

DETERMINING AND NUMERATING ADJECTIVES IN CHILDREN'S SPEECH¹

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The difficulty in scientifically attacking the basic aspects of the linguistic behavior of the child has forced investigators to concern themselves largely with extrinsic determinants and concomitants of speech development, such as intelligence, sex, home environment, and sibling status; and with the more obvious and readily measurable intrinsic characteristics of speech, such as vocabulary growth and sentence length. The analysis of basic grammatical processes must, however, be made before such higher-order phenomena as sentence length can be adequately understood. Although a number of studies have been published on sentence structure, sentence length, and degree of grammatical complexity, the present analysis is one of the first to investigate the development of a specific set of grammatical phenomena - namely, the use of determining and numerating adjectives with substantives. It attempts 1) to ascertain whether there are significant trends in the frequency of such words, and in which directions these trends lie; and 2) to describe grammatical development in terms of these trends.

The rules for the use of determiners and numeratives are stated by Bloomfield (1, pp. 202-6). The following outline will help to clarify these rules as well as Bloomfield's classification of adjectives:

BLOOMFIELD'S CLASSIFICATION OF ADJECTIVES

- ADJECTIVE EXPRESSION: Class meaning: "character of specimens of a species of objects."
- A. Descriptive adjectives: Class meaning: "qualitative character of specimens;" e.g., blue, soft, tall.
 - B. Limiting adjectives: Class meaning: something like "variable character of specimens."
 1. Determiners: Class meaning: "identificational character of specimens." (The class is defined by the fact that certain types of nouns are always accompanied by determiners).
 - a. Definite: Class meaning: "identified specimens." Consists of: Possessive adjectives; this, these, that, those, the.
 - b. Indefinite: Class meaning: "unidentified specimens." Consists of: a (an), any, each, either, every, neither, no, one, some, what, whatever, which, whichever, many a, such a, what a.
 2. Numeratives: Class meaning: "quantified specimens." Consists of: all, both, few, same, very, one, much, more, less, and others.

NOUNS AND THEIR DETERMINERS

- I. NAMES (PROPER NOUNS): These take no determiner, are always in the definite category (in the sense defined above), and do not have a plural.
- II. COMMON NOUNS: Class meaning: "species of object occurring in more than one specimen."
 - A. Bounded Nouns. Class meaning: "species of object occurring in more than one specimen, such that the specimens cannot be subdivided or merged."

	Singular	Plural
Definite:	(determiner)...	determiner required
Indefinite:	(not required)...	" not "

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- B. Unbounded Nouns. Class meaning: "species of object occurring in more than one specimen, such that the specimens can be subdivided or merged;" e.g., paper, heat, ice, water, sand, etc.
1. Mass nouns. Always definite; no plural. Class meaning: as in B with the proviso that the specimens "exist independently."
 2. Abstract nouns. Class meaning: as in B but the specimens "exist only as the demeanor (quality, action, relation) of other objects."

Singular and Plural

Indefinite: no determiner: "all specimens."

Definite)
Indefinite) determiner: "separate specimens."

Note: Some words which belong properly to one category sometimes may fall in another category, by a phenomenon known as "class cleavage". E.g., we say, "milk is healthful," but also, "the milks obtainable in the city;" in the second case the (ordinarily unbounded) noun milk has become a bounded noun.

This investigation notes all occurrences, in a sampling of children's speech, of determining and numerating adjectives, as well as words of these categories which by class cleavage are used as pronouns. The study of these words provides one of the easiest approaches to minute details of syntax because they occur frequently and constitute a relatively large part of the total number of words,

PROCEDURE

The protocols studied each contained 50 responses of children 2.5, 3.5, and 4.5 years old (the ages were accurate within a month), enrolled in the nursery school and experimental kindergarten of the University of Minnesota Institute of Child Welfare. The "free" and "controlled" situations and the method of recording the responses are described by Goodenough (4), and need not be explained here. The number of children, their mean I.Q., and the mean number of words per child are indicated in Table 1, together with the rank order correlation between the number of words in the "free" and the "controlled" situations.

In this study, the free and controlled situations were in general not distinguished, since the data from both situations were pooled on the assumption that in this way differences between the situations would be largely eliminated. Thus, a block of 100 responses per subject was obtained - i.e., 50 responses from each situation. Rank order correlation coefficients between total words in F and C situations range from +.04 to +.65. Section G in Results presents data on the factor of situation.

Mimeographed record sheets were prepared for tabulating the data, and the frequencies of the occurrence of each determiner and numerative were obtained, together with the type of noun with which each was associated. Tabulation was also made of the occurrence of determiners and numeratives which by class cleavage are also used as pronouns. In counting the words, the following rules were developed:

1. Proper nouns used as possessives were counted as possessive adjectives, e.g., in Bill's hands; or as possessive pronouns, e.g., in Are they Bill's? The syntactical constructions involved justify this procedure,
2. Possessive pronouns corresponding to possessive adjectives were counted among the pronouns even when the form is different. E.g., his (adj.) is the same as his (pron.), but my (adj.) is different from mine (pron.).

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3. Words combined with -thing and with -one or -body were counted among the adjectives, since their construction is similar to the construction of true adjectives -one was counted among the indefinite pronouns.
4. Determiners used in isolation were not counted. E.g., What's the... was found among the responses.
5. All was not counted when used as an adverb, as in "all done."

RESULTS

A. Total words (Table 1). The mean number of words spoken by each child rose with negative acceleration from 2.5 to 4.5 years of age. There were significant differences from each age to the next, but no significant sex differences, according to Fisher's t-test.² Nevertheless, the girls maintained a lead in mean words per child at 3.5 and 4.5 years. Since the "controlled situation" in this study is the same as the situation used by McCarthy (7) and Day (3), the mean length of response (obtained by dividing the mean number of words per subject by 50) in the controlled situation is comparable to the corresponding measure used by these authors. The mean lengths of response in the controlled situation for children of ages 2.5, 3.5, and 4.5 years are respectively 2.35, 3.59, and 4.33 words. Judged by this measure, the children studied here stand between McCarthy's singletons and Day's twins in linguistic maturity.

B. Total words Tabulated (Table 2; Fig. 1a). The "number of total words tabulated" is to be understood as including (1) determiners, (2) numeratives, and (3) corresponding pronouns by class cleavage. Significant age trends in the mean total words tabulated were found from each age to the next, but no sex differences were significant. Again, the girls were slightly ahead at 3.5 and 4.5, although apparently behind at 2.5 years. The proportion of the total linguistic sample comprised by the words counted in this study seemed to remain constant at about 15 per cent. A proportion of this kind increasing with age would tend to show increasing complexity of grammatical structure, but the expectations were not fulfilled by these data. The increase in total words tabulated from 2.5 to

TABLE 1
MEAN NUMBER OF WORDS IN THE PROTOCOLS, IN BOTH
THE FREE AND THE CONTROLLED SITUATIONS

Age	Sex	N	Mean I.Q.* (Verbal)	Mean Words per Child			S.D.**	Rho between F and C
				F	C	Total		
2.5	M	8	113.0	95.0	123.1	218.1	55.19	+.30
	F	9	115.8	103.9	112.1	216.0	54.89	.65
	All	17	114.3	99.7	117.3	217.0	53.29	.40
3.5	M	15	113.7	149.6	180.5	330.1	72.38	.65
	F	17	116.3	167.1	178.8	345.9	61.36	.08
	All	32	115.1	158.9	179.6	338.5	65.13	.35
4.5	M	14	111.6	182.1	211.4	393.5	72.01	.04
	F	24	114.8	197.6	219.1	416.8	89.87	.27
	All	38	113.5	191.9	216.3	408.2	83.82	.16

*I.Q.'s based on Minnesota Pre-School Scales, Verbal Score.

**All standard deviations are calculated from R. A. Fisher's formula using (N-1) in the denominator.

²The probability level of .05 (i.e., 5 chances out of 100 that t would occur by chance alone) is used as the point distinguishing significant from non-significant differences between means.

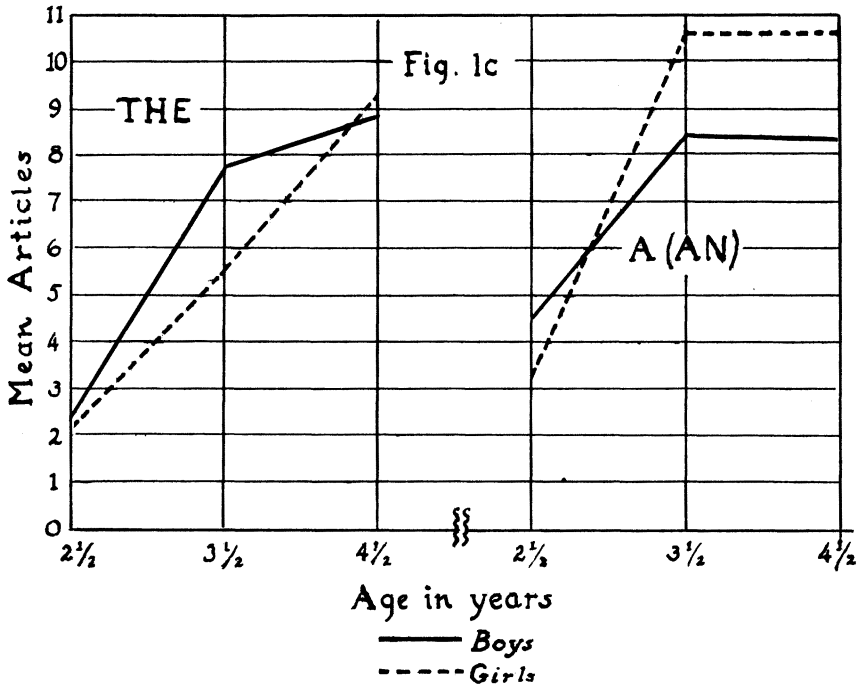
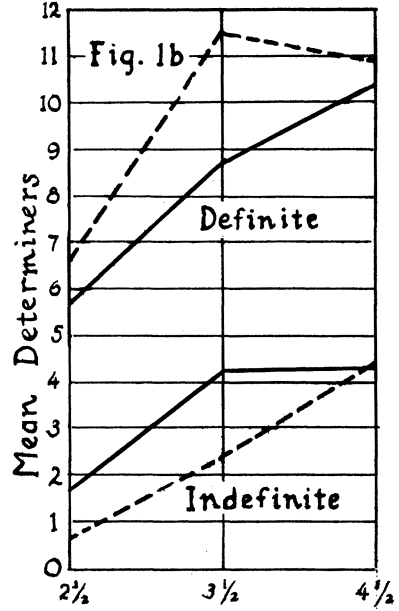
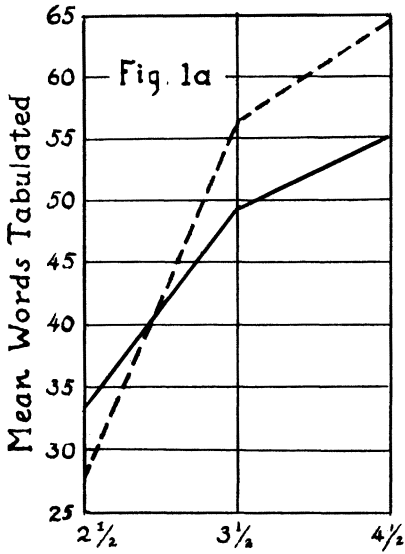


Fig. 1a. Mean number of words tabulated: age trends.

Fig. 1b. Mean number of definite and indefinite determiners (excluding articles): age trends.

Fig. 1c. Mean number of articles THE and A (AN): age trends.

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TABLE 2

TOTAL NUMBER OF WORDS TABULATED: NUMERATING AND DETERMINING ADJECTIVES PLUS OCCURRENCES OF THE CORRESPONDING PRONOUNS

Age	Sex	ADJECTIVES AND PRONOUNS				Per cent of all words
		Mean determiners	Mean numeratives	Mean wds. tabulated	S.D.	
2.5	M	33.1	.37	33.50	17.34	15.35
	F	27.2	.33	27.33	14.71	12.75
	All	30.0	.35	30.35	15.81	14.00
3.5	M	46.6	2.53	49.13	11.44	14.88
	F	53.6	2.94	56.54	12.78	16.35
	All	50.4	2.75	53.15	12.46	15.67
4.5	M	53.1	2.35	55.43	17.92	14.09
	F	61.0	3.66	64.71	18.71	15.53
	All	58.1	3.18	61.29	18.73	15.02

TABLE 3

NUMBER OF PLACES FILLED ON THE TABULATING SHEET; RANK ORDER CORRELATIONS BETWEEN MEASURES

Age	Sex	Places filled		Rank order correlations (Rho)		
		Mean	S.D.	Total words and words tabulated	Places filled and total words	Places filled and words tabulated
2.5	M	7.75	2.25	.86	.83	.86
	F	8.00	2.55	.70	.55	.87
	All	7.88	2.34	.77	.70	.89
3.5	M	12.00	3.20	.71	.52	.71
	F	12.80	2.60	.53	.32	.45
	All	12.37	2.88	.67	.52	.63
4.5	M	15.36	3.14	.59	.72	.50
	F	15.71	3.73	.71	.77	.89
	All	15.58	3.49	.65	.71	.76

3.5 years was largely due to an increase in determiners and corresponding pronouns, but also due to the appearance of more numeratives, which were very sporadic at 2.5, but occurred in greater numbers at 3.5 and 4.5 years.

C. Number of places filled on the tabulating sheets (Table 3). This classification refers to what might be termed the "grammatical vocabulary" of the children with respect to the types of words studied here. Since different spaces were provided on the tabulating sheet for noting occurrences of adjectives with mass nouns and with common nouns, a child would be given extra credit by this measure if he used determiners or numeratives with mass nouns as well as with common nouns. The age trends shown in the means were highly significant, since the relative variability of this measure was considerably less than that of other measures used in this study. Table 3 also presents rank order correlations between (1) total words, (2) words tabulated, and (3) places filled. The correlation between (2) and (3) tended to be slightly higher than that between (1) and (3), as would be expected, but most correlations indicate the comparable validity of the measures used. Grammatical development thus takes place pari passu in all aspects measured here.

D. Definite and indefinite adjective (determiners), excluding the articles (Table 4; Fig. 1b). In the means, age differences were only significant from 2.5 to 3.5 years. Consideration of the data from all ages shows that the girls

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TABLE 4

DEFINITE AND INDEFINITE ADJECTIVES EXCLUDING THE ARTICLES

Age	Sex	DEFINITE			INDEFINITE			TOTAL
		Mean	S.D.	Per cent of total	Mean	S.D.	Per cent of total	Mean
2.5	M	5.67	4.03	76.3	1.75	2.43	23.7	7.42
	F	6.55	5.17	91.0	.66	.87	9.0	7.21
	All	6.13	4.55	83.9	1.17	1.81	16.1	7.30
3.5	M	8.80	5.77	67.7	4.20	3.03	32.3	13.00
	F	11.48	5.51	83.0	2.35	1.62	17.0	13.83
	All	10.20	5.70	76.0	3.22	2.52	24.0	13.42
4.5	M	10.43	6.11	70.9	4.28	1.98	29.1	14.71
	F	10.96	5.95	71.5	4.37	2.77	28.5	15.33
	All	10.76	5.93	71.3	3.34	2.48	28.7	15.10

were ahead with respect to definite adjectives, and behind with respect to indefinite adjectives, in spite of the convergence of the curves at 4.5 years. Proportions of definite and indefinite adjectives showed an age trend in the direction of relatively fewer definite adjectives and more indefinite adjectives; in this respect the girls were behind, because of their more frequent use of definite adjectives. But regardless of proportions, it is also true that at all ages the girls used more definite determiners, especially possessive adjectives.

It may be suggested here as a possible interpretation of these data that although girls are ahead of the boys in the use of easier elements of language, once they have been learned, the boys tend to be ahead, at least in the earlier years, in the use of the more complex elements of language - i.e., although they have learned the easier elements they do not use them so much to the exclusion of the more difficult elements as do the girls.

E. Use of "the" and "a (an)" (Table 5, Figs. 1c and 2b). All age trends were significant except from 3.5 to 4.5 years in the case of "a"; there were no significant sex differences, though girls tended to be ahead of the age trend in the case of "a" and behind in the case of "the". The fact that the growth curve for "a" levels off while the curve for "the" continues its rapid acceleration is reflected in the steady trends shown by the relative proportions of "the" and "a", where "the" constitutes 36.9 per cent of all articles at 2.5 years and 48.3 per cent at 4.5 years. A high proportion of "a" is probably an immature characteristic, since word-counts of adult English speech find "the" more frequent than "a". M. E. Smith (9) finds "a" more frequent than "the" in children's speech; in her frequency list "a" holds rank 7, "the" holds rank 10. It would appear, then, that the age trends found in this study are correct.

Although it was found (Section D) that definite adjectives are more common, here the indefinite "a" is more frequent than the definite "the". This fact indicates that we must be cautious in reasoning strictly in terms of categories when analyzing the processes operating in grammatical development. On the other hand, the interpretation of the data presented here is partly dependent upon the possibly large errors in recording "the", since the sound (t) is relatively difficult for children to articulate, and for recorders to distinguish.

F. All determiners (Table 6). Table 6 combines the figures of Tables 4 and 5, with the result that the approximately opposite trends of the latter tables are canceled out. Sex differences are largely eliminated, and age trends are only significant from 2.5 to 3.5 years. The proportion of definite to indefinite determiners remains approximately constant from 2.5 to 4.5 years. The constancy of this proportion may indicate that there is a tendency, inherent in

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TABLE 5

THE ARTICLES, THE AND A (AN)

Age	Sex	THE			A (AN)			TOTAL
		Mean	S.D.	Per cent of total	Mean	S.D.	Per cent of total	Mean
2.5	M	2.37	4.37	34.6	4.50	6.09	65.4	6.87
	F	2.11	3.92	39.6	3.22	4.60	60.4	5.33
	All	2.24	4.01	36.9	3.82	5.22	63.1	6.06
3.5	M	7.73	5.69	47.0	8.40	6.49	52.1	16.13
	F	5.53	4.72	34.3	10.60	5.74	65.7	16.13
	All	6.56	5.23	40.7	9.56	6.10	59.3	16.13
4.5	M	8.86	6.05	51.5	8.36	4.67	48.5	17.22
	F	9.29	7.66	46.7	10.60	5.57	53.3	19.89
	All	9.13	7.03	48.3	9.76	5.32	51.7	18.89

TABLE 6

ALL DETERMINERS (ADJECTIVES ONLY)
(Tables 4 and 5 Combined)

Age	Sex	Per cent total			Per cent total			Per cent of		
		Mean	S.D.	Determ.	Mean	S.D.	Determ.	Mean	S.D.	Total Words
2.5	M	8.00	5.29	56.1	6.25	7.92	43.9	14.25	11.59	6.53
	F	8.67	6.58	69.0	3.89	4.75	31.0	12.56	10.29	5.81
	All	8.35	5.83	62.6	5.00	6.34	37.4	13.36	10.61	6.18
3.5	M	16.53	10.08	56.7	12.60	5.88	43.3	29.13	12.71	8.83
	F	17.00	8.34	56.8	12.95	5.42	43.2	29.94	10.08	8.66
	All	16.78	9.05	56.7	12.78	5.54	43.3	29.56	10.84	8.73
4.5	M	19.28	8.99	60.4	12.94	4.85	39.6	31.93	10.52	8.12
	F	20.25	10.43	57.5	14.96	7.16	42.5	35.21	14.96	8.44
	All	19.89	9.82	58.5	14.10	6.44	41.5	34.00	13.43	8.32

either the language or the individual, or both, to maintain equilibrium between the definite and indefinite categories and within the category of determiners, regardless of the relative frequencies of various sub-categories. The last column of Table 6 shows an age trend in the percentage of the total words comprised by determiners. After 3.5 years the percentage remains constant at about 8.5 per cent, though there are possibly further trends at greater ages.

G. Adjective vs. pronoun usage of determiners with class cleavage (Table 7; Fig. 2a). All determiners except "the" and "a" may be used as pronouns by class cleavage, except that some of the possessive adjectives are changed in form in pronoun use. Pronouns do not involve the use of an accompanying noun and therefore may be assumed to represent a simpler linguistic phenomenon than adjectives. The child learns to say "What's this?" and "What's that?" before he learns to use the constituent words in other contexts. Therefore, the increasing use of adjective determiners relative to the use of the same words as pronouns should be an index to linguistic maturity. A "pronoun-adjective index" is found by dividing the number of pronouns by the number of adjectives, either in a particular sample or in the total group.

Age trends were not found to be as definite as expected, but the indices were in general lower for ages 3.5 and 4.5. Most clear-cut was the trend in the case of the indefinite determiners, where the pronoun-adjective index dropped from 5.30 at 2.5 to 2.05 at 4.5 years. Relatively to the age trend, the girls were significantly behind the boys in this case. This sex difference can be

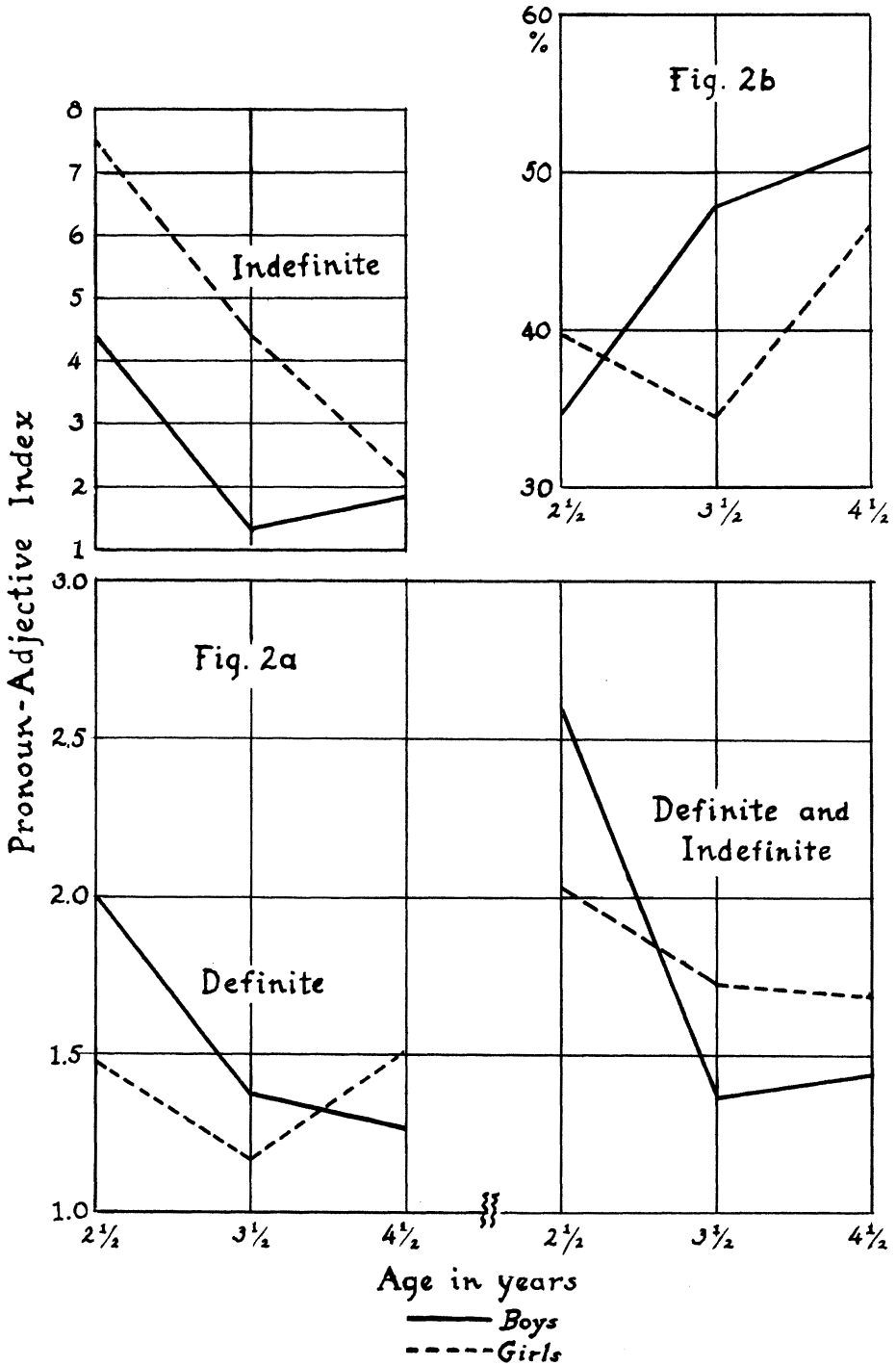


Fig. 2a. Pronoun-adjective index: age trends.

Fig. 2b. Percent THE of THE and A (AN): age trends.

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TABLE 7

ADJECTIVE PRONOUN INDICES FOR DETERMINERS WITH CLASS CLEAVAGE

Age Sex	2.5			3.5			4.5		
	M	F	All	M	F	All	M	F	All
Definite	2.00	1.47	1.70	1.37	1.16	1.25	1.26	1.50	1.41
Indefinite	4.36	7.50	5.30	1.33	4.40	2.52	1.88	2.15	2.05
All	2.68	2.03	2.28	1.36	1.72	1.55	1.44	1.68	1.60

TABLE 8

THE ARTICLES, THE AND A(AN), IN THE "FREE SITUATION" ALONE, WITH PROPORTIONS OF THE ARTICLES IN BOTH THE "FREE" AND THE "CONTROLLED" SITUATIONS *

Age	Sex	THE		A (AN)		Per cent "Free" of All Words
		Mean	Per cent of All the's	Mean	Per cent of All a's	
2.5	All	.41	18.4	.47	12.3	45.9
3.5	All	2.96	45.3	2.03	21.2	46.9
4.5	M	3.14	35.5	3.50	41.8	46.2
	F	3.54	38.1	3.33	31.5	47.4
	All	3.39	37.2	3.39	34.8	46.9

*The last column gives for the purpose of comparison the percentage of the words in both situations comprised by all words in the free situation.

interpreted according to the hypothesis suggested in section D. Although the girls had progressed farther in their mastery of the (common and easy) definite determiners (adjectives), they still favored the use of the corresponding pronouns in the case of the indefinite determiners,

H. Effect of situation on the frequency of "the" and "a". Table 8 presents the mean frequency of "the" and "a" in the free situation responses, with the percentage of all articles which these articles constitute. At ages 3.5 and 4.5, the percentages for "the" and "a" are approximately alike, though smaller than the proportion of total words which the words in the "free situation" responses constitute. (See Table 1). Thus "the" and "a" are relatively more frequent in the controlled situation, but with respect to the differential frequency of "the" and "a" the free situation resembles closely the controlled situation. However, at 2.5 years the scarcity of articles in the free situation responses suggests that the learning of the more complex grammatical techniques occurs in "controlled" situations, i.e., situations involving older persons and a variety of play objects and other stimuli. The relationships found in the case of "the" and "a" probably hold for other linguistic measures used in this study, but they have not been worked out.

I. Use of descriptive adjective phrases (Table 9). The psychological factors involved in the use of determiners and numeratives may be assumed to be more complicated when a descriptive adjective is interposed between the limiting adjective and the noun. For example, "a big boy" represents a higher degree of linguistic integration than "a boy", which in turn is higher than simply "boy". The use of descriptive adjective phrases (i.e., all combinations of descriptive adjectives and substantives, with or without determiners) was noted, and the quantitative findings are presented in Table 9. Since descriptive adjective phrases must follow the rules concerning the determiners required with substantives, certain combinations are incorrect - namely, where a singular noun is modified by a descriptive adjective without a determiner. For example, "good boy" alone is incorrect. A mass noun, however, can stand without a determiner; e.g., "fresh milk". These details, taken together, account for the lack of

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TABLE 9

MEAN NUMBER OF DESCRIPTIVE ADJECTIVE PHRASES

Age	Sex	With Determ.		Without Determ.		Total
		Sing.	Plu.	Sing.	Plu.	Sing. and Plu.
2.5	M	1.25	.00	1.75	.38	3.38
	F	.78	.00	1.00	.22	2.00
	All	1.00	.00	1.35	.29	2.65
3.5	M	3.47	.07	.53	.13	4.20
	F	4.00	.12	.41	.29	4.88
	All	3.75	.09	.50	.22	4.56
4.5	M	3.50	.36	.72	.14	4.71
	F	5.21	.08	1.37	.37	7.04
	All	4.58	.18	1.13	.29	6.18

obvious trend in Table 9 under "Without determiners, Singular". The most outstanding trend is in the case of descriptive adjective phrases involving a singular noun and a determiner. The much faster development of the girls in this respect should be pointed out. Other types of phrases are so infrequent that no generalizations can be made.

INTERPRETATIONS OF GRAMMATICAL DEVELOPMENT

Introduction. The mere observation of children's speech cannot solve all the problems of grammatical development. Some of these problems might possibly be attacked experimentally, especially if they were formulated in terms of hypotheses such as those offered here. Accordingly, tentative interpretations of trends in grammatical development will be set forth in these pages in the hope that they will be suggestive for future experimentation.

In view of the circumstances surrounding the obtaining of the protocols used here, certain assumptions³ concerning their interpretation are necessary, as follows: 1) that the responses give an adequate picture of the situations in which they occurred; 2) that the intonations and other linguistic phenomena not directly recorded can be read into the responses; 3) that the recorders have accurately recorded what the children actually "meant to say"; 4) that processes occurring at very early stages are reflected in trends revealed in the growth curves from 2.5 to 4.5 years.

Principles of syntactical development. Various behavioristic writers (e.g., Allport, Social Psychology; Weiss, Theoretical Basis of Human Behavior; etc.) have worked out stimulus-response schemas to explain an infant's learning to make a simple linguistic response, such as the word "doll" at the sight of a doll. The period of babbling responses merges into a period of combined selection and imitation (discrimination and reinforcement). It may occur that the child makes a response sounding like "doll" when a doll happens to be in the environment, whereupon the child is rewarded by an older individual with (e.g.) a pat on the back. After a number of such occurrences the response has been conditioned to the actual doll as a substitute stimulus. On other occasions, the child makes a response sounding like "doll" when a doll is not present. Older persons, inferring that the child wishes his doll, bring the doll to him and eventually condition the child to say "doll" when he wishes the doll. In this situation the doll serves as the reward. B. F. Skinner (8) has thought it useful to distinguish between the two situations, calling the word as learned in the former situation a "tact" and the word as learned in the latter situation a "mand".

³It is not claimed, however, that these assumptions necessarily have any basis in fact.

But the older person will not always say simply "doll", but often "a doll", or "the doll", or "that's the doll". In his unconscious attempts to approximate what he hears, especially after he has learned the meaning of the word "doll", the child will begin to say "a doll" or "the doll" after the older person. This will usually occur in the tact situation (i.e., when the response is made in the presence of the doll but is not necessarily reinforced with the doll but with some other reward), since older people are more likely to reinforce the response in this situation. In the mand situation (i.e., when the doll is not necessarily present but is given as a reward), the mother is usually inclined to infer that the child has already learned "doll", since he seems to be asking for it. Most word-learning in early stages occurs in tact situations until, at least, the naming stage appears.

Thus far the child has learned only simple phrases like "a doll" or "the doll". Guillaume (5, 6) has suggested that these simple, conventionalized, often-used phrases are patterns from which elements of free combination are "differentiated". An element is differentiated in meaning when it is no longer a predicate of a total situation but a counterpart of a specific entity which recurs in various situations; it is differentiated grammatically when it has a functional individuality independent of any phrases in which the element may occur. The concept of differentiation proposes to explain the detaching of the "a" from "a doll", and its use in "a telephone" before the child has ever heard that phrase. It involves the hearing of a great number of phrases like "a doll", "a man", etc., before "a" can be used in a completely new context. This process may be classed as a special type of concept formation, in that such words as "doll", "man", etc., are recognized as forming a class of words which can be connected with "a". Semantic and grammatical differentiation seem to occur simultaneously; i.e., functional differentiation involves a gradual learning of the meaning of the unit which is being differentiated. In the case of "a", the meaning would develop for the child as "one specimen", since "a" is usually associated with the single occurrence of an object. However, several cases of the incorrect use of "a" have been found: "a bunnies" (3.5 Girl); "a new shoes".

By the same token, "doll" becomes differentiated in the sense that a certain number of words are recognized as permissible before it; e.g., in "this doll", "the doll", "any doll". Through the mutual differentiation of each word in any elementary phrase pattern, grammatical pattern as such assumes psychological reality. The process of analogy, as it is often termed by linguistic scientists, can only be understood in terms of mutual differentiation, and not in terms of mere substitution. For example, substitution would lead to the following absurdity:

The man: the water: a man: x

where x would be a water, a linguistic impossibility in English unless class cleavage is considered.

Until "doll" has been heard and learned in another pattern (e.g., "that's the doll"), it cannot be generally used in patterns similar to "that's the doll". Each new conventionalized pattern provides opportunity for new sets of differentiations.

Incorrect differentiation occurs when the process of differentiation as such leads in a direction which does not conform to the structure of the language being learned.

Indication and limiting adjectives. Indication, according to Collinson (2), is "the use of a word or gesture whose function it is to direct attention either towards or away from a given item or items," or "to point to (or away from) some item... or to mark some item already presented...." Most of the limiting adjectives treated in this study are "indicators", words which serve the function of indication. It is possible to set up a complete and logically coherent system

of indication, but as the English language does not do this the child must learn the various types of indication separately, each in its proper context. Many types of indication can be expressed in single-word sentences. Since indicators do not specifically refer to the object in question - for example, "that" is not equivalent to "doll", though used in reference to the doll - the child learns a word like "that" as a characteristic of a situation. "That" would normally be accompanied by a pointing gesture on the part of the mother; while imitating the pointing the child would say something like "dat!" Later a phrase like "what's that?" would be learned when the mother is trying to get a naming-response from the child. The child would learn that this phrase would be rewarded with a name; the stimulus-response scheme is in the form of a "mand". The so-called naming stage is really a period during which the child is continually asking to be rewarded with name-words.

Types of phrase-wholes. There are numerous phrases which are probably learned as wholes by the child. Although we cannot determine the origin of a phrase-whole without making observations of the first occurrences of each new word or grammatical pattern, it is allowable to hypothesize the form of certain larger wholes. Where this is done, the hypothetical original phrase is starred, after the practice of the comparative philologists.

1. Nursery rhymes are an important source of learned phrase-words. For example, "Mary had a little lamb"; "Jingle bells...all the way"; "Catch a nigger by the toe"; and many others. The presence of nursery rhymes in the speech samples used here was a complicating factor since many phrase-wholes were included which the children would probably not use in spontaneous conversation. An interesting investigation could be set up on the hypothesis that learning of rote material is an important factor in speech development.

2. Phrases with articles; e.g., a doll; the doll. The learning of the distinction between a and the is discussed below. Support for the theory that article-noun phrases are learned as wholes is lent by the consideration that if the article and the noun were each learned as separate units, the child might juxtapose them and produce (e.g.) a water. Since he seldom commits errors of this type, the article-noun phrases in his speech are probably reproductions or variants of heard phrases.

3. Phrases with articles and descriptive adjectives. The phrase "and a big little one" (3.5 Girl) may be explained on the basis that little had not been differentiated from the phrase-whole little one.

4. That, learned as a single word. Later, what's that? What that? is often found. The same remarks apply to this. - That's the way; that way. Later found in "that's the way you pump." (3.5 Girl). - That one; this one are learned as selective responses, also as the responses to the question Which? - That's a... That's was incorrectly differentiated by a child who said "That's that's that's." (3.5 Girl).

5. What? - also learned as a single word. At this point, what, this, and that can be differentiated out of their respective original phrase wholes. - For what is associated with Why? Incorrect differentiation was shown by a child (3.5 Boy) who said "Why are you writing for?"

6. More; s'more would probably be learned as mands. Some more was still undifferentiated in the response "Don't push me some more" (3.5 Boy). The child had used some more correctly in a previous response. - Any in any more would be differentiated with respect to negatives: "I can't play any more games" (3.5 Boy).

7. Wait a minute; a little while; after a while are certainly phrase-wholes because they are idiomatic constructions which cannot easily be meaningfully analyzed.

8. A whole bunch of ...; a whole lot; a whole bundle of... These also are idiomatic. One child (3.5 Boy) said "a whole bundle of doggies", possibly from a whole bundle of (e.g.) sticks.

9. Miscellaneous: Somepin'; something; something else (3.5 Boy). - One of those; one of them, etc. - Another one. - Mine; it's mine; that's mine;

yours; it's yours; etc. - every day; everyone. - All through; all the time;
all the water (3.5 Boy). - All kinds of...; what kind of...

Many other phrase-wholes involving "indicators" might be cited, but the list as given probably represents the main types. It would be interesting to study a child's vocabulary in terms of the phrase-wholes contained in it. Phrase-wholes may be of very diverse types. Even such a mistake as the response "What the kitty says?" may be perhaps interpreted as the incorrect differentiation of a long phrase-whole such as "Hear what the kitty says!"

As Guillaume notes, children are often observed to experiment with phrase patterns. Several more or less consecutive responses of a 3.5 year old girl are reproduced here:

- Response 31, 32: "I want that piano thing again.
 33: I want that other piano thing again.
 34: ... the other noise.
 40: ... that other thing.
 41: ... that other mousie thing."

Interpretation of pronoun-adjective ratio. Table 9, as has been noted before, shows a steady trend in the direction of more frequent adjective use of words like "this", "that", etc. In the case of definite determiners, the trend was not as marked as in the case of indefinite determiners, but inspection of the tabulations shows that if the possessive adjectives were dropped from the definite category, more comparable trends would appear. The more frequent occurrence of pronouns probably indicates that the child learns simple phrase-words like "that!" "this!" before he learns more complex ones like "this one"; "this ball"; etc. Though it may be thought that pronoun use is more frequent because adjective use requires the knowledge of the noun (e.g., in "this telephone"), this may not necessarily be true since the child can always say "this thing" or "this one" if he has not learned the name of the object in question. The true explanation should probably be in terms of the phrase-whole learned first. A factor working in the opposite direction, however, is that as in adult speech the pronoun usage serves as a convenient abbreviation. For example, one child (2.5 Girl) said first, "Open dis", and when her request was not respected, she insisted, "Open dis door".

The Articles. Table 5 shows a much greater frequency of "a" in the earlier years, with a trend toward relatively greater use of "the". A tentative explanation for this phenomenon is that the mother, in teaching her child the names of objects, is more likely to use the indefinite article (e.g., "a ball", "that's a ball"), because she is more interested in the generic term "ball" than in "ball" as the name for this particular ball. When the child learns to ask "What's that?" he will get replies such as "That's a doll", "That's a horse". Only in practical situations is it necessary to use the definite article, where both child and teacher have a particular ball in mind. They may say, "Where's the ball?" "Here's the ball", etc. As the child grows older it is increasingly necessary for him to conceptually manipulate identified specimens, and as a result, more "the's" are found in his speech. While "a" shows little increase from 3.5 to 4.5 years, the curve for "the" continues its rapid (though negative) acceleration.

Mass nouns. The use of determiners with mass nouns is learned according to the phrase-whole principle. The child hears "the snow" but seldom "a snow"; hence he rarely makes the error of saying "a" with "snow" or other mass nouns. The class meaning of mass nouns also prevents his saying "a snow".

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SUMMARY AND CONCLUSIONS

1. The mean number of words spoken by each child in 100 responses rises significantly with negative acceleration from 2.5 to 4.5 years; though there are no significant sex differences, the girls are in general slightly ahead of the age trend.

2. More determiners, numeratives, and corresponding pronouns are found at successive ages from 2.5 to 4.5 years, but the proportion of these words to the total number of words remains fairly constant. There are no significant sex differences. Numeratives, very infrequent at 2.5, are very rapid in their development.

3. There are significant increases in the number of places filled on the tabulating sheet. The number of places filled has a fairly high positive correlation ($\rho = +.32$ to $.83$) with the number of words in 100 responses, and a slightly higher correlation ($\rho = +.45$ to $.89$) with the number of words tabulated (i.e., determiners, numeratives, and corresponding pronouns).

4. Both definite and indefinite determiners, not including articles, increase in number from 2.5 to 4.5 years. Proportions of definite and indefinite adjectives show an age trend in the direction of relatively fewer definite adjectives and more indefinite adjectives.

5. The growth curve for the frequency of "a" levels off from 3.5 to 4.5 years, but the curve for "the" shows a rapid rise from 2.5 to 4.5 years. The proportions of "the" to "a" show an age trend in the direction of an increase in the proportion of "the", reaching 48.3 per cent of the total at 4.5 years.

6. When all determiners are pooled, the proportions of definite to indefinite determiners remains fairly constant. There is a slight age trend in the percentage of the total words comprised by determiners, the percentage rising from 6.7 at 2.5 to 8.8 at 3.5 years.

7. The pronoun usage of determiners used as pronouns by class cleavage decreases markedly with age, especially in the indefinite category. Relatively to the age trend, the girls were behind the boys at all ages.

8. The frequency of descriptive adjective phrases increases markedly with age; the girls are behind the age trend at 2.5 but their responses increase in frequency more rapidly than the boys' thereafter.

9. In the case of "the" and "a", there are relatively more articles used in the "controlled" situation, but situation does not markedly affect the relative frequency of "the" and "a" to each other.

10. An attempt is made to outline the processes involved in the learning of the determiners, numeratives and other "indicators" studied here, using the principle of differentiation from phrase-wholes.

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