

PART ONE

AN ANALYTICAL STUDY OF LANGUAGE
ACHIEVEMENT IN PRESCHOOL
CHILDREN

by

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The data reported in this study were collected for the purpose of making certain preliminary analyses which seemed essential for the organization of a scale of language development for preschool children. In particular there seemed to be a need for a more accurate determination of those aspects of language development showing sufficient independence to require special attention in the construction of a scale. This objective necessitated making a rather broad and inclusive analysis of the language achievement of a single group of children. The results from such an analysis are presented here.

The primary emphasis in this study is on expressive usage. This may be defined as that degree of skill which a child has acquired in the actual use of conventionalized language in communication. In this report certain problems of method, the interrelationships of various aspects of this complex ability, and the degree to which these are related to maturity and brightness are considered.

A preliminary observational analysis of language in its expressive setting suggested the following aspects as being worthy of study:

1. The ability to make the necessary speech sounds
2. Correctness in word usage
3. Development of the sentence or expression unit
4. Vocabulary

TEST TECHNIQUES

The techniques which seemed capable of eliciting the points desired in the analysis were as follows: a specially designed test of the ability to produce the common speech sounds of the English language, a phonetic transcript of the children's spontaneous speech, and tests of vocabulary.

The test for speech sounds was a modification of that reported in the study of speech sounds by Wellman, Case, Mengert, and Bradbury (5). Photographic copies of pictures were used to elicit the desired words as spontaneously as possible. These were checked, when need arose, by having the child repeat the word after the examiner. Ninety-eight sounds and consonant blends were tested.

The consonant blends to be included in the test were chosen on the basis of frequency of appearance in the 2,500 most frequently used words in the Thorndike list (3), and the International Kindergarten Union (2) list of 2,500 words. The score on this test was the total number of sounds correctly given.

The phonetic transcription was made in the play and group situation, records being taken of the conversation as it occurred and was clearly heard by the observer. The necessary sampling from each child usually extended, therefore, over several days.

The sampling unit was what seems preferable to be called an expression unit rather than a sentence. This might be as brief and incomplete as a single word, or might extend over several highly connected clauses given together as a more or less integrated unit.

Units in which the child has something to express to some one else were selected for the records to be used in this study. Forty such units were sampled from each child. It is believed that this method gave a fairly representative sample of the child's expressive control over language in a type of situation where the conventional ellipsis common in replies to questions would be at a minimum.

The need for an index of correctness of word usage was emphatically brought forward in the preliminary observations. Very often, especially with younger children, a large proportion of words is seriously mutilated from the point of view of conventional speech, in a manner which cannot necessarily be referred from ordinary speech sound substitutions. The score for this unit was the number of words conventionally given per fifty running words. The total score was therefore 50. The judgment regarding correctness of usage was made as far as possible in terms of the meaning of the total expression unit.

From the many measures of expressive control possible from the phonetic transcript, the following were chosen for treatment in this report: (1) correctness and completeness of word usage, (2) mean length of the expression unit, (3) sentence completeness in terms of the subject-predicate-object relationship, and (4) complexity of organization of the unit in terms of the grammatical classification of simple, compound, and complex.

In calculating the mean number of words per unit, the practice of the International Kindergarten Union committee was favored in deciding what should be called a word. Combinations such as "I'h" were treated as one word. On the other hand, words run

together phonetically such as "willye" were not so counted. Adhering to the definition of expression unit given above, two statements given in immediate succession without pause and intimately related were treated as a single compound sentence. The score was the mean number of words per unit of expression.

In the analysis for completeness, the subject-verb-object relationship was the full requirement, conventional ellipsis like "I think I will" being scored as complete. The classifications of unintelligible, incomplete, and complete were weighted arbitrarily as 0, 1, and 2 for the total score.

In the analysis of complexity of the sentence the implied, if conventional, form was accepted. For example, "I know I'm going" would be scored as complex. In view of the many contradictory factors influencing any statistical weighting, arbitrary weights of 0, 1, 2, 3, and 4 were given to unintelligible, simple, complex, and compound-complex units for the total score.

For the measurement of vocabulary, the Van Alstyne (4) and a modification of the Smith (6) test were used. In this modification two comparable lists of forty-two words each, sampled at random from the Smith test, were given. The test was given in two ways, an A series in which pictures and materials were used in the attempt to elicit the desired word spontaneously, and a B series in which the examiner used the word and required the child to react appropriately by action or verbal response. The B examination was given at the end of the A series on only those words failed by the child on the first trial. The two lists were given on successive days. Other modifications in the test included photographic reproductions of the stimuli as vivid and detailed as possible, as well as certain changes in the presentation of the statements.¹ In both vocabulary tests the score was the total number correct.

RELIABILITY OF TECHNIQUES

The method of phonetic transcript being a relatively new technique for this purpose, a brief critique of it might be of value. In the first place, particular care should be taken to record only those units which are clearly and completely heard, the eye being used to aid the ear. Since there is undoubtedly a tendency in the transcript to conventionalize the sounds actually made by the children, the method is probably chiefly valid when it is used as a measure

¹ This test is more fully described in the third study in this monograph.

of deviation from the conventional form rather than as a true analysis of the sounds as produced, and it has been so used in this study. Nevertheless, this tendency, in a trained observer, is very much less than when ordinary longhand or shorthand methods are used.

A quantitative validation of the method was made in terms of the per cent of agreement between observers trained in phonetics. Six hundred ninety-one speech sounds in a running sample were recorded with 88 per cent agreement between two such observers including both omissions and disagreements. When certain fine distinctions in reporting, such as the difference between a pure a and the diphthong ai, or between o and ov, were eliminated, this percentage rose to 95.

It was also possible to compare the record made at one hearing in the actual situation with a leisurely study of a high quality dictaphone recording made by the Betts technique (1). The objective check-up showed that the phonetic transcript may at times be noticeably in error on very long units. For this reason the age of five probably represents the upper limit of valid applicability of the method. The per cent of agreement between the phonetic transcript and the objective record for 687 speech sound units common to both was 92. Betts has shown that a large per cent of the total language at the grade school level is lost in the phonetic transcript, but this conclusion does not apply to the relatively short units recorded by the method used here. The International phonetic alphabet was used. Naturally, its successful use is conditioned by the delicacy of hearing and the training of the recorder.

The scoring of the various test items in the language units has been admittedly subjective and arbitrary at many points, but this is more or less inevitable in this type of material. The individual differences as a whole were so gross as to outweigh by a considerable margin the arbitrariness of these decisions. The per cent of agreement between two scores for various test analyses is shown in the tabulation below:

Test	Number of Items	Per Cent Agreement
Word usage	150	88
Sentence length	120	100
Sentence completeness	120	73
Sentence complexity	120	83

These language tests involved a fairly generous time allotment for each child. The vocabulary units occupied thirty minutes of individual testing time, the speech sounds unit ten. Approximately two hours per child were necessary to obtain the forty units in the phonetic transcription.

RESULTS

The results to be reported here were obtained from a total group of seventy children distributed as follows in chronological age and mental age:

Age, Months	Children	
	Chrono- logical Age	Mental Age
30 to 42	13	6
43 to 54	23	13
55 to 66	18	18
67 to 78	16	16
79 to 90	0	13
90 and over	0	4

All of these children were not measured on all tests. A special group of thirty-eight three- and four-year-old children completely tested on all items was therefore selected and the data on these were treated in the same way as the data on the whole group. Test reliabilities were calculated on this special group.

The reliability of the various test items was predicted from chance halves of the test. For the total number of speech sounds given correctly, the reliability was .91; for word usage it was .94. The other reliabilities were: sentence length .86, sentence completion .89, and sentence complexity .87. The reliability of the total revised Smith test predicted from both forms was .84 for this group. It is substantially higher over the whole age range to which it is applicable. The reliability of the Van Alstyne has been reported as .87 over a six months age range at the three-year level.

Though the range of effectiveness of the various test scores varied considerably in the group, there were no zero scores and few perfect scores on the tests used.

Test Intercorrelations

The most essential data for the present analysis are the intercorrelations between the variables considered. These are presented in Table 1 for two groupings: (1) all of the children available for

Table 1
Intercorrelations of Variables

Group	Number	Mental Age	Number	Speech Sounds	Number	Word Usage	Number	Length of Unit	Number	Completeness of Unit	Number	Complexity of Unit	Number	Van Alstyne Vocabulary Test	Number	Smith-Williams Vocabulary Test
	Chronological Age															
Total	70	.88 ± .02	38	.31 ± .09	70	.60 ± .05	70	.68 ± .04	70	.31 ± .07	70	.56 ± .06	48	.57 ± .07	58	.62 ± .05
Restricted	38	.56 ± .08	38	.31 ± .09	38	.43 ± .09	38	.54 ± .08	38	.41 ± .09	38	.45 ± .09	38	.36 ± .09	38	.16 ± .11
Mental Age																
Total	38	.12 ± .11	70	.59 ± .05	70	.69 ± .04	70	.33 ± .07	70	.59 ± .05	48	.66 ± .05	58	.75 ± .04	38	.47 ± .09
Restricted	38	.12 ± .11	38	.49 ± .08	38	.78 ± .04	38	.55 ± .08	38	.59 ± .07	38	.52 ± .08	38	.52 ± .08	38	.47 ± .09
Speech Sounds																
Total	38	.64 ± .06	38	.60 ± .07	38	.61 ± .07	38	.61 ± .07	38	.62 ± .05	38	.62 ± .05	38	.16 ± .11	38	.01 ± .10
Restricted	38	.64 ± .06	38	.60 ± .07	38	.61 ± .07	38	.61 ± .07	38	.62 ± .05	38	.62 ± .05	38	.16 ± .11	38	.01 ± .10
Word Usage																
Total	70	.66 ± .05	70	.72 ± .04	70	.62 ± .05	48	.61 ± .06	58	.55 ± .07	38	.36 ± .09	38	.27 ± .10	38	.27 ± .10
Restricted	38	.62 ± .07	38	.80 ± .04	38	.57 ± .07	38	.36 ± .09	38	.27 ± .10	38	.27 ± .10	38	.27 ± .10	38	.27 ± .10

Length of Unit

Total	70	.42 ± .07	70	.79 ± .03	48	.55 ± .07	58	.51 ± .07
Restricted	38	.65 ± .06	38	.80 ± .04	38	.56 ± .08	38	.37 ± .09

Completeness of Unit

Total	70	.52 ± .06	48	.36 ± .08	58	.34 ± .08
Restricted	38	.74 ± .05	38	.41 ± .09	38	.21 ± .10

Complexity of Unit

Total	48	.50 ± .07	58	.50 ± .07
Restricted	38	.56 ± .08	38	.41 ± .09

Van Alstyne Vocabulary Test

Total	58	.67 ± .05
Restricted	38	.59 ± .07

a given correlation and (2) a selected group of thirty-eight three- and four-year-old children on whom a complete set of data was available. Aside from fluctuations which seem to be chance in character, the intercorrelations show the following general tendencies:

1. Consistent with expectation, there is a decrement in correlation with chronological age, but not mental age, in the selected group, due to selection in the former variable.
2. No consistent trend is shown in the correlation of the various tests with chronological age.
3. There is a tendency for the correlation with mental age to rise progressively from speech sounds and usage through unit organization to vocabulary.
4. The various aspects of organization show only moderate intercorrelations.

A further control of results was introduced through the use of the partial correlation technique. Second order partial correlations between the language items, with chronological age and mental age held constant, are given in Table 2.

In terms of this analysis, command over speech sounds and the various aspects of language organization tend to cohere fairly well but not highly, the second order partial correlations ranging from .28 to .71. Vocabulary, especially the revision of the Smith test, tends to show the greatest independence, the second order partial correlations with the other aspects of language studied tending to be below .35, with three exceptions. It would appear, then, that with the exception of vocabulary, or for special reasons, these aspects of language development may be welded into a single unit scale of language achievement.

SUMMARY

A group of logically distinct language abilities of preschool children was studied analytically for the purpose of ascertaining the degree of independence they displayed. The ability to enunciate speech sounds was determined by a specially devised test in which the habitual pronunciation of the sounds was the measure. The accuracy and completeness of word pronunciation, the length, grammatical completeness, and grammatical complexity of the expression units of the children were scored from phonetic transcripts of their spontaneous conversation. In these transcripts, replies to questions and other conventional ellipses were not used. The method of

phonetic transcript was found to be reliable by checking with the report of another trained recorder and with a high fidelity electrical recording.

Heterogeneity in chronological age and mental age of the children was controlled by the selection of a special group of narrow chronological age and by the partial correlation technique. It was found that there was a moderate correlation between all these abilities, except vocabulary, which showed a rather high degree of independence.

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