. **Stir**
a. Use a small box filled with sand; with a pencil stir the sand. Say, "I'm playing I'm making a cake. What am I doing?"
b. "Show me how you stir things."

47. **Never**
"Did you ever ride in an airplane? I never did. Did you ever?" If the answer is only "No," say, "Tell me all about it, tell me I ne....."

48. **Miss**
a. Ask, "What is your teacher's name?" or ask for the name of any single woman whom the child knows.
b. "What does Miss mean?" The meaning of either "miss" or "Miss" is satisfactory.

49. **Kettle**
a. Show a picture of a kettle. Ask what it is.
b. "What is a kettle for?" Passed if the answer gives any use made of a kettle.

50. **Slip**
a. Say, "When it is slippery or icy, you must be careful not to .....?", or,
b. "What do you do when you slip?" Passed if the child says, "Fall down," "Get hurt," or "Cry," if he can tell why he cries.

51. **Honey**
a. "What do bees make?"
b. "What is honey for?" Passed if the answer is "To eat" or "To put on bread."

52. **Taxi**
a. Use a toy automobile or picture of an automobile

colored like the automobiles used by a well known taxi line in the city. Say, "What is this? A yellow ....."

b. "What is a taxi for?"

53. **Bright**

a. According to weather, vary "The other day was rainy, but today the sun shines nice and br....." or "Today is rainy, but yesterday (or the other day), the sun shone nice and br....."

b. "Tell me something that is bright." Passed if the child names the sun or any bright object.

54. **Blue**

a. Show a strip of blue paper, pure color, and ask the child, "What is the name of this color?"

55. **Watermelon**

a. Show a colored picture of a watermelon cut open, and ask what it is.

b. "What do you do with watermelon?" Passed if the answer is "Eat it."

56. **Scold**

a. Show a picture of a boy running from a broken window. Say, "See, the naughty boy threw a stone and broke the window. Now he is running away because he knows the people who live in the house will come out and sc..... What will they do to him?" If the answer is "Spank him," wait until end of test and ask,

b. "Do they scold naughty boys and girls or good boys and girls?" Passed if the answer is "Naughty ones."

57. **Storm**

a. Use a picture of a number of persons in the rain, with umbrellas raised. Say, "See how hard it is raining, I think it must be a big thunder....., what?"

b. "What does it do when it storms?" Passed if the child uses "rains," "snows hard," "blows," or "thunders" in his answer.

58. **Year**

a. Ask, "How old are you?" If the answer is "Three" or "Four," say, "Four what? Four weeks?" The child must use the word year in order to pass.

59. **Edge**

a. Point to the middle of the table saying, "Here is the middle of the table, and this [touching the edge] is the ....." If the child says, "Side" or "End," ask,

b. "Where is the edge?" Passed if the child points correctly.

60. **Cane**

a. Show a picture of a boy leading a blind man who is carrying a cane. Say, "See the poor man can't walk alone. The little boy is helping him, and what has the man in his hand to help him walk?"

b. "What is a cane for?" "To help you walk" or "To carry" passes.

61. **Everybody**

a. Say "They are having a party at Mary's school. The teacher said, 'We don't want anybody to stay at home,

we want to have ev.....' Whom did they want to have come?''

62. **Lion**
   a. Show a picture of a lion. Ask ''What is this?'' or ''Did you go to the circus? What animals did you see there? Did you see horses? And what else?''
   b. ''What is a lion?''

63. **Soldier**
   a. Use two pictures of soldiers, one of a soldier with a gun at shoulder, ready to fire, the other with the gun at parade rest. Ask, ''What are these men?''
   b. ''What do soldiers do?'' Passed if the answer is ''Fight,'' ''Shoot people,'' ''Go to war,'' or ''March.''

64. **Lemonade**
   a. Show an advertisement of lemons in which there is a glass of lemonade. Ask what it is.
   b. ''What do you do with lemonade?''

65. **Dozen**
   a. ''When Mother goes to the store to buy eggs, she doesn't say 'I want twelve.' She says 'I want a .....?' ''

66. **Scrap**
   a. Point to small bits of torn paper, previously laid on the floor. Say, ''Those aren't good pieces of paper, are they? They're just little .....''
   b. Ask, ''What do you do with scraps?'' Passed if the answer is ''Feed the dog,'' or ''Feed the kitty,'' or ''Throw them away,'' or a similar answer.

67. **Ditch**
   a. Draw slowly along the side of a book a pencil, or toy automobile, letting it slip off at the end of the book, while saying, ''They were out riding in the car and the road was very narrow. Mother said, 'Watch out, Daddy, don't let the car run into the .....' ''
   b. ''Where are there ditches?'' Passed if the child says, ''By the road,'' or gives a possible location.

68. **Six**
   a. Show a picture in color of a woman carrying a birthday cake with six candles. Say, ''It's the little boy's (or girl's) birthday. Let's count the candles and see how old he is. You help me. One, two, three .....'' Point to each as the child counts. Passed if he counts to six in order.

69. **Mosquito**
   a. ''We put screens at the windows to keep out flies and mo.....?''
   b. ''What do mosquitos do?'' Passed if the answer is ''Bite,'' ''Hurt,'' ''Make you scratch.''

70. **Race**
   a. Show a picture of two children running a race. Say, ''See the little boy and girl. They're running as fast as they can. They're trying to see who will get there first. They're running a ....., what?''
   b. ''What do you do when you race?''

71. **Thin**
   a. Show two pieces of paper, one heavy wrapping paper,

one very thin. Say, while pointing, "This paper is thick and this one is ..... what?" or "After the little boy was sick he was not fat any more, he was ....."

b. Show a piece of thin paper and ask, "Is this thin or thick?"

72. **Body**

a. Ask, "Where is your body?" Passed if the child touches any part of the front of his trunk. The word is frequently confused with "bottom."

73. **Flash**

a. Show pictures of two types of flashlights. Ask, "What are they?" If answer is "Lights," ask, "What kind of lights?"

b. "What is a flash?" Passed if the answer is "Light," "It's bright," "When it thunders."

74. **Gingerbread**

a. "On Christmas trees they sometimes hang men made out of gin.....?"

b. "What is gingerbread like?" Passed if the child makes some correct distinction between it and common bread.

75. **Rather**

a. "Daddy was going down town. He said to Johnny, 'Do you want to go with me or stay with Mother?' Johnny said, 'I would ra.....' What did Johnny say?"

76. **Freight**

a. Show a picture of freight cars. Say, "See here is a part of a train of cars. What kind of train is it?"

b. "What do freight trains carry?" Cows, pigs, coal, boxes, any article of freight passes. If answer is doubtful, ask, "Would you ride on a freight train?" Record failure if the answer is "Yes," unless the child shows that he means a "mixed" train.

77. **Chilly**

a. "Johnny said, 'I don't feel cold. I just feel ch.....' "

b. "How do you feel when you are chilly?" Passed if the child says, "Cold."

78. **Playhouse**

a. "The children were building a house to play in. They called it their ....."

b. "What is a playhouse for?" Passed if the answer is "To play in," and if the child can explain further by stating that he or some playmate has one, or if he can describe play carried on in it. The term itself is so suggestive of the answer that an explanation from the child is necessary.

79. **Chest**

a. Show a picture of a cedar chest. Say, "This is a cedar ....."

b. (1) "Where is your chest?" The child must point to his chest approximately correctly. Record failure if he points to his throat. (2) "What is a chest for?" "To put things or clothes in," passes.

80. **Drip**
a. "When the faucet won't shut tight then the water keeps .....?"
b. "What drips?" "Faucet" or "Water" passes.

81. **Rang**
a. "Johnny heard the bell ring. He said, 'Mother, the bell just .....' What did the bell do?" The answer must be "Rang." "Ringed" does not pass.

82. **Nowhere**
a. "Johnny couldn't find his cap. He had looked and looked for it. Mother asked, 'Where is your cap, Johnny?' Johnny said, 'I can find it no.....' "

83. **Bumble(bee)**
a. Show a picture of bumble bees. Say, "Do you know what these are? Bum....."
b. "What do bumble bees do?" Passed if the answer is "Sting," or "Fly."

84. **Check**
a. Show a check book, while saying, if child is of a family of better circumstances, "When Daddy wants to pay a bill, sometimes he writes a .....," or if the child is poorer, "When Daddy gets his pay, sometimes he gets a ....."
b. "What is a check?" Record a pass if the answer suggests the equivalent of money or is an attempt to explain a checked pattern in dress goods.

85. **Saturday**
a. "What days do boys and girls not go to school? Sunday and ....., what other day?"

86. **Spade**
a. Show a picture of shovels and a spade. Ask, "What are these?" If the answer is "Shovels," point to spade, saying, "The others are, but this one has another name, it is to dig with. What is it?"
b. "What is a spade?" Passed if the answer is, "To dig."

87. **Tuck**
a. (1) "Mother said, 'That dress is too long, Mary, I must take a [Fold the cloth as for a tuck.] .....', what in it?" (2) "When you go to bed at night, Mother comes, and what does she do so you won't get uncovered?" [Make gesture as if tucking in bed covers.]
b. "What do people tuck?" "Me up at night," "The bed," "Covers," "Dresses" pass.

88. **Turnips**
a. Show a colored picture of turnips. Ask what they are. [The picture is seldom recognized.]
b. "What are turnips for?" "To cook" or "To eat" passes.

89. **Icy**
a. Show a picture of Santa Claus and reindeer. Say, "See here is where Santa Claus lives. See it's all snowy and ....., what? Snowy and i.....?" Passed only if "icy," not "ice," is used.

90. **West**
a. Point to the west, saying, "That side of the room is east, and this side is ....., what?" or "The sun rises in the east and sets in the ....."

b. "Where is west?" Passed if the child points approximately correctly.

91. **Gray**
a. Show a slip of gray paper and ask, "What is this color?"

92. **Pave**
a. "What do they do to the streets and roads so that cars won't get stuck in the mud?"
b. "What do people pave?" "Streets" or "Roads" passes.

93. **Ocean**
a. "Where do the big ships and steamers go?"
b. (1) "What is in the ocean?" Passed if the answer is "Water." (2) "What goes on the ocean?" Passed if the answer names any ocean-going vehicle.

94. **Angry**
a. "When the boys teased Johnny it made him very an....."
b. "What do you do when you are angry?" Such answers as "Cry," "Hit somebody," "Get mad," "Kick," "It's naughty," pass.

95. **Starch**
a. "When people wash and want to have the clothes stiff, what do they use?"
b. "What is starch for?" Passed if the answer connects starch with the washing of clothes or with any other use of starch.

96. **Fool**
a. "Johnny said, 'That isn't really so, I was only f.....' "
b. "What do you do when you fool somebody?" [This question has never elicited a reasonable answer if question a. failed.]

97. **Jerk**
a. Hand the child one end of a piece of string, jerk it, and ask him, "What did I do?" If answer is "Pull," say,
b. "Pull it hard. Now pull it easy. Pull it hard again. Jerk it." Passed if the child really jerks the string.

98. **Fountain**
a. Show a picture of a fountain seen through a window. Say, "Play you're in this house looking out the window. What do you see in the park, there [pointing] where the water goes up and down?"
b. "What is a fountain?" Passed if the child explains the usual conception, drinking fountain, or fountain pen.

99. **Ugly**
a. Show a colored picture of a little girl and a crude outline of a man. Point to the girl, saying, "This little girl is pretty, isn't she? But I don't think the man [pointing] is a bit pretty, do you? He isn't pretty, he's what?"
b. "What is ugly?" A synonym or "Not pretty" or the naming of some really ugly object passes.

100. **Wife**
a. Show a picture of a man and a woman. Pointing, say, "Here is a picture of a man and a ..... He is the

[Use the word the child supplied.] .....'s husband and she is his .....''

b. ''What is a wife?'' ''Mother is Daddy's wife'' and ''A mother'' pass.

101. **Camera**

a. Show a picture of an open camera. Ask what it is.

b. ''What is a camera for?'' Passed if the answer is ''To take pictures.''

102. **Worry**

a. ''Mother was afraid the children would get sick. Daddy said, 'Don't wor.....' ''

b. ''What do people worry about?'' ''That they will get sick,'' ''When Daddy is late,'' or any cause for worry named passes.

103. **King**

a. ''Who sit on thrones and wear crowns and tell people what to do, queens and ....., who else?''

b. ''What do kings do?'' ''What are kings?'' Passed if answer shows any familiarity with word such as ''On cards,'' ''Wear crowns,'' ''Make people mind.''

104. **Plow**

a. Show pictures of a man plowing, a walking plow, and a riding plow. For the first picture, ask, ''What is the farmer doing?'' For the last two pictures ask, ''What is this?''

b. ''What do people plow?'' ''The garden,'' ''The fields,'' ''The dirt,'' ''Corn'' all pass.

105. **Witch**

a. Show a picture of a witch. Ask, ''What is this?''

b. ''What is a witch?'' Passed if the answer is, ''For Halloween'' or any other response that shows some real idea of the word.

106. **Suffer**

a. ''The poor man was hurt so badly when he fell that he suf.....''

b. ''What happens when you suffer?'' Passed if answer is ''It hurts,'' ''I cry.''

107. **Week**

a. ''Seven days make a .....''

b. ''Can you tell me some of the names of the days of the week?'' Passed if several days are named.

108. **Postal**

a. Show a postal card and ask what it is.

b. ''What is a postal?'' Passed if the answer is ''Postal card,'' ''For a letter,'' ''To put in the mail.''

109. **Cardboard**

a. Show a piece of cardboard and ask, ''What kind of paper is this?''

b. ''What is cardboard?'' Passed if the answer is ''Heavy paper,'' or ''It's that paper you showed me a while ago.'' But in the latter case the child must point to the cardboard.

110. **Shape**

a. Show diagrams of a 1-inch square, a right angled triangle with 1-inch legs, and a circle with diameter of 1 inch, and tell the child, ''See, there is a triangle and a square and a circle. They aren't alike, are they?

They are different in what way? They have different ....."

111. **Liver**

b. "What is liver for?" Passed if "To eat" is the answer or if the child identifies the word with an organ of the body.

112. **Neighbor**

a. "People who live on each side of us we say are our neigh....."

b. "Who are your neighbors?" Passed if the child says, "They live next door," or "They live close by." If the child names a certain family, ask where they live and if his answer then shows that the family he named are neighbors, he passes.

113. **Howl**

a. "Dogs bark, lions roar, kitties miaow, and wolves ....., what do they do?"

b. "Tell me something that howls." "Dogs," "Wolves," "The wind," "Babies," "I do when I cry" all pass.

114. **Sort**

b. Hand the child a small box containing clips and toothpicks. Say, "See, these are all mixed up, can you sort them for me?" Passed if the child really does sort them.

115. **Shingle**

a. Show a clear picture of a house with a shingled roof. Ask, "What is the roof of this house covered with?"

b. "What are shingles for?" If the answer is "For houses," ask, "Where do you put the shingles?"

116. **Price**

a. To a boy, say, "Johnny wanted to know how much the coaster would cost so he asked, 'What is the p.....?' " To a girl, say, "Mary wanted to know how much the dolly would cost, so she asked, 'What is the p.....?' "

b. "What do you want to know when you ask 'What is the price?' " Passed if the child can explain.

117. **Thursday**

a. "Do you know the days of the week?" If the child says "Yes," let him name them. If he says "No," begin, "Sunday, Monday, Tuesday, Wednesday, and what comes next? What other days are there?" Passed if the child names Thursday even if not in order.

118. **Sunlight**

a. "When the moon shines we see the moonlight; when the sun shines we see the ....."

119. **Twin**

a. "Helen and Ellen are two little sisters. They are both four years old. People call them ....."

b. "What are twins?" Passed if the answer includes the idea of same age and same family.

120. **Cottage**

a. "In winter they lived in a big house, in summer by the lake (or at the mountains, or by the sea) they lived in a little cot....."

b. "What is a cottage for?" "To live in" passes.

121. **Bawl**
b. "What did baby do when baby bawled?" "Cried" or "Screamed" passes.

122. **Kangaroo**
a. Show a picture of a kangaroo. Ask what it is.
b. "What is a kangaroo?" Passed if the answer is "an animal."

123. **Crown**
a. Show a picture of a crown, saying, "This is something kings wear. What is it?"
b. "Where do people wear crowns?" The answer must be "On the head," in order to pass.

124. **Necklace**
a. Show pictures of a necklace in a box and of a woman wearing a necklace. Ask, "What is the woman wearing about her neck?" or "What is in the box?"
b. "What is a necklace for?" "To wear" and "To put around your neck" pass.

125. **Notebook**
a. Show a notebook of the type most likely to be familiar to the child. Ask, "What kind of a book is this?"
b. "What is a notebook for?" "To study," "To write in," "To take notes" pass.

126. **Strip**
a. Show a sheet of paper, a strip, and a small scrap. Say, "There is a good sheet of paper; this is a little scrap; what is this?" Point to each as it is mentioned.
b. "What is a strip?"

127. **Polite**
a. Show a picture advertising a system of child training that presents two children with their mothers; one child is very demure and ladylike, the other acting very naughtily. Point to these children, saying, "See this little girl; she is sticking her tongue out at the other little girl. She is very rude, but the other little girl is not rude, she is ....."
b. "Does a polite child forget to say, 'Thank you' and 'Please?'" Passed if the answer is "No."

123. **Orchard**
a. "The farmer has a great many apple trees and other fruit trees in his ....."
b. "What grows in an orchard?" Passed if any kind of fruit that grows on trees is named.

129. **Funnel**
a. Show a small tin funnel and ask the child what it is.

130. **Prison**
a. "Bad men who steal are put in ....., where?"
b. "Whom do they put in prison?" Any answer that conveys the idea of a wrongdoer passes.

131. **Sailor**
a. Show a picture of a boy in a sailor costume. Ask, (1) "What kind of suit is he wearing?" or (2) "Men who work on ships are called ....., what?"
b. "Where do sailors work?" "On boats," "On ships," "On steamers," "On the ocean," all pass.

132. **Balance**
a. "Suppose you tipped your chair up on one leg, like this, [illustrate] and Mother saw you, she might say,

'Watch out, ..., [child's name] you'll lose your bal.....' ''

133. **Ashore**

b. ''From what do people go ashore?'' ''From the lake,'' or an answer naming any body of water, or from any means of water transportation, such as a boat, passes.

134. **Usually**

a. ''Johnny said, 'I don't always go to school, but I do us.....' ''

135. **Velvet**

a. Show a piece of velvet. Say, ''Feel this and tell me what kind of cloth this is.''

b. ''What is velvet?''

136. **Easily**

a. Johnny said, ''That is not hard to do, I can do it very e.....''

137. **Burr**

a. ''When you walk through long grass, what sometimes sticks to your clothes?'' or ''Chestnuts are found in .....''

b. ''What are burrs?'' Attempts to explain the weed, the covering of certain nuts, or the tool pass.

138. **Lilac**

a. Show a picture of lilacs or the real flower. Ask what it is.

b. ''What are lilacs?'' ''Flowers'' passes.

139. **Guard**

a. ''They were afraid the enemy would tear down the bridge so they put soldiers there to .....''

b. ''What do you do when you guard something?'' ''Take care of it'' is the most common right answer, but any answer that shows understanding of the word passes.

140. **Plan**

a. ''Somebody asked Mother what she was going to do this summer. She said, 'We have made no .....''

b. ''What do you do when you make plans?'' ''Get ready to go some place,'' is an example of a passing answer.

141. **Pebble**

a. Show a pebble. Ask what it is. If the child says it is a rock or stone, later ask,

b. ''What is a pebble?'' ''A little stone,'' or ''A little rock'' passes.

142. **Brownie**

a. Show a picture of a brownie. Ask, ''What is this?''

b. ''Do you know anything about brownies?'' Passed if the child shows familiarity with the word.

143. **Hornet**

a. ''Did you ever see a nest that some little things like bees build? Something besides bees that sting? Hor.....''

b. ''What are hornets?'' ''They fly,'' ''They sting (or bite) people,'' or ''They are like bees'' passes.

144. **Level**

a. Lay a pencil on a book set on a slant. Ask, ''Why does the pencil roll off the book and not off the table?'' If answer is, ''The table's flat,'' say, ''Yes, or we might say, 'It is le.....' ''

b. "Tell me something that is level." Any flat object named passes.

145. **Whenever**
a. "A polite child says, 'Thank you' whenev..... you give him something. What is the rest of the word, 'whenev.....?' "
b. "If Johnny takes a book to school whenever he goes, does he ever forget it?" The answer "Yes" fails, but if answer is "No," continue, in order to make certain that the child knows the word, "How often is whenever?" "Every time," or "Always" passes.

146. **Dynamite**
a. "When men want to blow up rocks what do they use?"
b. "What is dynamite for?" "To blow up" or any reasonable answer passes.

147. **Mahogany**
b. What kinds of things are made of mahogany?"

148. **Singer**
a. "Someone who sings is a .....?"

149. **Colt**
a. Show a picture of a colt. Ask what it is. If the child says "Horse," say, "Yes, it is a baby horse. A baby dog is called a puppy, what is a baby horse called?"
b. "What is a colt?" "Horse" or "Pony," with or without qualifiers, passes.

150. **Delivery**
a. "What kind of wagon does the grocer bring things in?"
b. "Do you know any kind of delivery?" "Wagon," "Truck," "Man brings things" all pass.

151. **Return**
a. "Another word for 'to go back' is to .....?", or "When you borrow something you must be sure to re....."
b. "What do you do when you return?" or "What do you do when you return something?" "Give it back" or "Take it back" or "Go back" passes.

152. **Scarlet**
a. Show a strip of scarlet paper. Ask, "What kind of red is this?"
b. "What is scarlet?"

153. **Whoever**
a. "The teacher said, 'I know somebody broke the window. No matter who did it, he should tell. I want whoev..... Now I leave out part of a word, can you guess it? I want whoev..... did it to tell.' "

154. **Moisture**
a. "It is damp because the air is full of ....."
b. "What is moisture?" The answer must convey idea of wetness to pass.

155. **Rot**
a. "When potatoes don't grow but decay, we say they .....?"
b. "What do things do when they rot?"

156. **Rumple**
a. "Mother said, 'Your dress (suit) is nice and smooth, Mary (John), you must be careful not to muss or rum..... it.' "
b. "What do you do when you rumple something?"

157. **Grandson**
a. "Johnny is his father's son; he is his grandfather's little ....., what?"

158. **Allow**
a. "Johnny said, 'No, I can't go. Mother will not al.....'"
b. "If Mother allows it, may you do it or should you not do it?" "Do it" passes.

159. **Fringe**
a. Show a piece of a fringe or a picture of a fringed curtain. Ask what they are.

160. **Amuse**
a. "Baby was crying. Mother said, 'Mary, come and a.....'."
b. "What do you do to amuse somebody?" "Play with them," "Make them happy," "Read to them" all pass.

161. **Ornament**
a. "On Christmas trees we hang pretty things called or....."
b. "What are ornaments?" "To put on Christmas trees," or any answer conveying the idea of prettiness, passes.

162. **Shabby**
a. "Mother said, 'That coat is too old to wear. It looks very .....'"
b. "What kind of things look shabby?" "Old things" passes.

163. **Cider**
a. "Do you know something people drink that is brown, and made out of apple juice?"
b. "What is cider for?"

164. **Unpleasant**
a. "When things are not pleasant, they are ....., what?"

165. **Timber**
b. "What is timber?" "Wood," "Have picnics in the timber," "Lots of trees," or "Big pieces of wood" passes. [In the middle west, woods are often called timber.]

166. **Skull**
a. Show a picture of a skull. Ask what it is.
b. "Where is your skull?"

167. **Crate**
a. Show catalog pictures of crates for eggs. "Do you know what these boxes for packing eggs are called?"
b. "What is a crate for?" Any use that is made of a crate including the crating of furniture, is acceptable in the answer.

168. **Cylinder**
b. "What is a cylinder?" "Round" or "It's in a car" passes.

169. **Mention**
a. "Mary said, 'This is a secret. You must not men.....'"
b. "What do you do when you mention something?" The answer must involve the idea of telling something.

170. **Stylish**
a. "When a dress is not a bit old fashioned it is sty....." "Style" does not pass.
b. "When are things stylish?" The answer must involve the idea of what is being worn.

171. **Comical**
b. "What does comical mean?"

172.	**Flesh**	a. Touch the child's hand, saying, "Here is skin on your hand. Underneath is bone. What is between the bone and the skin?"
		b. "What is your flesh?"
173.	**Flop**	b. "What does flop mean?"
174.	**Scum**	a. "Sometimes on hot milk or cocoa you find ....., something I think you don't like. What is it?"
		b. "What is scum?"
175.	**Lukewarm**	b. "Is lukewarm hot or cold?" The answer must be "Neither."
176.	**Pillar**	a. Show a picture that includes some pillars. Ask, "What are these?"
		b. "What are pillars for?"
177.	**Bargain**	a. "What kind of a sale is it where things are sold cheap?"
		b. "What is a bargain?" Examples of passing answers are "Sell things cheap," "You must do it 'cause you made a bargain."
178.	**Forgave**	a. "Johnny's mother was going to punish him but when he said, 'I am sorry I was naughty. I won't do it any more,' his mother for ..... What do you think his mother did?"
179.	**History**	a. "What kind of stories tell us about Washington and people who lived long ago?"
		b. "What is history?" "Learn it at school" or "Stories" passes.
180.	**Ledge**	a. Touch some ledge in the room and ask what it is.
		b. "What is a ledge?"
181.	**Tabby**	b. "Do you know anything that is called tabby?" "A kitty" passes.
182.	**Bosom**	b. "Where is your bosom?"
183.	**Pulse**	a. Put the child's finger on his pulse. Ask what he feels there.
		b. "Where is your pulse?"
184.	**Wampum**	a. "What did Indians use for money?"
		b. "What is wampum?"
185.	**Yoke**	a. Show a picture of a dress with a yoke. Ask, "What part of a dress is this?"
		b. "What is a yoke?" Any one of the different meanings of the word passes.
186.	**Also**	b. "You may go also. What does that mean?"
187.	**Beech**	a. "What is a beech?" If the child's answer shows that the word is confused with "beach," say, "That's right, and do you know what the other kind of beech is, too?" "A tree" passes.
188.	**Hawthorn**	a. "What is hawthorn?" "Flowers" or "Bush" passes.

If the answer is "Tree," ask, "Is it a big tree?" Passed if the child says "No."

189. **Cog**
a. Show a picture of a cogwheel. Ask, "What kind of a wheel is this?"
b. "What kind of a wheel is a cogwheel?"

190. **Helm**
b. "What is a helm?" Either meaning passes.

191. **Niece**
a. Turn to the picture used to illustrate 'polite.' Point to the 'polite' child and the woman with her. Say, "This is the little girl's auntie; she is her auntie's little ....., what?" Or, "Mary is her auntie's little .....'"

192. **Piston**
b. "Where are there pistons?" Any kind of machinery in which pistons are used passes.

193. **Tortoise**
a. Show a picture of a tortoise. Ask, "What is this?" If the answer is "Turtle," ask the child if he knows another name for it.
b. "What is a tortoise?"

194. **Ungrateful**
a. "Auntie gave Mary and Susie each a pretty dolly. Mary seemed glad and said, 'Thank you.' Susie did not seem glad, nor say 'Thank you.' Mary was grateful, Susie was ....."

195. **Cowslip**
a. "What flower's name begins with cow.....?"
b. "What are cowslips?"

196. **Defeat**
a. "The army that did not win was de....."
b. "What happens to an army that is defeated?"

197. **Herd**
a. "We talk of flocks of sheep, and what do we call a lot of cows or cattle?"
b. "What is a herd?"

198. **Saber**
b. "What is a saber?"

199. **Volume**
b. "What is a volume?"

200. **Arbor**
b. "What is an arbor?"

201. **Execute**
b. "What does execute mean?"

202. **Coo**
a. "Dogs bark. What do doves do?"
b. "What coos?"

203. **Stud**
b. "What is a stud?"

VOCABULARY TEST

Reliability of Test

If a test can be divided into two comparable halves, half being given at one time, the other at some later time, the reliability of the test can be determined. Since the vocabulary test, when given originally, consisted of four lists of words (Table 6) of similar difficulty given at different sittings, it was possible to use the results for determining the reliability of the test. For this purpose lists A and D were combined to form one half and lists B and C to form the other half of the test. The scores of fifty-three children of the preschool-junior primary type, ranging in age from four to six years, were taken and the correlation between their scores on the two lists was determined by the product-moment method and found to be .95 ± .01. This indicates the correlation between the two halves of the test. By applying the Spearman-Brown formula[3] to this correlation, the correlation between one form of the test and another comparable form of the same test, that is, the reliability of the test, was estimated and found to be .97. It must be noted, however, that this correlation was based on a two-year range instead of the usual one-year.

Validity of Test

It was possible to check the validity of the test in various ways, because other estimated vocabularies were available for comparison.

Check 1: Comparison of Theoretical and Actual Vocabularies.— The first check necessary was to determine whether multiplying the number of words known on the list by the constant 20 gives a child's approximate vocabulary. The seventy-seven vocabularies available were again scanned and all words found in the test also were checked and counted. The score thus obtained was multiplied by 20; the difference between this theoretical number and each child's actual vocabulary was then determined. As there is, in published vocabularies, so much difference of opinion as to what constitutes a word it was, of course, necessary to review the lists and deduct variations of the same words and such words as were counted twice as different parts of speech, in order to make the lists comparable with the Thorndike list.

It was found that for the seventy-seven vocabularies, the varia-

3. Kelley, T. L.: *Statistical Method.* New York: Macmillan, 1923. Pp. 390 (p. 205, 206).

TABLE 6
Words of Preliminary Form of Smith Vocabulary Test

List A	List B	List C	List D
button	away	take	hurt
window	cake	hot	say
pocket	tired	fish	a
hold	bib	blue	any
too	love	dish	dry
glove	the	mine	didn't
woke	quick	corn	paint
told	wear	caught	mud
change	hill	closet	sometime
strawberry	honey	never	kettle
those	six	sled	herself
gravy	slip	across	lion
everybody	gray	miss (Miss)	body
lemonade	splash	postal (card)	year
rather	mosquito	rang	gun
witch	thin	stir	icy
tuck	storm	ocean	king
week	edge	gas	race
ditch	cane	sort	dozen
drip	ugly	scrap	scold
fountain	camera	bright	twin
bumblebee	usually	soldier	velvet
chest	angry	chilly	Saturday
watermelon	crown	howl	spade
colt	fool	sunlight	freight
brownie	jerk	it's	necklace
level	kangaroo	lilac	sailor
allow	neighbor	shingle	pave
wife	west	starch	hornet
cylinder	burr	amuse	guard
liver	orchard	fringe	plan
mention	polite	plow	turnip
worry	Thursday	skull	scarlet
whenever	flash (light)	pebble	price
ungrateful	nowhere	notebook	tabby
bawl	unpleasant	strip	shape
forgave	tortoise	taxi	ashore
dynamite	whoever	beech	also
pillar	herd	flesh	easily
cider	crate	ledge	prison
balance	cardboard	playhouse	check
singer	cowslip	funnel	ornament
bosom	return	gingerbread	cottage
bargain	niece	cog	lukewarm
saber	helm	history	moisture
scum	comical	hawthorn	piston
grandson	rumple	pulse	suffer
volume	stylish	shabby	timber
coo	yoke	wampum	execute
mahogany	flop	defeat	stud
rot	arbor	delivery	Sam
Jane	Michael	Richard	Frances
	Ethel		

tions from the true vocabulary ranged from +33.33 per cent to —40 per cent, with a mean variation of 7.5 per cent. The actual negative sum was 268.5 and the positive sum 269.1, which makes the average theoretical vocabulary for all the cases differ but 0.3 per cent from the actual average. If thirteen cases of vocabularies less than 200 words are excluded, the range of difference becomes +25 per cent to —14 per cent with a mean variation of 6 per cent. In only three cases of the sixty-four was the difference more than 14 per cent. For these sixty-four cases, the sum of the negative variations was 127.5 and the sum of the positive 264.0, so that the average theoretical vocabulary differed from the average actual vocabulary by 2.1 per cent. When only thirty-eight vocabularies ranging from 650 to 2,500 words were used, the mean variation was found to be 3.9 per cent and the difference between the theoretical and actual numbers 0.9 per cent.

Since these vocabularies were obtained in various ways and the rules for including words and counting separate words differed so widely, the variability would be expected to be large. But, since the averages of the theoretical and actual vocabularies so nearly coincide, it may be assumed that the method of determining actual vocabulary from the test score is valid for the average of a group, though it may err in individual cases.

Check 2: Correlation between Smith Vocabulary Test and Other Vocabulary Tests.—A further check was to correlate the child's vocabulary obtained by the Smith test with that obtained by other vocabulary tests. Two other tests were available for this purpose, Cobb's[19] rearrangement for young children of the Terman vocabulary, and Descoeudres'[21] "Partial Tests of Language." These tests were given to fifty-five of the children used in this study, their ages ranging from two and one-half to six years. Descoeudres' test was translated, with a few slight changes, to adapt it for American children, although the ninth test had to be omitted on account of the doubtful familiarity of French and American children with the same words. The method of determining total vocabulary from partial language test scores used by Descoeudres was followed, but an adjustment had to be made to allow for the ninth test that was omitted.

The correlation between Smith and Descoeudres tests for the raw scores was .94 ± .01, for the total vocabularies .875 ± .02; the

correlation between the Smith and Cobb tests was .84 ± .03; and the correlation between Cobb and Descoeudres tests was .785 ± .04; but it must be noted that the range here is from two and one-half years to six years and not one year.

The average scores for each half year of age for the fifty-five children for the three tests, together with the average chronological and mental ages, are given in Table 7.

TABLE 7

Average Vocabulary Scores of Fifty-Five Children on the Smith, Cobb, and Descoeudres Vocabulary Tests

Age group	Number of children	Scores			Age	
					Average chronological	Average mental
Years Months		Smith	Cobb	Descoeudres	Years Months	Years Months
2—6	3	707	780	825	2— 6.3	3— 3.3
3—0	2	1,160	675	1,395	3— 2	3—11.5
3—6	8	1,528	799	1,519	3— 6.5	3—11.7
4—0	5	1,900	1,260	2,053	3—11.3	4—10
4—6	5	2,064	1,350	2,176	4— 6.5	5— 4.8
5—0	9	2,518	2,196	2,580	5— 0	6— 1.2
5—6	17	2,700	2,170	2,624	5— 6	7— 4
6—0	6	2,877	2,640	2,718	5—11	7— 0.2
All ages	55	2,224	1,757	2,240		

The differences between the average scores here from year to year can not be considered on account of the small number of cases for each half year; but the general trend of differences between the three tests themselves can be considered. In the first place, it is clear that the Cobb test average runs lower than the others at first, but begins to gain from five years on. This is, of course, due to the fact that the Terman test, of which the Cobb test is a rearrangement, calls for definitions that can not be given by children less than five, at which age the Stanford-Binet mental tests place the first test for definitions. The average number of words for the Smith and Descoeudres tests are remarkably close when the difficulty of using a translated test is realized and it is considered that Descoeudres' method of calculating total scores is based to begin with on the relationship of her partial to her complete language

test, and, then, on their relationship to the total vocabulary of three children only of different ages.

Check 3: Correlation between Frequency of Words in Various Vocabularies and Frequency of Knowledge in Tests.—A still further check of the validity of the test was to find the correlation between the ranks of words in the test according to the frequency, on the one hand, as obtained from the seventy-seven vocabularies, and, on the other hand, as obtained from the tests of the 194 children. [Appendix, page 78.] The correlation was calculated by

TABLE 8
Average Size of Vocabularies of 273 Children* from Eight Months to Six Years

Age group (Years Months)	Number of children	Average I. Q.	Vocabulary	
			Number of words	Gain
8	13		0	
10	17		1	1
1— 0	52		3	2
1— 3	19		19	16
1— 6	14		22	3
1— 9	14		118	96
2— 0	25		272	154
2— 6	14		446	174
3— 0	20	109	896	450
3— 6	26	106	1,222	326
4— 0	26	109	1,540	318
4— 6	32	109	1,870	330
5— 0	20	108	2,072	202
5— 6	27	110	2,289	217
6— 0	9	108	2,562	273

* Forty-three children were tested more than once, some three or four times.

the Spearman rank order method[4] and found to be .91 ± .01, equivalent to a correlation of .92 by the product-moment method.

Inspection of the two lists of frequencies shows that, in almost every case, the shift in rank is due not to inadequate understanding of questions but to the different conditions. For example, "taxi" rises high in the test list. This is due to the fact that many of the children in the Iowa Child Welfare Research Station laboratories ride to and from the laboratories every day in a taxi. Again, cer-

4. Kelley, T. L.: *Statistical Method.* New York: Macmillan, 1923. Pp. 390 (p. 193).

tain words rise because they belong to one particular season, so that vocabularies based on words actually used by children during a few weeks would not catch them, although the child might know the word perfectly. Yet again, other words, for example, gas, rise because the use of gas is more common than it was some years ago, and some of the published vocabularies used were collected as long ago as fifty years.

Check 4: Comparison of Results of Test and Mother's Observations.—It was necessary to determine whether the vocabulary test

TABLE 9
Individual Vocabularies by Count of Ten Children at Different Ages

Child's number	Age		Vocabulary	Age		Vocabulary	Age		Vocabulary	Age		Vocabulary
	Years	Months		Years	Months		Years	Months		Years	Months	
Boys												
66	1	0	4	1	8	180						
61	1	7	16	1	10	33						
75	1	1	7	1	5	100						
38	1	2	1	1	4	2	1	11	17	2	3	90
37	1	7	4	2	1	28						
Girls												
46	1	0	5	1	2	10						
20	1	7	22	1	9	43	1	11	55	2	3	322
1	1	0	10	1	3	17						
5*	1	0	7	1	3	21	2	0	256			
44	1	8	1	2	2	2						

* Bilingual.

questions elicited all the words known by the child. Three children, two and a half to three and a half years of age, whom the writer knew well and whose mother could be trusted to mark accurately the words known by the child, were tested and the list of test words was checked independently by the mother for words known by the children during a short period just preceding the test. With the two older children agreement was almost exact. For the three and a half-year-old boy two words were interchanged, the test giving one that was not checked and the other, "blue," was credited but not known according to the test. It was found, later, that the child knew "blue" only as associated with his blue suit and not as an abstract color. A later double check and test of this child at four

and a half years showed no words checked that were not elicited by the test, and four words elicited but not checked. It is thus fairly evident that the test, at this age, secures the words more surely than does the mother in a short period of observation, even with the list ready at hand. For the youngest child, two years and five months, the mother's check was made some weeks after the test

TABLE 10
Individual Vocabularies by Test of Thirty-Three Children at Different Ages

Child's number	Age		Vocabulary	Age		Vocabulary	Age		Vocabulary
	Years	Months		Years	Months		Years	Months	
Boys									
91	1	4	240	1	9	680			
13	2	2	180	2	10	620			
8	2	3	80	2	6	280			
17	2	4	0	2	11	0			
15	2	4	220	2	9	740			
27	2	8	180	3	1	580			
36	3	0	580	3	3	840			
37	3	1	660	4	0	1,180			
33	3	6	1,540	4	1	2,060	4	6	2,340
52	3	6	780	3	10	1,020			
53	3	6	1,320	3	10	1,720			
38	3	7	980	4	1	1,320	4	4	1,520
32	3	7	1,440	4	1	1,800			
69	3	9	1,080	4	1	1,600			
72	3	9	2,060	4	2	2,560			
90	4	2	1,620	4	9	1,940	5	1	2,240
68	4	3	1,780	4	7	2,160			
97	4	5	1,760	4	8	2,100			
Girls									
3	1	11	440	2	3	1,060			
1	2	0	900	2	5	1,100			
21	2	5	1,300	2	9	1,940			
28	2	11	1,160	3	3	1,420			
20	3	1	1,080	3	3	1,440			
5*	3	2	620	3	5	960			
25	3	2	860	3	7	1,220			
41	3	5	1,840	3	10	1,980			
44	3	8	1,880	4	3	2,260			
152	3	8	1,300	4	2	1,740			
60	3	10	1,100	4	3	1,700			
84	4	4	1,280	4	7	1,480			
91	4	7	1,220	4	11	1,800			
80	4	7	1,100	4	9	1,420			
106	4	10	820	5	10	1,620			

* Bilingual.

was given. It gave several words more than the test, but it can not be stated whether the omitted words were known at the time of the test or acquired later.

TABLE 11
Average Size of Vocabulary According to Age Groups and Sex

Vocabulary by count			Vocabulary by test			
Age group	Number of children	Number of words	Age group	Number of children	Number of words	Age, Average mental
Years Months			Years Months			
Boys						
10	11	1	2— 0	5	304	2— 7
1— 0	20	3	3— 0	23	822	3— 3
1— 3	14	21	4— 0	31	1,571	4— 3
1— 6	7	30	4— 0*	29	1,603	4— 4
1— 9	5	200	5— 0	23	2,181	5— 6
2— 0	11	256	6— 0	10	2,606	6— 5
			6— 0*	8	2,006	6— 0
Girls						
10	6	1	2— 0	6	743	2— 9
1— 0	28	4	3— 0	18	920	3— 4
1— 3	5	12	4— 0	22	1,624	4— 6
1— 6	7	35	4— 0*	21	1,576	4— 4
1— 9	9	83	5— 0	29	2,058	5— 7
2— 0	14	287	6— 0	11	1,964	5—10
			6— 0*	10	2,064	6— 0

* This group was made comparable in mental age as well as in chronological age.

MEASUREMENT OF VOCABULARY

Subjects of this Investigation

Two hundred seventy-three children, representing all of the groups described in Chapter I, were used in this part of the investigation; forty-three were used more than once.

Tentative Age Norms

Table 8 gives the average vocabulary of 273 children from eight months to six years, at two month intervals to one year, at three month intervals before two years, and at six month intervals after two years; forty-three children were tested two or more times. The vocabularies of the children less than two years of age, it will be remembered, were obtained from lists from mothers. This table shows that before twelve months of age practically no words are

known. A few words are acquired before eighteen months and then there is a more rapid gain in vocabulary.

Since counts of the vocabularies of a number of children were repeated and many children had repeated measurements in the vocabulary test, these records are tabulated separately in Tables 9 and 10 to give a picture of the vocabulary development for individual children.

TABLE 12
Average Accomplishment in One-Hour Conversations According to Age Groups and Sex

Number of children	Age group		Age, Average mental		Words	
	Years	Months	Years	Months	Number to the hour	Number to the sentence
Boys						
8	2—	0	2—	7	66	1.91
21	3—	0	3—	5	272	3.45
20	3—	0*	3—	3	252	3.39
19	4—	0	4—	6	401	4.45
17	4—	0*	4—	7	341	4.47
13	5—	0	5—	5	477	4.77
11	5—	0*	5—	2	523	4.76
Girls						
8	2—	0	2—	9	229	2.44
18	3—	0	3—	2	176	3.14
18	3—	0*	3—	2	176	3.14
17	4—	0	4—	9	313	4.50
16	4—	0*	4—	7	310	4.53
13	5—	0	4—	11	469	4.49
10	5—	0*	5—	2	461	4.68

* This group was made comparable in mental age as well as in chronological age.

Figure 2 shows the average increase from year to year in the growth curves of two boys and two girls. Of these Boy 38 is slightly below average mentality, Boy 33 is of average mentality, and Girl 20 is of superior mentality. Boy 33 had more contact with other children at an earlier age than the others. He was the third child in his family. Boy 38 and Girl 20 were first-born children. Girl 5 is a special case. She was bilingual, speaking English and Chinese until the end of her third year, when, through lack of use, she forgot her second language. This perhaps explains the fall of her curve from its higher position to near coincidence with the

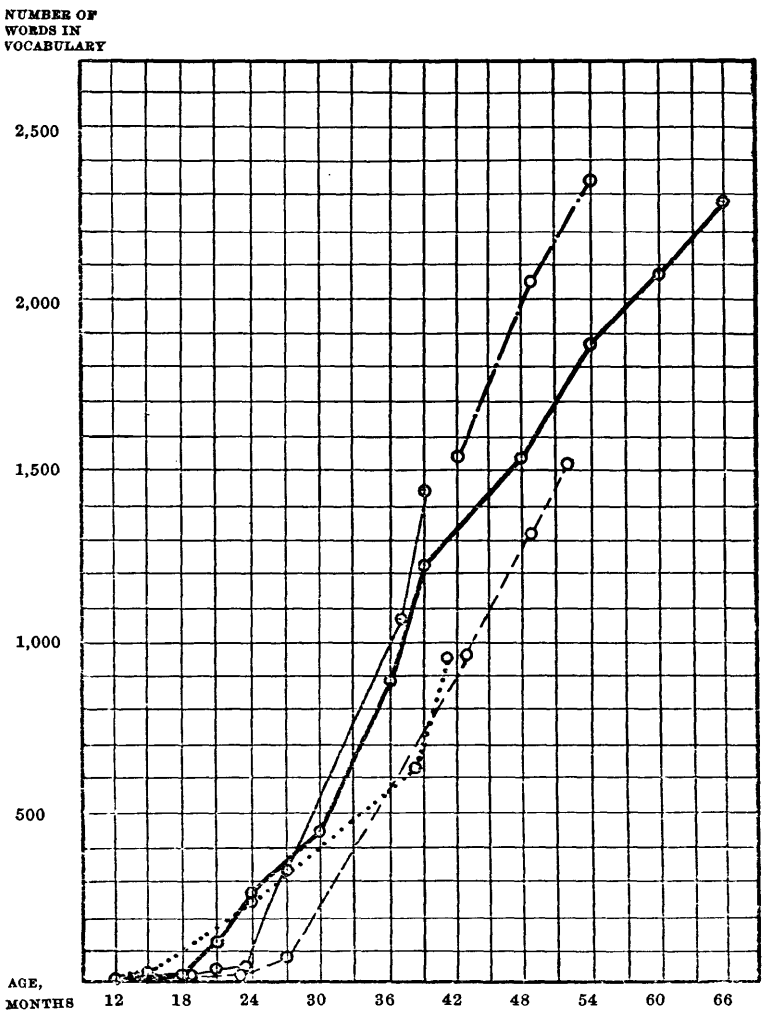

Fig. 2. Number of words in vocabulary at various ages

(——) Average of all children at half yearly intervals
(——) Girl 20, from the miscellaneous group, of superior mentality and high social level
(·····) Girl 5, from the Preschool Laboratory, bilingual until her third year
(– – –) Boy 38, from the miscellaneous group, somewhat backward
(—·—) Boy 33, from the Preschool Laboratory, of average mentality

curve of her cousin, Boy 38. Her intelligence quotient at three and a half years was 88 and his was 86.

Sex Differences

Tables 11 and 12 list the average size of vocabulary, according to counted baby vocabularies and test data, the average length of

TABLE 13

Data on Children Paired on the Basis of Social Types

Preschool Laboratory						Day Nursery					
Child's number	Age: Chronological Years	Age: Chronological Months	Age: Mental Years	Age: Mental Months	Number of words: In vocabulary / To the sentence	Child's number	Age: Chronological Years	Age: Chronological Months	Age: Mental Years	Age: Mental Months	Number of words: In vocabulary / To the sentence
Boys											
8	2	6	2	6	280 / 2.2	27	2	8	2	6	180 / 1.9
38	3	7	3	1	980 /	55	3	7	3	2	1,000 /
38	4	1	3	6	/ 4.5	66	4	0	3	6	/ 3.7
97	4	8	4	7	2,100 /	98	4	8	4	4	1,520 /
90	5	0	5	1	2,240 /	113	5	1	5	3	2,020 /
95	4	10	4	7	2,240 /	125	5	5	4	8	2,000 /
14	5	5	4	5	1,740 /	116	5	2	4	4	1,480 /
Girls											
20	3	1	3	7	1,080 /	154	3	2	3	6	1,100 /
41	3	1	3	5	/ 4.1	154	3	2	3	6	/ 4.0
5	3	5	3	0	960 /	46	3	6	3	4	660 /
5	3	4	2	11	/ 3.8	46	3	6	3	4	/ 2.8
64	3	9	4	0	1,280 /	62	3	11	4	2	860 /
76	4	6	5	8	/ 5.2	102	4	8	5	10	/ 5.4
78	4	8	5	3	1,480 /	87	4	7	5	4	1,940 /
75	4	8	5	9	2,660 /	102	4	8	5	10	1,880 /
91	4	8	4	8	/ 4.0	82	4	4	4	8	/ 5.0
142	5	10	5	4	2,040 /	130	5	8	5	1	1,440 /
Boys and Girls											
F 5	3	2	2	10	620 /	M 36	3	3	2	11	840 /
M 33	3	2	3	3	/ 3.8	F 153	3	3	3	2	/ 4.4
F 152	3	2	2	10	/ 2.9	M 27	3	1	2	8	/ 3.4
M 95	4	8	4	2	/ 5.3	F 81	4	4	4	0	/ 5.6
M 129	5	6	5	6	2,280 /	F 117	5	6	5	6	1,400 /

sentence, and average number of words per hour according to conversations for boys and girls separately at the various ages. These tables furnish data for determining whether there are any significant sex differences.

It is uncertain, from the data furnished by the baby vocabu-

laries for children up to two years of age, whether there are any significant differences between the boys and the girls. There are so few children and the vocabularies are so small that the record

TABLE 14
Data on Children Paired on the Basis of Order of Birth

First born				Later born			
	Age				Age		
Child's number	Chronological	Mental	Vocabulary	Child's number	Chronological	Mental	Vocabulary
	Years Months	Years Months			Years Months	Years Months	
Boys							
15	2— 4	2— 6	220	8	2— 6	2— 6	280
155	2—11	3— 8	820	13	2—10	3— 5	620
49	3— 9	3—10	1,600	33	3— 6	4— 1	1,540
52	3—10	3— 4	1,020	37	4— 0	3— 4	1,180
69	4— 1	4— 2	1,600	33	3—11	4— 3	2,060
72	3— 9	5— 1	2,000	70	3—11	5— 0	1,780
38	3— 7	3— 1	980	57	3— 8	3— 4	920
67	4— 1	3— 6	1,320	71	3—11	3— 2	1,240
49	4— 3	4— 8	2,000	33	4— 6	4— 8	2,340
147	6— 2	7— 3	2,940	146	6— 1	6—11	2,840
127	5— 6	6—11	2,700	126	5— 5	7— 0	3,200
Girls							
3	2— 0	2— 7	440	1	2— 0	2— 7	900
20	3— 1	3— 7	1,080	25	3— 2	3— 9	860
152	3— 8	3—10	1,300	45	3— 8	4— 1	2,040
44	3— 9	4—10	1,880	54	3— 8	4—10	1,760
63	3—10	3— 9	1,360	60	3—10	3—10	1,100
61	3— 9	5— 2	1,320	43	3— 9	4—11	1,880
84	4— 7	3— 4	1,480	79	4— 4	3— 4	1,160
85	4— 5	4—10	1,740	59	4— 4	5— 0	1,320
105	5— 1	4—11	1,920	91	4—10	4—10	1,800
104	4—11	6— 3	2,760	88	4—10	6— 3	2,500
124	5— 6	6— 9	2,620	120	5— 5	6— 5	2,260
Boys and Girls							
M 16	2— 5	3— 4	740	F 1	2— 5	3— 4	1,100
M 26	3— 2	4— 4	1,460	F 29	3— 0	4— 0	1,580
M 112	5— 2	7— 8	2,940	F 108	5— 2	7— 8	3,060
F 132	5— 8	7— 0	2,320	M 136	5— 8	6—11	3,100
F 141	5—11	6—10	2,840	M 158	5— 9	6— 9	2,680
M 115	4—10	7— 4	3,260	F 107	5— 0	7— 8	2,580
Average vocabulary			1,738				1,774

of one boy who is markedly advanced in talking is sufficient to reverse the rank of the sexes at fifteen and twenty-one months.

Taking, next, the test data and considering particularly the groups in which both the chronological and mental ages are comparable, it seems that, for ages two and three, there is a tendency for the girls to be ahead of the boys; but later the boys progress and catch up to the girls. This is somewhat in line with Doran's[23] conclusions. He found, from a comparison of the published data on a few vocabularies with his vocabulary tests of school children, that up to the fifth or sixth year the girls use more words than the boys.

With regard to the differences in the average number of words used per hour, although the boys tend to surpass the girls, excepting at two years, when the differences between the averages on the basis of the P.E. of these differences are judged, they are found not to be significant.

Finally, the differences in average sentence length are found to be insignificant when the P.E.'s of these differences are calculated.

It can not be said, then, that the data show any real differences between the sexes, as far as vocabulary development is concerned. The tendencies for one sex to excel at any particular age that have been indicated can not be considered to be anything more than just tendencies on the basis of the comparatively small number of cases used in this study.

Social Class Differences

In order to determine whether there was any tendency for the social classes that the children represented to be a factor influencing the size of the vocabulary, a number of children of approximately the same chronological and mental ages and the same sex were paired; one member of the pair was of the preschool laboratory type, the other of the day nursery type. Seventeen such pairs were available. Five pairs of the opposite sex were also available. The data concerning these paired children, their vocabularies, and their average sentence lengths are given in Table 13.

The average vocabulary of the children of the same sex and of the preschool laboratory type was 1,832 words, of the day nursery type, 1,527 words; by including two pairs of the opposite sex it became 1,908 and 1,608 respectively. The preschool type thus shows

a higher average, but the number of cases used is too small to allow drawing any definite conclusions.

In sentence length, on the other hand, the preschool children have no advantage over the day nursery children. This may be accounted for by the fact that the preschool children, having opportunities for more active play and being together for shorter periods, were not inclined to sit down and chat together as frequently as the day nursery children.

These findings are rather at variance with those of Descoeudres,[22] which did not take into consideration the factor of intelligence. This factor was eliminated in this study by choosing for pairs children of equal mental ability.

Effect of Order of Birth

It has often been contended that the younger children of a family have an advantage over the older ones in learning to talk. Conclusive data have not been brought forward, however, to substantiate this contention. In the published data on two children of the same sex in the same family studied at the same age, the younger child appears to have the advantage in the cases reported by Schneider,[64] Stern,[68] Holden,[39] Gale,[28] and Bateman[4,5]; but the older child is the farther advanced in the cases reported by Bloch,[10] Gheorgov,[32,33] West reported by Gale,[29] and Nice.[54,56]

In the case of two families of four and eight children respectively, whose records are included in this study under baby vocabularies, the older children were slightly slower than the younger in talking.

In order to determine whether the order of birth had any effect on the size of vocabulary of the children studied, a number of first-born children were paired with later-born children of approximately the same chronological and mental ages. The data for these pairs are given in Table 14.

In their records the average vocabulary is approximately the same for both the earlier-born and the later-born children for the ages here studied. There are only two pairs of children available under two and a half years, and it is to be expected that the difference would be most marked in young children. It happens that, in both these pairs, the later-born child has the larger vocabulary.

Correlations

The correlation[5] between sentence length and size of vocabulary was calculated for forty-five children to whom the vocabulary test was given within a few days of the recording of their conversations. This correlation was found to be .69 ± .05, showing that sentence length is to some extent indicative of the size of vocabulary.

Intercorrelations were calculated between chronological age, mental age, and size of vocabulary for 145 children. These included every child for whom a mental age had been found, and no child more than once. When a child had been tested two or three times, his score was used for the age that brought him nearest the mean of the age distribution. In the cases in which the tests were not given within a few days, the mental age was computed for the time of giving the test according to the method described by Baldwin and Stecher.[2] These correlations are .79 ± .02 for chronological age and mental age, .74 ± .02 for chronological age and vocabulary, and .87 ± .01 for mental age and vocabulary.

Partial correlations were next determined. It was found that when chronological age is constant, the correlation between mental age and vocabulary is .69 ± .03; when mental age is constant, the correlation between chronological age and vocabulary is .20 ± .05; and when vocabulary is constant, the correlation between chronological age and mental age is .42 ± .05. In interpreting these partials, it must be remembered that mental age is determined by the Stanford-Binet test; and it is clearly evident that in order to pass a test for early ages the child must have some vocabulary. For example, at three years only one test does not require a child to be able to speak. At four years three tests require a verbal response; at five years, two, and at six years, five. It is not surprising therefore that so high a correlation is found between mental age and vocabulary. However, since the correlation between chronological age and vocabulary, although small, is still significant, it may be concluded that this vocabulary test is not measuring exactly the same ability that the Stanford-Binet test measures.

SUMMARY

A vocabulary test was devised for this study that has proved applicable to very young children. The list of words in this test was compiled by using every twentieth word in the Thorndike list

5. Correlations were calculated by the product-moment method.

of the most common words and eliminating from these all words that do not occur in fifty-five published vocabularies and twenty-two available unpublished vocabularies of young children. The words in the test were elicited through the use of objects, pictures, actions, and questions in order to avoid the young child's difficulty of definition.

The validity of the test was shown by a correlation of .875 ± .03 between vocabulary scores obtained by the test and those obtained by the Descoeudres partial tests of language and a correlation of .84 ± .03 with scores obtained by the Cobb rearrangement of the Terman vocabulary test. The validity of the test was further shown by a correlation of .91 ± .01 found by the Spearman rank order method between the order of difficulty of the words of the test, as determined from their frequency in seventy-seven children's vocabularies, and the frequency of knowledge of the words as found by the testing of 194 children.

When halves of the test were used as a measure, and the Spearman-Brown formula applied, the reliability of the test was found to be .97.

Results of the test scores of children from two to six years of age combined with the counts of actual vocabularies of babies show practically no words known before twelve months, then a slight rise of the average curve until eighteen months, followed by a more rapid rise.

For the children studied the correlation between mental age as measured by the Stanford-Binet test and vocabulary was found to be .69 ± .23 with chronological age constant; and between chronological age and vocabulary .20 ± .05 with mental age constant.

A study of other possible factors in increase of vocabulary showed some sex difference in favor of girls at two and at three years but none at a later age; a slight difference in favor of the higher social class, although the numbers used were too few to draw a definite conclusion; and no significant difference between children of different order of birth.

The correlation between sentence length and size of vocabulary was found to be .69 ± .05.

CHAPTER IV

SUMMARY AND CONCLUSIONS

This investigation consisted of two parts, a study of the development of the sentence in young children and the development of a test for use in the determination of the extent of vocabulary in young children.

The subjects used in this investigation were mainly from the Baby Examining and Preschool Laboratories of the Iowa Child Welfare Research Station, the Junior Primary Group of the University Elementary School, and a day nursery and an orphanage in Cedar Rapids, Iowa.

The mental ability of the group was average, but there were more children at both extremes of the distribution than in the normal curve.

DEVELOPMENT OF THE SENTENCE

The method used for the first part of the investigation was an analysis of individual records made of all words used spontaneously by eighty-eight children during an hour of free active play with other children.

Findings

1. The number of words per sentence increased with age from two to four and a half years.
2. The number of words used per hour increased with age during this period, but the variability is too great for this to be a significant measure of sentence development.
3. Declarative sentences predominated at all ages.
4. The repetition of identical sentences decreased with age.
5. The ratio of complete to incomplete sentences was significantly greater at three and at four years than at two.
6. At two years, verbs, nouns, and adverbs were more frequently used than adjectives and connectives, and at three and four years, verbs and pronouns were more frequently used than adjectives, articles, interjections, and connectives.
7. There was a significant decrease from two to five years in the percentages of adverbs that are place and modal to those of other types.

8. Other trends that may be significant, that were found from an analysis of the conversations recorded, were a decrease with age in the proportion of simple sentences to complex and compound sentences, an increase in the number of questions asked and a decrease in the number of exclamatory sentences as the child grows older, and a slight increase in the use of pronouns and adjectives and of abstract nouns.

9. The ten words most frequently used were: I, is, it, you, that, do, a, this, not, and the.

Conclusions

1. The recording of all words spontaneously used by a child during a period of free active play is a useful method of obtaining material for a comparative study of sentence development.

2. The most significant differences in sentence development with age are an increasing length of sentence, a greater frequency of complete sentences, and a decrease in the amount of repetition of identical phrases.

3. Other age differences that may be found to be significant with an additional number of subjects are an increasing complexity of sentence, a greater use proportionally of questions, abstract nouns, pronouns, and adjectives, and a decreased use of interjections and of adverbs that are place and modal.

EXTENT OF VOCABULARY

The words of the test used in the investigation of the extent of vocabulary were obtained by selecting every twentieth word from the Thorndike list of most common words and from these eliminating all words not found in any one of seventy-seven vocabularies of children. The test proved applicable to children from two and one-half to six years of age. The method used in giving the test sought to avoid the young child's difficulty of definition of words by eliciting the words of the test through the use of objects, pictures, actions, and questions.

The validity of the test was shown by correlations of scores obtained through its use and those obtained by two other tests, Descoeudres' and Cobbs' rearrangement of Terman's, and by means of the Spearman rank order method, between the words of the test ranked according to the order of difficulty as determined by the frequency of occurrence in seventy-seven children's vocabularies and as determined by the frequency of knowledge of 194 children tested. The correlation between total vocabulary scores on the test

and those on the Descoeudres' partial tests of language was found to be .875 ± .02, and with scores on the Cobb rearrangement of the Terman list to be .84 ± .03. The rho(ϱ) correlation between the two orders of difficulty was .91 ± .01.

The reliability of the test as found by using halves of the test as a measure was estimated and found to be .97 by the Spearman-Brown formula.

Findings

1. The average number of words in the vocabularies of 273 children increased from 0 at eight months to 2,562 at six years; the average gain per year from two to six years was 572.5 words.
2. The correlation between mental age as measured by the Stanford-Binet test and vocabulary was found to be .69 ± .03 with chronological age constant.
3. When the children of the same age and equal mental ability were paired according to social status the higher social class showed a higher average of words known, although the numbers were too few to allow drawing a definite conclusion.
4. No significant differences were found for order of birth among the children.
5. The girls had acquired a few more words than the boys at two and at three years of age, but after this age there was no difference.
6. Sentence length was to a slight extent indicative of the size of vocabulary, as shown by the correlation of .69 ± .05 between the two measures.

Conclusions

1. A test employing a device for eliciting words is a usable form of vocabulary test for very young children.
2. The average number of words in children's vocabularies increases from 0 at eight months to about 2,500 at six years.
3. The most significant factor in increase of vocabulary is that of mental age.
4. Girls are likely to begin the acquisition of a vocabulary at an earlier age than boys, but the sex factor is not important after three years of age.
5. It is probable that children of a higher social class have larger vocabularies than children of a lower social class even when mental ability is equal.
6. Order of birth does not have any significance in the size of vocabulary after two and one-half years.

REFERENCES

The stars indicate the references to articles including children's vocabularies that were used in determining which of the selection of words appearing in Thorndike's test should be tried out in the Smith vocabulary test.

*1. Anon. David's Vocabulary Till Three Years Old. *Child Life*, 1911, 13, 22-24.

2. Baldwin, B. T., and Stecher, L. I. Mental Growth Curve of Normal and Superior Children. *Univ. of Iowa Stud. in Child Welf.*, 1922, Vol. II, No. 1, 1922, Pp. 61. (p. 8-9.)

*3. Bateman, W. G. A Child's Progress in Speech with Detailed Vocabularies. *J. of Educ. Psychol.*, 1914, 5, 307-320.

*4. Bateman, W. G. Two Children's Progress in Speech. *J. of Educ. Psychol.*, 1915, 6, 475-493.

*5. Bateman, W. G. The Language Status of Three Children at the Same Ages. *Ped. Sem.*, 1916, 23, 211-240.

6. Bateman, W. G. Papers on Language Development. The First Word. *Ped. Sem.*, 1917, 24, 391-398.

*7. Beyer, T. P. The Vocabulary of Two Years. *Educ. Rev.*, 1915, 49, 191-203.

*8. Beyer, T. P. The Vocabulary of Three Years. *Educ. Rev.*, 1916, 52, 478-489.

9. Bloch, Oscar. Les premiers stades du langage de l'enfant. *J. de psychol.*, 1921, 18, 693-712.

10. Bloch, Oscar. Langage d'action dans les premiers stades du langage de l'enfant. *J. de psychol.*, 1923, 20, 670-674.

11. Bloch, Oscar. La phrase dans le langage de l'enfant. *J. de psychol.*, 1924, 21, 18-43.

12. Bohn, W. E. First Steps in Verbal Expression. *Ped. Sem.*, 1914, 21, 578-595.

13. Bonser, F. G., Burch, L. H., and Turner, M. R. Vocabulary Tests as Measures of School Efficiency. *School and Soc.*, 1915, 2, 713-718.

14. Boyd, William. The Development of a Child's Vocabulary. *Ped. Sem.*, 1914, 21, 95-124.

*15. Brandenburg, G. C. The Language of a Three-year-old Child. *Ped. Sem.*, 1915, 22, 89-120.

*16. Brandenburg, G. C., and Brandenburg, Julia. Language Development during the Fourth Year. *Ped. Sem.*, 1916, 23, 14-29.

17. Bühler, Karl. *Die geistige Entwicklung des Kindes.* Jena: Fischer, 3rd ed. 1922. Pp. 486. (Part IV. Die Entwicklung der Sprache, 213-236.)

*18. Bush, A. D. The Vocabulary of a Three-year-old Girl. *Ped. Sem.*, 1914, 21, 125-142.

19. Cobb, M. V. Tentative Order of Difficulty of the Terman Vocabulary with Very Young Children. *J. of Educ. Psychol.*, 1922, 13, 357-362.

20. Conradi, Edward. Psychology and Pathology of Speech-Development in the Child. *Ped. Sem.*, 1904, 11, 328-380.

21. Descoeudres, Alice. *Le développement de l'enfant de deux à sept ans.* Paris. Delachaux et Niestlé, 1921. Pp. 327.

22. Dewey, John. The Psychology of Infant Language. *Psychol. Rev.*, 1894, 1, 63-66.

23. Doran, E. W. A Study of Vocabularies. *Ped. Sem.*, 1907, 14, 401-438.

*24. Drever, James. A Study of Children's Vocabularies. *J. of Exper. Ped.*, 1915, 3, 34-43; 96-103; 182-188.

25. Drever, James. The Vocabulary of a Free Kindergarten Child. *J. of Exper. Ped.*, 1919, **5**, 28-37.
*26. Drummond, Margaret. Notes on Speech Development. *Child Study*, 1916, **9**, 83-86; 95-99.
27. Feldmann. *De statu normali functionem corporis humani.* Dissert. Bonner, 1833. Cited by Bateman.
*28. Gale, M. C., and Gale, H. A. The Vocabularies of Three Children in One Family to Two and a Half Years of Age. *Psychol. Studies*, 1900, No. 1, 70-117.
*29. Gale, M. C., and Gale, H. A. The Vocabularies of Three Children in One Family at Two and Three Years of Age. *Ped. Sem.*, 1902, **9**, 422-435.
30. Gerlach, F. M. Vocabulary Studies. *Studies in Education and Psychology.* Colorado Springs, Colorado College, No. 1, 1917. Pp. 123.
31. Gesell, Arnold. *The Mental Growth of the Pre-school Child.* New York: Macmillan, 1925. Pp. 447. (Chap. IX, 89-99.)
32. Gheorgov, J. A. *Ein Beitrag zur grammatischen Entwicklung der Kindersprache.* Leipzig: W. Engelmann, 1908. Pp. 191. Cited by Stern.
33. Gheorgov, J. A. *Le vocabulaire dans le langage des enfants Sofia*, 1910. Pp. 301. (L'Annuaire de l'Université de Sofia. En bulgare). Cited by Stern.
*34. Grant, J. R. A Child's Vocabulary and Its Growth. *Ped. Sem.*, 1915, 22, 183-203.
*35. Greenwood, J. M. *Annual Report of the Public Schools of Kansas City for the Year Ending June 30, 1900.* Pp. 124-133. (Report first printed in report for 1887-1888.)
*36. Hall, Mrs. W. S. The First Five Hundred Days of a Child's Life. *Child Study Mo.*, 1896-1897, **2**, 586-608.
*37. Heilig, M. R. A Child's Vocabulary. *Ped. Sem.*, 1913, **20**, 1-16.
*38. Hills, E. C. The Speech of a Child Two Years of Age. *Dialect Notes*, 1914, **4**, Part II, 84-100.
*39. Holden, E. S. On the Vocabularies of Children under Two Years. *Trans. Amer. Philol. Assn.*, 1877, **8**, 58-68.
*40. Hull, C. L., and Hull, B. I. Parallel Learning Curves of an Infant in Vocabulary and in Voluntary Control of the Bladder. *Ped. Sem.*, 1919, 26, 272-283.
*41. Humphreys, M. W. A Contribution to Infantile Linguistics. *Trans. Amer. Philol. Assn.*, 1880, **11**, 5-17.
*42. Jegi, J. I. The Vocabulary of a Two-year-old Child. *Child Study Mo.*, 1901, 6, 241-261.
43. Keller, Helen. *Story of My Life.* New York: Doubleday Page, 1903. Pp. 441. (Chap. IV, 20-24.)
44. Kirkpatrick, E. A. A Vocabulary Test. *Pop. Sci. Mo.*, 1907, **70**, 157-164.
45. Kirkpatrick, E. A. *Fundamentals of Child Study.* New York: Macmillan, 1918. Rev. ed. Pp. 380. (Chap. XV, 239-253.)
*46. Major, D. R. *First Steps in Mental Growth.* New York: Macmillan, 1906. Pp. 360. (Chap. XV, Language, 278-333.)
*47. Mateer, Florence. The Vocabulary of a Four-year-old Boy. *Ped. Sem.*, 1908, **15**, 63-74.
48. Mead, C. D. The Age of Walking and Talking in Relation to General Intelligence. *Ped. Sem.*, 1913, **20**, 460-84.
*49. Mickens, C. W. Practical Results of Child Study. *Child Study Mo.*, 1897-1898, **3**, 196-205.
*50. Moore, Kathleen. The Mental Development of a Child. *Psychol. Rev. Monog. Suppl.*, 1895-1897, No. 3. Pp. 150. (Pt. 4, 115-145.)
51. Moyer, H. B. *Speech Development.* Univ. of Penn. Thesis, 1911. Pp. 61.
52. National Society for the Study of Education. *Twenty-Fourth Yearbook,*

Bloomington, Ill., Public School Publishing Co., 1925. Pp. 356. (Pt. I, 185-193.)

*53. Nice, M. M. The Speech Development of a Child from Eighteen Months to Six Years. *Ped. Sem.*, 1917, **24**, 204-243.

54. Nice, M. M. Ambidexterity and Delayed Speech Development. *Ped. Sem.*, 1918, **25**, 141-162.

55. Nice, M. M. Concerning All Day Conversations. *Ped. Sem.*, 1920, **27**, 166-177.

56. Nice, M. M. A Child Who Would Not Talk. *Ped. Sem.*, 1925, **32**, 105-142.

*57. Oatman, M. E. A Boy's Development at Eighteen Months. *Ped. Sem.*, 1921, **28**, 52-59.

58. Pavlovitch, Milivoïe. *Le langage enfantin. Acquisition du Serbe et du Français par un enfant Serbe.* Paris: Champion, 1920. Pp. 204.

*59. Pelsma, J. R. A Child's Vocabulary and Its Development. *Ped. Sem.*, 1910, **17**, 328-369.

60. Ronjat, Jules. *Le développement du langage observé chez un enfant bilingue.* Paris: Champion, 1913. Pp. 155. Cited by Pavlovitch.

61. Rowe, E. C., and Rowe, H. N. The Vocabulary of a Child at Four and Six Years. *Ped. Sem.*, 1913, **20**, 187-208.

62. Saer, D. J. An Inquiry into the Effect of Bilingualism upon the Intelligence of Young Children. *J. of Exper. Ped.*, 1922, **6**, 232-240; 266-274.

63. Saer, D. J. The Effect of Bilingualism on Intelligence. *Brit. J. of Psychol.*, 1923, **14**, 25-38.

64. Schneider, O. Die schöpferische Kraft des Kindes in der Gestaltung seiner Bewusstseinzustande bis zum Beginn des Schulunterrichts. *Ztschr. f. Philos. u. philos. Kritik*, 1903, **121**. Pp. 35. Cited by Stern.

65. Smith, Frank. Bilingualism and Mental Development. *Brit. J. of Psychol.*, 1923, **13**, 270-282.

66. Snyder, A. D. Notes on the Talk of a Two-and-a-half Year Old Boy. *Ped. Sem.*, 1914, **21**, 412-424.

67. Starch, Daniel. *English Vocabulary Test.* Madison, Wis., Univ. Coop. Co.

68. Stern, Clara, and Stern, Wilhelm. *Die Kindersprache. Eine psychologische und sprachtheoretische Untersuchung.* Leipzig: Barth, 1922, 3rd ed. Pp. 434.

69. Terman, L. M. *The Measurement of Intelligence.* Boston, New York: Houghton Mifflin, 1916. Pp. 362. (167-169; 224-231.)

70. Thorndike, E. L. *The Teacher's Word Book.* New York: Bureau of Publications, Teachers College, Columbia University, 1921. Pp. 134.

71. Tracy, Frederick. *Psychology of Childhood.* Boston: D. C. Heath and Co., 1897, 4th ed., Pp. 170. (118-165.)

72. Whipple, Prof. and Mrs. G. M. The Vocabulary of a Three-year-old Boy, with some Interpretive Comments. *Ped. Sem.*, 1909, **16**, 1-22.

73. Whipple, G. M. *Manual of Mental and Physical Tests. Part II, Complex Processes.* Baltimore: Warwick and York, 1915. Pp. 336. (Chap. XII. 308-317.)

74. Whipple, G. M. Vocabulary and Word Building Tests. *Psychol. Rev.*, 1908, **15**, 94-105.

APPENDIX

TABLE 1

Complete Conversation and Vocabulary Test Records of 158 Children From Two to Eight Years

Child's number	Sex	Order of birth	Source*	Age				I. Q.	Words in one-hour conversation		Vocabulary test
				Chronological		Mental			Total number	Number to the sentence	Number of words
				Years	Months	Years	Months				
1	F	2	M	1	11	2	6	130	250	2.4	
1	F	2	M	2	0	2	7	130			900
2	F	1	M	2	1	2	2	104			260
3	F	1	P.L.	2	0	2	7	130	95	1.7	440
4	F	2	M	2	0	2	2	108	46**	2.2	300
5	F	4	M	2	0				55**	2.8	
6	F	2	P.L.	2	2	2	8	123	46	1.8	
7	M	1	M	2	1	2	4	112	179	2.3	
8	M	2	P.L.	2	3	2	2	96			80
9	M	1	P.L.	2	2	2	8	123	53	2.0	400
10	M	2	H.F.	1	11				4	1.0	
11	M		H.F.	2	0				21	1.3	
12	M		D.N.	2	3				108	1.4	
13	M	2	P.L.	2	1	2	0	96	0	0.0	
14	M	1	P.L.	2	5	2	10	117	73	2.8	
13	M	2	P.L.	2	6	2	9	110	23	1.2	
15	M	1	P.L.	2	4	2	6	107	26	2.0	220
16	M	1	P.L.	2	5	3	4	138	176	3.8	740
17	M	1	D.N.	2	4				12	1.2	0
18	M		D.N.	2	5	2	2	90			80
19	F		H.F.	2	3	2	2	96	113	1.8	
20	F	1	M	2	3	2	6	111	260	2.3	
1	F	2	M	2	5	3	4	138	846	3.7	1,100
21	F	2	P.L.	2	4	3	2	136	139	3.2	
21	F	2	P.L.	2	5	3	3	134			1,300
6	F	2	P.L.	2	5	3	3	134	93	2.8	
8	F	2	P.L.	2	3	2	2	100	27	1.1	
5	F	4	M	2	5				208	3.5	
3	F	1	P.L.	2	3	2	11	130			1,060
22	F	3	D.N.	2	6	2	2	86	50**	2.2	80
23	F		M	2	8	2	5	91			360
24	F		D.N.	2	7	2	2	84	82	1.4	40
6	F	2	P.L.	2	7	3	7	140			620
25	F	3	P.L.	2	8	2	9	105	12	2.4	
13	M	2	P.L.	2	7	3	0	116			180
26	M	1	P.L.	2	8	3	8	138	113	3.2	
8	M	2	P.L.	2	6	2	6	100	52	2.2	280

* Source: P.L., Preschool Laboratory; J.P., Junior Primary; H.F., Home of the Friendless; D.N., Day Nursery; M, miscellaneous.

** Test not a full hour.

TABLE 1 (Continued)
Complete Conversation and Vocabulary Test Records of 158 Children From Two to Eight Years

Child's number	Sex	Order of birth	Source	Age		I. Q.	Words in one-hour conversation		Vocabulary test
				Chronological	Mental				
				Years Months	Years Months		Total Number	Number to the sentence	Number of words
27	M	2	D.N.	2— 8	2— 6	94	64	1.9	180
28	F	1	P.L.	2—11	3— 8	126			1,160
28	F	1	P.L.	3— 0	3— 9	126	60	2.7	
28	F	1	P.L.	3— 3	4— 1	126			1,420
5	F	4	M	3— 2	2—10	90	398	3.8	620
21	F	2	P.L.	2— 9	3— 9	136			1,940
25	F	2	P.L.	2—11	3— 3	111	96	3.2	
25	F	2	P.L.	3— 2	3— 9	118			860
152	F	1	P.L.	3— 2	2—10	89	116	2.9	
20	F	1	M	3— 1	3— 7	116			1,080
153	F	2	D.N.	3— 3	3— 4	103	522	4.3	
154	F		D.N.	3— 2	3— 6	111	306	4.0	1,100
29	F	2	P.L.	3— 0	4— 0	133			1,580
41	F	1	P.L.	3— 1	3— 5	111	98	4.1	
155	M	1	P.L.	2—11	3— 8	126			860
13	M	2	P.L.	2—10	3— 5	121			620
26	M	1	P.L.	2—11	3— 3	138	305	4.0	
26	M	1	P.L.	3— 2	4— 4	138			1,460
30	M	1	P.L.	2—11	3— 1	106	181	2.9	
30	M	1	P.L.	3— 2	3— 4	110	264	3.2	
31	M	1	P.L.	2—11	3— 2	109	117	3.1	
31	M	1	P.L.	3— 2	3— 5	109	238	3.6	
32	M	1	P.L.	3— 2	3—10	121	242	3.5	
33	M	3	P.L.	3— 2	3— 3	103	479	3.8	
34	M	1	P.L.	2—10	4— 4	153			1,400
35	M	2	H.F.	3— 1	2— 6	81			460
27	M	2	D.N.	3— 1	2— 8	86	115	3.4	580
36	M	2	H.F.	3— 0	2— 8	89			580
36	M	2	H.F.	3— 3	2—11	89			840
37	M	2	M	3— 9	2— 4	86	110	1.8	
38	M	1	M	2—11	2— 6	86	151	2.2	
39	M	3	M	3— 3	2— 8	82			360
17	M		D.N.	2—11	2— 2	74			0
15	M	1	P.L.	2— 9	2—11	107			740
40	M		D.N.	2—10	2— 4	78			260
152	F	1	P.L.	3— 6	3— 6	100	113	3.3	
42	F	1	P.L.	3— 4	3—11	118	89	3.8	
44	F	1	P.L.	3— 5	4— 3	124	32	3.6	
45	F	2	P.L.	3— 3	3— 7	111	162	4.4	
5	F	4	P.L.	3— 4	2—11	87	292	3.8	
5	F	4	P.L.	3— 5	3— 0	88			960
20	F	1	M	3— 3	3—10	118	621	4.0	1,440
46	F		D.N.	3— 6	3— 4	91	82	2.8	660
47	F		H.F.	3— 3	2— 2	67			20
47	F		H.F.	3— 4	2— 2	65	49	1.8	
41	F	1	P.L.	3— 5	3— 8	108			1,840

TABLE 1 (Continued)
Complete Conversation and Vocabulary Test Records of 158 Children From Two to Eight Years

Child's number	Sex	Order of birth	Source	Age		I. Q.	Words in one-hour conversation		Vocabulary test
				Chronological	Mental				
				Years Months	Years Months		Total number	Number to the sentence	Number of words
48	F	1	P.L.	3— 5	4— 0	117			780
30	M	1	P.L.	3— 4	3— 8	110			1,540
33	M	3	P.L.	3— 6	4— 1	117	293	4.1	1,540
32	M	1	P.L.	3— 5	4— 6	132	380	4.6	
49	M	1	P.L.	3— 4	3— 8	110	764	5.6	
50	M	1	P.L.	3— 5	5— 4	156	684	4.7	
51	M	1	P.L.	3— 5	4— 4	127	394	4.9	1,640
14	M	1	P.L.	3— 5	4— 2	122	176	3.7	1,540
38	M	1	M	3— 3	2— 8	82	587	2.6	
37	M	2	M	3— 5	2—11	86			660
52	M	1	H.F.	3— 6	3— 0	86			780
31	M	1	P.L.	3— 4	3— 7	109			1,080
53	M	1	P.L.	3— 6	3—10	109			1,320
27	M	2	D.N.	3— 3	2—10	86	219	3.5	
152	F	1	P.L.	3— 8	3—10	105			1,300
43	F	2	P.L.	3— 8	4—10	132	340	3.7	
44	F	1	P.L.	3— 9	4—10	132			1,880
45	F	1	P.L.	3— 8	4— 1	111			2,040
25	F	3	P.L.	3— 7	4— 6	125	275	4.4	1,220
54	F	3	P.L.	3— 8	4—10	132			1,760
5	F	4	P.L.	3— 5	3— 2	88	1100	3.6	
32	M	1	P.L.	3— 7	4—11	138			1,440
49	M	1	P.L.	3— 9	3—10	102			1,600
38	M	1	M	3— 7	3— 1	86			980
55	M	1	M	3— 7	3— 2	88			1,000
52	M	1	H.F.	3— 8	3— 2	86	452	3.8	
56	M	3	H.F.	3— 9	3— 6	93			780
57	M	2	H.F.	3— 8	3— 4	91	459	4.9	920
58	M	1	P.L.	3— 7	3—10	107			1,060
49	M	1	P.L.	3— 7	3— 9	105	156	5.8	
72	M	1	P.L.	3— 8	5— 0	138	193	4.9	
59	F	2	P.L.	4— 2	4— 8	112	734	4.8	
60	F	3	P.L.	3—10	3—10	100	537	5.2	1,100
152	F	1	P.L.	4— 2	4—10	116	156	4.1	1,740
41	F	1	P.L.	3—10	4— 6	117	64	4.3	1,980
61	F	1	P.L.	3— 9	5— 2	138			1,320
61	F	1	P.L.	3—10	5— 3	138	35	3.5	
43	F	2	P.L.	3— 9	4—11	132			1,880
62	F		H.F.	3—11	4— 2	106			860
63	F	1	M	3—10	3— 9	98			1,360
64	F	1	P.L.	3— 9	4— 0	107			1,280
65	F		H.F.	4— 0	3— 8	92			1,320
38	M	1	M	3—10	3— 4	88	435	3.1	
38	M	1	M	4— 1	3— 6	88	392	4.5	1,320
66	M	2	D.N.	4— 0	3— 6	88	230	3.7	
67	M	1	P.L.	3—11	4— 4	111	404	4.0	

TABLE 1 (Continued)
Complete Conversation and Vocabulary Test Records of 158 Children From Two to Eight Years

Child's number	Sex	Order of birth	Source	Age		I. Q.	Words in one-hour conversation		Vocabulary test
				Chronological	Mental				
				Years Months	Years Months		Total number	Number to the sentence	Number of words
67	M	1	P.L.	4— 1	4— 9	116			2,100
68	M	1	P.L.	4— 3	4— 9	112			1,780
68	M	1	P.L.	3—11	3—11	100	121	4.3	
33	M	3	P.L.	4— 1	4— 3	104	852	4.8	2,060
50	M	1	P.L.	3—10	5—10	152	508	5.2	
69	M	1	P.L.	3— 9	3—10	102			1,080
69	M	1	P.L.	3—10	3—11	102	67	4.2	
32	M	1	P.L.	4— 1	5— 8	139			1,800
70	M	2	P.L.	3—11	5— 0	130	95	3.8	1,780
71	M	2	D.N.	3—11	3— 2	80	923	4.1	1,240
72	M	1	P.L.	4— 2	5— 8	136			2,560
72	M	1	P.L.	3— 9	5— 1	136			2,000
69	M	1	P.L.	4— 1	4— 2	102			1,600
53	M	1	P.L.	3—10	4— 5	109			1,720
37	M	2	M	4— 0	3— 4	83			1,180
73	M		H.F.	3—11	3— 6	90			880
52	M	1	H.F.	3—10	3— 4	86			1,020
90	M	1	P.L.	3— 9	3— 7	89	780	4.8	
90	M	1	P.L.	4— 2	4— 7	110			1,620
90	M	1	P.L.	4— 1	4— 4	106	456	4.7	
58	M	1	P.L.	4— 0	4— 3	107			1,460
74	F	2	P.L.	4— 6	5— 0	111	26	5.2	
75	F	2	P.L.	4— 5	5— 7	127	560	5.1	
76	F		P.L.	4— 6	5— 8	126	83	5.2	
77	F	2	P.L.	4— 6	5— 3	117			2,600
77	F	2	P.L.	4— 3	5— 0	117	199	4.9	
78	F	1	P.L.	4— 6	5— 1	113	41	4.6	
79	F	2	D.N.	4— 4	3— 4	77	177	3.2	1,160
81	F		D.N.	4— 4	4— 0	92	275	5.6	
82	F		D.N.	4— 4	4— 8	104	352	5.0	
43	F	2	P.L.	4— 4	6—10	158	362	4.1	2,620
59	F	2	P.L.	4— 4	5— 0	115			1,320
44	F	1	P.L.	4— 3	5—10	137			2,260
84	F	1	H.F.	4— 4	3— 2	73			1,280
60	F	3	P.L.	4— 3	4— 3	100			1,700
85	F	1	P.L.	4— 5	4—10	109			1,740
33	M	3	P.L.	4— 6	4— 8	104			2,340
100	M		P.L.	4— 5	5— 7	126			1,900
50	M	1	P.L.	4— 5	6— 6	147			1,740
101	M	2	P.L.	4— 4	5— 4	123			2,460
97	M		P.L.	4— 5	4— 4	98	251	4.5	1,760
49	M	1	P.L.	4— 3	4— 8	110	350	4.6	2,900
38	M	1	M	4— 4	3—10	88	496	4.8	1,520
84	F	1	H.F.	4— 7	3— 4	73			1,480
80	F		D.N.	4— 7	4— 0	87	904	3.8	1,100
86	F	2	P.L.	4— 7	6— 4	138			2,480

TABLE 1 (Continued)
Complete Conversation and Vocabulary Test Records of 158 Children From Two to Eight Years

Child's number	Sex	Order of birth	Source	Age: Chronological: Years	Age: Chronological: Months	Age: Mental: Years	Age: Mental: Months	I. Q.	Words in one-hour conversation: Total number	Words in one-hour conversation: Number to the sentence	Vocabulary test: Number of words
87	F		D.N.	4	7	5	4	116			1,940
78	F	1	P.L.	4	8	5	3	113			1,480
73	F	2	P.L.	4	8	5	9	123			2,660
88	F	2	P.L.	4	9	6	2	129	563	5.6	
89	F	1	D.N.	4	8	3	8	79	217	4.4	1,260
91	F	2	P.L.	4	7	4	7	100			1,220
91	F	2	P.L.	4	8	4	8	100	266	4.0	
102	F		D.N.	4	8	5	10	125	967	5.4	1,880
74	F	2	P.L.	4	8	5	4	115			2,260
92	M	1	D.N.	4	8	3	10	82	717	4.9	
93	M	1	P.L.	4	7	5	3	114			2,460
93	M	1	P.L.	4	8	5	4	114	650	5.5	
95	M	1	P.L.	4	8	4	2	90	939	5.3	
66	M	2	D.N.	4	7	4	0	83			1,340
96	M	2	P.L.	4	8	6	0	129			2,160
90	M	1	P.L.	4	9	4	10	97			1,940
68	M	1	P.L.	4	7	5	10	127			2,160
97	M		P.L.	4	8	4	7	98			2,100
99	M	2	P.L.	4	8	6	5	138	82	4.1	
98	M		H.F.	4	8	4	4	93			1,520
101	M	2	P.L.	4	6	5	6	123	602	4.6	
103	F	1	P.L.	4	1	4	7	112	265	4.2	
103	F	1	P.L.	5	1	6	0	118			1,900
104	F	1	P.L.	4	11	6	3	128			2,760
104	F	1	P.L.	4	10	6	2	128	179	4.6	
105	F	1	P.L.	5	0	4	9	95	281	4.8	
105	F	1	P.L.	5	1	4	11	97			1,920
106	F		D.N.	4	10	3	2	65	364	3.4	820
88	F	2	P.L.	4	10	6	3	130			2,500
107	F	2	J.P.	5	0	7	8	154			2,580
108	F	2	J.P.	5	2	6	10	132			3,060
80	F		D.N.	4	9	4	2	87	982	3.8	1,420
87	F		D.N.	4	10	4	9	116	566	5.4	
89	F	1	D.N.	5	0	4	2	83	515	4.6	1,440
91	F	2	P.L.	4	10	4	10	100	22	4.4	1,800
109	F	1	H.F.	4	10	4	6	90			1,120
110	M	2	P.L.	4	10	6	1	126	89	4.2	
111	M	2	P.L.	4	10	5	7	115	63	4.8	
111	M	2	P.L.	5	1	5	10	115			2,020
112	M	1	P.L.	5	2	6	10	132			2,940
112	M	1	P.L.	5	1	6	7	130	369	5.6	
113	M	1	D.N.	5	1	5	4	105	512	4.3	2,020
114	M	2	P.L.	5	1	4	2	82	172	5.1	1,420
90	M	1	P.L.	5	0	5	1	102			2,240
90	M	1	P.L.	4	10	4	11	102	506	4.6	
115	M	1	J.P.	4	10	7	4	152			3,260

TABLE 1 (Continued)

Complete Conversation and Vocabulary Test Records of 158 Children From Two to Eight Years

Child's number	Sex	Order of birth	Source	Age				I. Q.	Words in one-hour conversation		Vocabulary test
				Chronological		Mental					
				Years	Months	Years	Months		Total number	Number to the sentence	Number of words
116	M		M	5	4	4	4	81			1,480
92	M		D.N.	4	10	4	0	82			1,080
95	M	1	P.L.	4	10	4	7	94			2,240
96	M	2	P.L.	4	10	6	3	129	428	4.5	
93	M	1	P.L.	4	11	5	7	114	1,080	4.5	
94	M	2	P.L.	5	1	6	4	125			2,880
117	F		M	5	6	5	6	100			1,400
118	F	2	J.P.	5	3	7	9	148			3,300
119	F	2	J.P.	5	4	6	3	117			2,800
120	F	4	J.P.	5	5	6	5	118			2,260
121	F	2	J.P.	5	5	7	9	143			3,360
122	F	1	J.P.	5	5	6	10	126			2,560
123	F	1	J.P.	5	6	6	11	126			2,300
124	F	1	J.P.	5	6	6	9	123			2,620
125	M	1	D.N.	5	5	4	8	86			2,000
126	M	2	J.P.	5	5	7	0	128			3,200
127	M	1	J.P.	5	6	6	11	135			2,700
128	M	2	J.P.	5	5	6	5	118			2,980
129	M	1	J.P.	5	6	5	6	100			2,280
114	M	2	P.L.	5	5	4	5	82			1,740
157	F	1	J.P.	5	8	7	0	124			2,180
130	F	1	D.N.	5	8	5	1	90	309	5.2	1,440
131	F		J.P.	5	7	5	7	100			1,960
132	F	1	J.P.	5	8	7	0	124			2,320
133	F	2	H.F.	5	7	5	0	90			1,220
134	F		H.F.	5	8	4	2	66			1,180
135	M		M	5	9	5	2	90			2,040
136	M	2	J.P.	6	8	6	11	122			3,100
137	M	2	J.P.	6	8	6	8	118			2,920
138	M		H.F.	5	8	4	2	72			1,600
139	M	1	J.P.	5	7	8	5	151			3,060
158	M		J.P.	5	9	6	9	118			2,680
92	M		H.F.	5	8	5	4	94			1,800
106	F		D.N.	5	10	4	8	81			1,620
140	F		D.N.	5	11	4	11	84			1,680
141	F	1	J.P.	5	11	6	10	117			2,840
142	F		J.P.	5	10	6	10	91			2,040
143	F		J.P.	5	11	9	0	152			3,340
144	M		D.N.	6	0	6	2	103			3,080
145	M		D.N.	5	11	4	8	79	192	4.5	
146	M	2	J.P.	6	1	6	11	114			2,840
147	M	1	J.P.	6	2	7	3	118			2,940
148	F		D.N.	7	0	6	2	88			2,480
149	F		D.N.	6	10	5	6	80			1,800
150	M		M	6	7	7	0	106			2,720
151	M		M	8	0	8	0	100			3,280

TABLE 2
Frequency of Occurrence of Test Words in Seventy-Seven Lists of Children's Vocabularies

Test word	Frequency of occurrence		Test word	Frequency of occurrence	
	Lists	Per cent (of 77)		Lists	Per cent (of 77)
hot	69	90	splash	22	28
button	69	90	slip	22	28
take	61	79	year	22	28
cake	60	78	herself	22	28
pocket	60	78	stir	21	27
away	59	77	lemonade	20	26
mine	57	74	gray	19	25
window	56	73	mosquito	19	25
fish	55	71	body	18	23
hurt	55	71	fountain	17	22
too	53	69	soldier	17	22
say	52	68	cane	16	21
dish	51	66	edge	16	21
blue	51	66	everybody	16	21
it's	50	65	bright	15	19
a	48	62	chest	15	19
love	47	61	thin	15	19
hold	46	60	tuck	14	18
the	46	60	week	14	18
quick	44	57	rather	14	18
paint	42	55	bumble (bee)	13	17
any	41	53	gas	13	17
bib	41	53	king	13	17
didn't	41	53	ocean	13	17
mud	41	53	storm	13	17
tired	41	53	spade	13	17
glove	39	51	ugly	13	17
closet	38	49	drip	12	16
corn	38	49	race	12	16
dry	37	48	scrap	12	16
strawberry	36	47	starch	12	16
hill	34	44	watermelon	12	16
caught	33	43	crown	11	14
gravy	33	43	ditch	11	14
those	32	41	dozen	11	14
never	31	40	easily	11	14
miss (Miss)	30	39	icy	11	14
six	30	39	Saturday	11	14
honey	29	38	usually	11	14
told	29	38	velvet	11	14
wear	29	38	camera	10	13
lion	29	38	howl	10	13
across	28	36	scold	10	13
sled	28	36	turnip	10	13
gun	27	35	fool	9	12
change	24	31	sailor	9	12
kettle	24	31	sort	9	12
sometime	24	31	witch	9	12
			jerk	8	10

TABLE 2 (Continued)
Frequency of Occurrence of Test Words in Seventy-Seven Lists of Children's Vocabularies

Test word	Frequency of occurrence		Test word	Frequency of occurrence	
	Lists	Per cent (of 77)		Lists	Per cent (of 77)
plow	8	10	cardboard	3	4
rang	8	10	flesh	3	4
shingle	8	10	gingerbread	3	4
sunlight	8	10	niece	3	4
twin	8	10	notebook	3	4
allow	7	9	pillar	3	4
angry	7	9	piston	3	4
chilly	7	9	prison	3	4
freight	7	9	shape	3	4
kangaroo	7	9	skull	3	4
liver	7	9	tabby	3	4
necklace	7	9	whoever	3	4
strip	7	9	also	2	3
wife	7	9	ashore	2	3
amuse	6	8	cog	2	3
brownie	6	8	cottage	2	3
level	6	8	cowslip	2	3
lilac	6	8	crate	2	3
neighbor	6	8	dynamite	2	3
Thursday	6	8	flop	2	3
west	6	8	guard	2	3
woke	6	8	hawthorn	2	3
bawl	5	6	herd	2	3
flash	5	6	history	2	3
fringe	5	6	ledge	2	3
orchard	5	6	lukewarm	2	3
pave	5	6	mention	2	3
pebble	5	6	pulse	2	3
polite	5	6	return	2	3
postal	5	6	scum	2	3
price	5	6	shabby	2	3
worry	5	6	taxi	2	3
check	4	5	timber	2	3
cider	4	5	unpleasant	2	3
cylinder	4	5	arbor	1	1
funnel	4	5	bargain	1	1
hornet	4	5	colt	1	1
nowhere	4	5	comical	1	1
ornament	4	5	coo	1	1
plan	4	5	defeat	1	1
playhouse	4	5	delivery	1	1
rumple	4	5	execute	1	1
scarlet	4	5	grandson	1	1
tortoise	4	5	forgave	1	1
whenever	4	5	helm	1	1
balance	3	4	mahogany	1	1
beech	3	4	moisture	1	1
bosom	3	4	rot	1	1
burr	3	4	saber	1	1

TABLE 2 (Continued)
Frequency of Occurrence of Test Words in Seventy-Seven Lists of Children's Vocabularies

Test word	Frequency of occurrence		Test word	Frequency of occurrence	
	Lists	Per cent (of 77)		Lists	Per cent (of 77)
singer	1	1	ungrateful	1	1
stud	1	1	volume	1	1
stylish	1	1	wampum	1	1
suffer	1	1	yoke	1	1

TABLE 3
Frequency of Knowledge of Words in Vocabulary Test of 194 Children

Test word	Frequency of knowledge		Test word	Frequency of knowledge	
	Children	Per cent (of 194)		Children	Per cent (of 194)
button	190	98	gas	145	75
pocket	189	97	herself	143	74
hot	188	97	strawberry	140	72
cake	186	96	told	139	72
hurt	185	95	woke	139	72
take	185	95	caught	137	71
away	183	94	splash	137	71
mine	181	93	those	137	71
window	181	93	stir	134	69
dish	178	92	never	133	69
love	178	92	miss (Miss)	132	68
too	177	91	kettle	130	67
tired	176	91	slip	127	65
hold	173	89	honey	125	64
a	172	89	taxi	123	63
fish	172	89	bright	122	63
say	170	88	blue	120	62
dry	169	87	watermelon	118	61
didn't	168	87	scold	117	60
it's	168	87	storm	116	60
corn	167	86	year	116	60
bib	165	85	edge	115	59
any	162	84	cane	113	58
mud	162	84	everybody	112	58
the	162	84	lion	112	58
paint	161	83	soldier	112	58
wear	160	82	lemonade	111	57
gravy	159	82	dozen	110	57
gun	156	80	scrap	110	57
across	154	79	ditch	109	56
glove	152	78	six	108	56
closet	151	78	mosquito	107	55
hill	150	77	race	101	52
quick	149	77	thin	96	49
sled	149	77	body	95	49
sometime	148	76	flash	95	49
change	147	76	gingerbread	95	49

TABLE 3 (Continued)

Frequency of Knowledge of Words in Vocabulary Test of 194 Children

Test word	Frequency of knowledge		Test word	Frequency of knowledge	
	Children	Per cent (of 194)		Children	Per cent (of 194)
rather	95	49	necklace	39	20
freight	91	47	notebook	39	20
chilly	90	46	strip	39	20
playhouse	89	46	polite	37	19
chest	86	44	orchard	35	18
drip	85	44	funnel	34	18
rang	83	43	prison	34	18
nowhere	82	43	sailor	34	18
bumblebee	80	42	balance	33	17
check	80	42	ashore	32	16
Saturday	80	42	usually	32	16
spade	80	42	velvet	32	16
tuck	78	40	easily	29	15
turnip	78	40	burr	28	14
icy	76	39	lilac	27	14
west	76	39	guard	26	13
gray	74	38	plan	26	13
pave	70	36	pebble	23	12
ocean	69	36	brownie	22	11
angry	68	35	hornet	22	11
starch	68	35	level	21	11
fool	67	35	whenever	21	11
jerk	67	35	dynamite	20	10
fountain	64	33	mahogany	20	10
ugly	63	32	singer	20	10
wife	61	31	colt	19	10
camera	60	31	delivery	19	10
worry	59	30	return	19	10
king	54	28	scarlet	17	9
plow	54	28	whoever	17	9
witch	53	27	moisture	16	8
suffer	52	27	rot	16	8
week	52	27	rumple	16	8
postal	51	26	grandson	15	8
cardboard	50	26	allow	14	7
shape	50	26	fringe	14	7
liver	49	25	amuse	13	7
neighbor	48	25	ornament	13	7
howl	47	24	shabby	13	7
sort	47	24	cider	12	6
shingle	46	24	unpleasant	12	6
price	45	23	timber	11	6
Thursday	45	23	skull	10	5
sunlight	44	23	crate	9	5
twin	44	23	cylinder	9	5
cottage	43	22	mention	9	5
bawl	41	21	stylish	9	5
kangaroo	41	21	comical	8	4
crown	39	20	flesh	8	4

TABLE 3 (Continued)
Frequency of Knowledge of Words in Vocabulary Test of 194 Children

Test word	Frequency of knowledge		Test word	Frequency of knowledge	
	Children	Per cent (of 194)		Children	Per cent (of 194)
flop	7	4	cog	2	1
scum	7	4	helm	2	1
lukewarm	6	3	niece	2	1
pillar	6	3	piston	2	1
bargain	5	3	tortoise	2	1
forgive	5	3	ungrateful	2	1
history	5	3	cowslip	1	1
ledge	5	3	defeat	1	1
tabby	5	3	herd	1	1
bosom	4	2	saber	1	1
pulse	4	2	volume	1	1
wampum	4	2	coo	0	0
yoke	4	2	arbor	0	0
also	3	2	execute	0	0
beech	3	2	stud	0	0
hawthorn	3	2			

TABLE 4
Data for Correlation of Vocabulary Scores on Three Tests

Child's number	Sex	Age		Vocabulary score		
				Test		
		Years	Months	Smith	Cobb*	Descoeudres
21	F	2	5	1,300	1,620	990
15	M	2	7	180	180	495
6	F	2	7	620	540	990
25	F	3	2	860	450	1,125
26	M	3	2	1,460	900	1,665
30	M	3	4	1,540	630	1,530
31	M	3	4	1,080	540	945
41	F	3	5	1,840	810	1,710
33	M	3	6	1,540	1,260	1,620
32	M	3	7	1,440	720	1,260
152	F	3	8	1,300	900	1,350
49	M	3	9	1,600	810	1,665
44	F	3	9	1,800	720	2,070
72	M	3	9	2,000	1,080	2,236
43	F	3	9	1,880	1,800	2,279
67	M	4	1	2,100	1,440	2,064
90	M	4	2	1,620	720	1,634
59	F	4	4	1,320	630	1,720
77	F	4	6	2,600	1,890	2,520
74	F	4	8	2,260	1,530	2,480
75	F	4	8	2,660	1,980	2,520
78	F	4	8	1,480	720	1,640

* Rearrangement of Terman list.

TABLE 4 (Continued)
Data for Correlation of Vocabulary Scores on Three Tests

Child's number	Sex	Age	Vocabulary score		
			Test		
		Years Months	Smith	Cobb*	Descoeudres
95	M	4—10	2,240	1,620	2,040
115	M	4—10	3,260	3,600	2,880
88	F	4—10	2,500	2,430	2,560
104	F	4—11	2,760	1,980	2,600
107	F	5— 0	2,580	2,070	2,800
103	M	5— 1	1,900	1,890	2,560
105	F	5— 1	1,920	1,170	1,840
111	M	5— 1	2,020	1,440	2,560
112	M	5— 2	2,940	2,700	3,000
108	F	5— 2	3,060	3,060	2,960
118	F	5— 3	3,300	2,880	2,701
119	F	5— 4	2,800	1,980	2,701
120	F	5— 5	2,260	1,710	2,849
126	M	5— 5	3,200	2,250	2,627
121	F	5— 5	3,360	3,870	3,034
128	F	5— 5	2,980	1,710	2,701
122	F	5— 5	2,560	1,980	2,368
127	M	5— 6	2,700	3,800	2,664
123	F	5— 6	2,300	1,890	2,664
129	M	5— 6	2,280	1,530	2,146
124	F	5— 6	2,620	1,260	2,331
147	M	5— 7	3,060	3,060	3,061
131	F	5— 7	1,960	1,080	2,146
157	F	5— 8	2,180	1,440	2,664
136	M	5— 8	3,100	2,700	2,775
132	F	5— 8	2,320	2,250	2,331
138	M	5— 8	2,920	2,520	2,849
153	M	5— 9	2,680	2,610	2,627
142	F	5—10	2,040	1,440	2,331
141	F	5—11	2,840	2,520	3,886
143	F	5—11	3,340	3,760	3,061
146	M	6— 1	2,840	2,430	2,627
147	M	6— 2	2,940	3,060	2,775

* Rearrangement of Terman list.

SAMPLE CONVERSATIONS

These sample conversations were selected to illustrate the growth in use of sentences of one child and the differences found in children of slightly inferior, average, and superior mentality at three different age levels. Samples of the three and one-half year old group include records from the widest extremes used in the study. As some of the most representative conversations were very long, extracts only are included here.

ONE CHILD AT DIFFERENT AGES

Boy 38, I.Q. 82 to 88

A long serious illness beginning at seventeen months seems to have affected this child's development. His growth in vocabulary has been traced from the time of his first word at fourteen months until he was four and one-half years old. He was studied in his own home. He is an older brother of Girl 1, who is showing very rapid development in talking. It was impossible adequately to indicate his pronunciation.

I

Age: Two Years, Eleven Months

One-Hour Conversation: 151 Words

Here sit. I sit here. Mother sweet corn. Oh! Dessert. All right. Here. Dessert. Dora. All right. Oh, forgot. Got some store money. Money. This time. Store nere. There store. Oh, zat? (What's that?) Dessert. All right. Potatoes. Here is it. Here apples. Eat dessert. Here goes now. Here Gene 'ert. Now eat. Here comes. Forgot. Table back. Get table. Go store back. Store nere. Here goes. E ee ee. Joke. Here, Dora. Here dren (thread). In box. Shut it. Catch it. E ee. Catch it now. Now, go jump. E ee ee. Here goes. E ee ee. Sew? Oh, see. Sew. Sake in. (Shake head.) E ee ee. Go ee ee. Dora, ee ee. See choochoo. [Repeated four times.] Some of these. Meat. Mother, sew. What's that? New garter. Gene want garter. [Repeated three times.] Jump—jump down floor. No supper. Garter on. Garter on. See, garter on. No. Mother, nere, meat. Bread, meat. On me. See in nere. Done, see. Nere, nere (in there). Garter, see. Done. Sew garter on. See garter. Here comes mother.

II

This conversation was recorded the day after Christmas while the child and his little sister were playing at home with their new toys.

Age: Three Years, Three Months
One-Hour Conversation: 587 Words
Extract

[Playing with toy gun.] Bang! I shoot. I shoot the curtains. Bang! All dead. I shoot lamp. I shoot this. I open this. I shoot windmill. See. Broke that.

[Playing with train.] I want up. Corner. See right in corner. Watch. Choochoo go in there. Watch choochoo go in there. Choochoo go in windmill. There, all fixed. This. Where. Go? In nere (in there). Watch me. This go. Oh. Where this come? Oh. I got this. [Repeated three times.] See windmill. Oh. Windmill. Hard. I pull that down. [Repeated four times.] There, down. There, this down. [Repeated three times.] This. Oh, dear! See, this wrong. [Playing with train again.] Oh! Oh, dear! Oh, this one. Go back. Come back. See. Oh, see! Ohp! On choochoo track. See windmill. (I) see windmill. Put straight. [Child coughs.] I got bad cough. Got bad cough? [To person sneezing.] I play choochoo train. All right. Bump in choochoo train. See that dirt on choochoo track. Too hard. Over this way. Go dis way. Oh here. There choochoo. Oh, now. Ohp! This one. See it. Choochoo go this way.

Oh, just blow him. Gun, gun, gun. Where gun? In the room. Gun, gun, gun. I want gun. Oh, in room. Over there. All right. Oh, here gun. I shoot. No, no in the steam. I shoot Christmas tree. I shoot the buggy. I shoot chair. Bang! I shoot choochoo track. I shoot track. I shoot that. There, bang! Bang, bang, bang. All through. All light. Mother, what's that? Horn. Gun. Bang. Light. See, light come.

Mother, make windmill. I make windmill. I make windmill. I make windmill way up high. I make it, I make it. Mother, get windmill. Here's another. See there. Look, mother. See me do it.

III

This record was made on July 4, when the boy and his sister were playing outdoors with their fire crackers.

Age: Three Years, Ten Months
One-Hour Conversation: 435 Words
Extract

Make that one go off. Where it is? Here 'nother one. Where's dat big gun? Oh I know. Here it is. Hold it. Here hold it. Yes. Yes, you have to. Now here's a cannow [candle]. Light 'em. [Repeated twice.] What you going do? [Has noticed Examiner writing.] I want paper. I want w'ite. I want w'ite, Mudder. I want w'ite. Go get. I go w'ite on dis. I got. Here I got. I go w'ite some. I go'in w'ite. I want make dolly.

[Repeated twice.] Here's paper. And nose. Where her got arms? I w'ite it. Uhhuh, in here. It's mine. Dere's it. Dis is de top. Go de porch. No, don't touch. [To sister.] Get all dirty. Dere. Go in store. I don't know. Go in store get ice cream. 'By. [Making believe.] Oh see de flies. Bad have 'em in house. See 'em dere in. Fly won't go 'way. [Repeated three times.] Dis is ours. I going to w'ite. Get pencil. Mudder, see dis where I w'ite. No I don't want to. It hooked. [The screen door.] Can't get in. No. Can't get it down. You turn it. No, let me. Let me, Kakeen. [Repeated twice.] Dat's a kiddy-car. Come. I want Kakeen come. G'ass now so wet. No here. A tree. Dere's a tree. Dat's a tree. [He is trying to plant a weed.] Yes, I made it. It's in the mud. How would it went bang? Lit it went bang. I know it. Here's went one right here. We all go get back. Dere I got back. [He found an overlooked cracker.] Oh, I fire it. Can't find me. [Repeated three times.] [Runs and hides.] I goin' hide dis side. Can't find me. [Repeated twice.] Goin' try dis side. Now, can't find me. [Repeated three times.] Bang! You fix dis tree. Won't stay. Don't. I sweep dat all nice. [He had swept the sidewalk.] Come up grass. [Repeated twice.]

IV

This conversation was recorded on New Year's Day, when a small friend was visiting the boy and his sister.

Age: Four Years, Four Months
One-Hour Conversation: 496 Words
New Year's Day at home with his sister and a small friend
Extract

Here's a train too. Look at this train. This train is bigger. Look at this. No, this goes togedder. You wind it. Don't put that on the track. I want it to go alone. That don't go next. This one goes next. Let me put it on. I saw yours head, didn't I? Peek-a-boo, Kathleen. Hippopotamus. Oh ha ha. [Eating candy bell.] Look at mine. See. Isn't that funny? I found pink. I opened it and it was pink, didn't it? Here, I got off. I got off, didn't I? Mine got off. See that? Can't have it. It's mine. What chocolate? I know what bell says. Bell says "ding dong" for people to get out way. Uncle Ed go take a walk; 'cause it's Uncle Ed's turn. Take turns take a walk. All ours got off. They're clean now. Dis one. Dis is pink. You better wipe it, 'cause I wet it, didn't I? [Getting dressed up.] That's Kathleen's dress. That's my suit. It's nice and clean. Oh look the big tower (of blocks)! I make a (mi)'stake, shall I? Smoke's going to come out. Make a 'stake. shall I? I made a 'stake. [Repeated three times.] I want this on de track. My suit clean. Yes look it. . . [Waiting for promised ice cream.] I don't want any ice cream. Where you all going, Mother? I don't want you go 'way, Mother. No, you won't. Look at my spoon. I want to go to the candy jar and get some candy. Which you want? This I want. This candy I want. Jack got a piece. My mother going to get back to party now. No, I didn't talk. Red and yellow. What kind was yours? And what kind was Jack

Kremer's? Where the candy jar is now? Can't see it. [Looking at photos.] Dere a picture of the Christmas tree. Look what I got. See what I got on the Christmas tree. [Repeated twice.] A train. We got all of dose. Those are my pictures. I going to look at the pictures when (until) the ice cream comes. I going to have some ice cream. Look at my daddy's hat. I saw my daddy's hat in dere too. See dat where I was up dere. I saw dose up dere. I saw all. I saw dis up dere where you put flowers in and I saw that.

CHILDREN OF VARYING MENTAL ABILITY AT DIFFERENT AGES

Boy 13, I.Q. 96

This child of two years and one month said not one word on the day observed. He has occasionally been heard at the Preschool Laboratory to say one or two indistinct words. As a rule he says nothing. His mother says he can not talk. He cries easily.

Boy 7, I.Q. 112

This little boy was observed while playing at the home of two little friends. The three are together several times a week. Most of the time he is absorbed in Gene's new train, but he shifts his interest for a brief time to the little girl's doll and doll-buggy. Up until a month previous he had talked very little, but he had made very rapid progress in talking the last month.

Age: Two Years, One Month
One-Hour Conversation: 179 Words

[Playing with train.] Car. Au(tomo)bile. Will go. See car go round. [Repeated twice.] Here car. Here car. There. Train stop. Get off there. I go put it on. Go on. Oh, Choochoo fall off. [Repeated twice.] Wheel. Choochoo go round. Choochoo fall off. No train. Train go round. Train fall off. [Repeated three times.] Train go round. Train stop. All b(r)oke. Oh! Train got on. Three street car. [Repeated twice.] Train round. Cars. [Repeated twice.] Train's got off. Train fall off. Train off. Train fall. That go in there. Gun. Choochoo train. [Repeated twice.] Want more. Catch. All right. Street car. Go. Go round. Choochoo went over. [Repeated twice.] Choochoo car. Train run over Gene. Run over. Street car. Oh, get off. Oh, get off. Car go. [Repeated twice.] That car. Choochoo go. Street car off. [Repeated twice.] Choochoo. I got choochoo train. Choochoo fall out. Gun. Choochoo. [Repeated three times.] Oh, come. All broke. That all broke. She call you. See, I fix. Oh! I take baby riding. Me go night-night. Baby go night-night. Dolly go night-night. Dolly want in buggy. [Repeated twice.] Dolly want ride in buggy. That musn't go in. This go in there. Here it's. Me go out street car. [Repeated twice.] Choochoo. [Repeated four times.]

Girl 1, I.Q. 130

This child is a younger sister of Boy 38. A comparison with his conversations shows how much more rapid her speech development has been than his. Her vocabulary at twenty-four months nearly equaled his at three and one-half years. The sight of the paper and pencil for recording her conversation suggested to her having pictures drawn for her. She was observed in her own home one day when playing with her brother.

Age: Twenty-three Months
One-Hour Conversation: 250 Words

Here's a pentoss (pencil). Make baby. [Repeated three times.] [Request to draw pictures for her.] Write picture. Want paper. I fix it. Right in there. Screen door. I ride kiddy car. Where's my paper, Mother? I ride street car. I write paper. Where's a pentoss? I get pentoss. Brother get pentoss. Here paper. Brother paper. Here's co. [Repeated three times.] Here's them. Where Brother's? Daddy. Brother broke my pentoss. Burn? Button my shoes. Where's ——. Brother broke my pentoss. [Repeated three times.] Here, Grandma. Here my got. Help Mother. I want pentoss. Mother make cookie. No, car' me (carry me.) [Repeated twice.] Back up. [Repeated twice.] [Riding on kiddy car.] Bang! I write pentoss. Ride car. Ride car. Ride kiddy car,—like Brother. No, I catch Brother. Boy do it. Tuck in here. No, here. Where my pentoss? I break pentoss. Back door....

[Interval.]

Baby, stay here sleep. [Lays down doll.] Up here. [Repeated twice.] Here. Hole. [Pointing at a hole in paper.] Make hole! Oh, see pentoss. Gone. [Repeated three times.] Oh, my, see. Mother, make that. Make baby. [Repeated twice.] [Watching drawing.] See baby. House. Make baby. [Repeated four times.] Make a piece. Make baby. [Repeated four times.] Make feet. Oh, here baby! My paper piece. Piece paper. Make baby. I can't make baby.

Girl 4, I.Q. 65

This child is the only one of the groups studied who has been in an institution, the Home of the Friendless, practically all her life. She may be feebleminded. She is a very affectionate child. Her articulation is very poor and she uses many syllables that apparently have no meaning.

Age: Three Years, Four Months
One-Hour Conversation: 49 Words

Don't. Oh, Mama! [Wishes to be taken up.] See. I lo le. De. A. Ticktock. [Wants a watch.] I wan' ticktock. [Repeated twice.] I wan' det up. Oh! No (Don't want). No, see. [Repeated twice.] Tak ata. (Handkerchief?) [She wanted it.] See dere. Look. Aw du du. Look,

ticktock. De de di. I wan'. [Repeated six times.] I wan' mama. I wan'. I wan' mama. Dere. [Repeated three times.] I wan'. S bi dat. More. I wan' mo'. I bi dir. I wan' mo'. I wan'.

["I wan" expresses desire, not used separately. "I bi dir" apparently means "I am a big girl"—expresses self satisfaction. "Mama" means any person or any show of affection.]

Girl 45, I.Q. 103

This little girl and an older brother both attended the Preschool Laboratory. Considering her mental age, she made a high score on the vocabulary test a few months later. She was younger than most of those in her group at the Preschool Laboratory.

Age: Three Years, Three Months
Preschool Laboratory
One-Hour Conversation: 162 Words
Extract

[Looking at toy dog.] He has a funny dog, doesn't he? Santa Claus came to my house, too. He brought me a big dolly. Shall I come over and let you see it? Pig. [Goes to slide.] See, I go slide down. Miss Sunier say this tie like this. Miss Sunier, push me down. Funny tail, doesn't he? [A rag kitty.] I swing it. See. See him again. [On slide.] I can do this. I be coal car. [Self correction.] I'll be a coal car. Wait, John, I make a choochoo with you. You won't get—. I do that. Do it again. Now, we go. Let's not do that. I heavy for him. I go fast. Push me. Oh, push me. Oh, that fun. Push me, too,—fast. Oh, push me down, too. I did go. Now, push me on. Miss Sunier, push me. I'm going fast. He don't let me fall there. Yes, this one. Who bag is this? Can't put clothes on.

Boy 50, I.Q. 156

This is a child from the Preschool Laboratory. He has one of the highest intelligence quotients of the children studied. He fits in well with the group, but he did not at this age often take the lead in planning activities. He had a complex against being measured, hence his anxious question, "You aren't going to take me in this morning?"

Age: Three Years, Five Months
Preschool Laboratory
One-Hour Conversation: 684 Words
Extract

Goodbye, Mother. I got my book this morning. Put on slide. [Goes to sand.] Choo-choo train. Too-too! [To another child.] I saw your mother go by. Make hole. Train can go by. My daddy didn't bring me. My mama brought me. Uh-huh! No, my mama wouldn't let me. My home teddy. I

lost my school teddy. I lost it. Too-too! Let go my too-too train. Too-too! Too-too-too! Too-oo-oo! Too-oo-oo! Don't. [To another child.] He mussing my track all up. [To Miss H.] Huh? No, he mussing my track all up. Tell him not to break my track all up. Yes, I fixed it. No, that's a kitty—not a bear . . . . .

Look, my water. Big. Look at my big hole, has water. See, I got some gas'ine in here. That's my book. [Said as someone picked it up to show it to another child.] I don't care if she look at it. [Without leaving sand he listens to comments on pictures in his book, and objects to these remarks.] It ain't got Humpty-Dumpty in it. He's mussing my track. It don't have that. It don't have a spider. That what we have at home, too. That's my bottle. Found it down in there. Oh. It don't have that in it. Some day, I'm going to bring a bottle. Aw, give it to me. [To child.] Thank you. It ain't got any more holes in it. See, he can walk. He didn't have leaves in it. We saw some at Sunday School. That's a wagon and horses, a wagon. Funny man. Oh, that's a funny one, too. Oh, that big house. [One he had made in sand.] He want to touch it. I don't know. There a stone in that. No, there was a stone in my bottle one time ago. There was a stone in that cup. [He is now filling a bottle with sand.] [Sees Miss W., who gives anthropometric measurements and asks her:] You aren't going to take me in this morning? You didn't take me in that night. Look, what I found. [Holds up a shell.] These what you find in the Iowa River. I live down on Summit street. Up on Summit street. They're throwing stones right on the floor. [Referring to acts of other children.] It (bottle for sand) won't get any more. Have to push it right in and shake. Now, it's all full. Pour it. Look, I'm pouring my sand out. Stone in. Pour mine. See. My book didn't have birds in. Look, I'm making a big house. That's an Indian house. No, this is high enough. Choochoo train.

Girl 106, I.Q. 65

This child is of Bohemian parentage. She has been a fairly regular attendant at the day nursery since babyhood. She is more of a follower than a leader. She lisps badly. Tests at a year later gave a marked rise in intelligence quotient to 81 and a 100 per cent increase in vocabulary.

Age: Five Years
One-Hour Conversation: 364 Words
Extract

[Children are asking for picture books.] I want one. [Repeated.] I want a book. Esther, Esther, got one for me? Esther, come on and push me [in swing]. [Repeated.] Esther, Esther, Esther, come on and push. [Back to books.] Read mine. That's yoursh, ain't it? Whose? Teeter. Teeter. Look here. Teeter-totter. Teeter-totter. Shleds. In bed. In her bed. You are baby. Nurse, I got book. Eddie Shmif. Buddy, he hit me. You ain't going to see all fretty (pretty) part. No. Dat ain't no tree. Dere ain't no

tree. Dat one. You can read it. Your mama here. [To child whose mother enters.] I won't play with you. They're gone. Shee. Kitty cat shays miao, don't they? Oh I dot desh (these). I dot. [Choosing pictures.] No dat's mine. I dot dish (this). I dot one. I don't want it. Esther take dish.

[Goes to hall to fold up quilts they had used during naps.] Esther had dish (this). I never had it. Buddy had dish. No. (L)'ook dere. Esther. [Goes back to book.]

I shaw Shanta-Claush down shtairs lasht night. Shanta-Claush brought me a doll.

I dot a bid brudder. I want sit here. I'm free (three). My brudder had a birfday party at home. I'm going to have a tree. My mama, her dot a bid tree. Esther wait. I button it.

Boy 113, I.Q. 105

This boy is another child from the day nursery group. He is an active noisy youngster and quite aggressive. He stutters quite a little when excited.

Age: Five Years
One-Hour Conversation: 512 Words
Extract

Now let's fall in the river. Now jump down. We ain't to let you up. We need that. You think you're strong, don't you? Now we pull. Buddy pull her hand off. [They are trying to get a toy away from another child.] Help me, Jeanetta. Help, Esther. Goody, I'm glad they help us. Buddy, wait a minute till I get up here. Hold the chair so she won't get it. Here, here, now we're up. Glad we got it. [Repeated twice.] Esther, take that. Hey! Geneva, Geneva, take that out the way. [Climbing on the radiator.] Now. We're going to stay up all night. We're going to stay all the time, ain't we? Stay with nurse, ain't we? Buddy, will you keep this up here and I'll stay down there? Toot. Toot. Toot. Now I go down. Sh—sh—shall I go down? I-I-I got something to give you after a while. [Repeated twice.] Something good. No, to keep. Huh? Come on, take the chair off. It looks like. That—that was my brother's prize. Say, I didn't either lost it. Well I didn't. I didn't either. You didn't either. I didn't either lose it at all. I didn't lose it at all. Oh no, I don't want to look at 'em now. I bet they're pretty. Come on, Buddy. [Repeated twice.] I'll get up. Push. Push. No. I want the chair. [Repeated.] Something else I got. You ain't got it. Buddy will you take me? Take it. I'll drop it down. All right, come on. Jee jee jee juk juk juk. [Last collection of syllables repeated twelve times.] Give *me* a boost. Shine. [Repeated six times.] I'd like to know you didn't. [Repeated six times.] I'd like to know you sit down. [Repeated twice.] Lift you up.

Yeh if I see your head, I'll chop it off. [Repeated twice.] How can you walk on your nose? How can you walk on your bell? Oh, I can't walk. Oh there's a streetcar on the track. See! I see a ice wagon. You didn't either, Esther. I gave that to Buddy to keep. Yeh. Where's the stool? We need

the stool. Buddy, shall we do that again? Buddy, you watch me. Geneva's going to get the water. I'm higher than everybody. I'm higher, I'm higher than the ceiling. We're standing on the ceiling. I'm out again, Buddy. Hey! get up here sister. [Repeated twice.] I don't. Everybody's barefooted 'cept me and Buddy. Me and Buddy ain't barefooted. Iron shoes and iron stockings. And eyes and mouth and tongue and teeth and nose. Um h'm. Let me get down. No, I don't want to. Come on. Here's two bears. Yeh, mean ones too. Oh, she pushed me. Dere's my gun. Bang!

Boy 112, I.Q. 130

This boy was observed while at the Preschool Laboratory. He showed marked maturity for his years and at times failed to be interested in the occupations planned for the other children because he considered them too babyish. He was much disappointed when he first started to preschool because he was not taught to read. He and two other boys near the same age but of less mental maturity were constant companions. As a rule Boy 112 assumed the leadership. At the time of this conversation they were playing in the sand.

Age: Five Years

One-Hour Conversation: 369 Words

Extract

Why you're making it right in the road. Well, here's the road, and cars can't run in the ditch. Say, he's making it right in our road. Let's make a fence here. What? Got the new sand? Now let me have this one, you have mine. You play with this one and I play with this. Shall it be an accident? Now, John, you take the yellow one. Say, John, there is some sand. Oh, fell in. Well, John, I'll have to get this bottle out of there. We're going to make a real tunnel out of these, aren't we? Watch out, don't break it, Jack. We're getting out here now. Yes, let's. They don't have big things like that—. I know what this one is. This is mine sitting in here. Well, that's just as good, John. You can't see it. You can't see the running board. Let's fix this road up now. We'll fix this road up before—. Let's make a road down into yours, huh? Yes. See, let's make a ditch along the road. Have a big hole, see. Yes that—Oh. What is this? Oh. Here, don't come over here. Fence. Have a fence down here. Hey, get your hand out the way. Yes sir, so cars can't get on the paving. They do too have fences so cars can't go on the paving.