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ABSTRACT

This study focuses on the semantic development of individual lexical items, as viewed from a semantic features perspective. It involves four narrow semantic domains, a sample of elementary school-children and their teachers, and two native language groups, English and Spanish. Semantic development is studied through the process of equivalence formation, the ability to group discriminably different things and to treat them as alike in some way. The results show significant developmental differences across age levels, with few differences between language groups. The salient features of the meanings of noun items are primarily Perceptible (size, shape, color, etc.) for younger subjects, but become increasingly and predominantly Nominal (a label used to name the group of words, e.g., food) among older subjects. The primary features of verb items remain predominantly Perceptible at all age levels. The results of this investigation differ significantly from two similar equivalence formation studies conducted among different populations. The meaning of a word and its subsequent development appear to be tied to an indivual's perception of the phenomenon represented by the lexical item and to his level of cognitive development. The results of this and other studies imply a broadening of the traditional concept of vocabulary development. (Author)

Semantic Development of Selected Lexical Items as Studied Through the Process of Equivalence Formation

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This study focuses on the semantic development of individual lexical items, as viewed from a semantic features perspective. It involves four narrow semantic domains, a sample of elementary schoolchildren and their teachers, and two native language groups, English and Spanish. Semantic development is studied through the process of equivalence formation, the ability to group discriminably different things and to treat them as alike in some way.

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The meaning of a word and its subsequent development appear to be tied to an individual's perception of the phenomenon represented by the lexical item and to his level of cognitive development. The results of this and other studies imply a broadening of the traditional concept of vocabulary development.

Studies of language acquisition in recent years have provided much invaluable information about various stages of language development and about the acquisition process itself. One aspect of language development, however, has received little attention from a research perspective. That aspect is semantic development. While semantics is the most pervasive aspect of language, it is also the least understood. It is this lack of semantic understanding, particularly in terms of an adult language model, which has made research in this area difficult. Yet, the importance of understanding semantic growth and semantic differences among language users is evident. One must presume that the same differences which cause phonological and syntactic differences among language users also cause differences in the semantic structuring of these same language users. These semantic differnces, then, must be considered and studied as part of the communication process.

The present study is designed to investigate growth in the salient features of meanings of individual lexical items in four narrow semantic domains across age levels within the elementary school years and within two language groups, English and Spanish. Semantic development is studied through the process of equivalence formation, which is the ability to group discriminably different things and to treat them as "the same" or "alike" in some way. In addition, the developmental trends of elementary schoolchildren are compared with adult models in each language.

As already noted, the prime reason for a dearth of knowledge

about semantic development is the lack of a complete, well-articulated theory of semantics which can account for all aspects of natural language. One area of agreement, however, among various current semantic theories (Hjelmslev and Uldall, 1957; Lamb, 1964; Lyons, 1968) is that the meanings of lexical items are composed of a collection of basic elements of meaning, often called semantic features or markers (Katz and Fodor, 1963). For example, the word "bachelor" may have, among other semantic features, the set (human), (male), and (unmarried). In addition, these features account for the restricted number of possible ways in which lexical items may be combined in grammatical relationships (Fillmore, 1968; Chafe, 1970; Schlesinger, 1971). For example, the verb "breathed" can have only an animate subject.

The semantic features theory has proved to be a useful and accurate model upon which to base research and to interpret its findings (McNeill, 1970; Dale, 1972). Research studies in semantic development seem to indicate that children acquire the various semantic features of lexical items gradually over a long period of time, perhaps in an unmarked to marked progression (H. Clark, 1970; Anglin, 1970; E. Clark, 1971, 1972), although there is some contradictory evidence (Amidon and Carey, 1972).

Theoreticians and researchers agree that semantic development is closely, indeed inextricably, associated with cognitive growth in language learners (Piaget, 1954; Sinclair, 1969; Bierswich, 1970; Bloom, 1970, 1972; Schlesinger, 1971; Slobin, 1971, 1973). The semantic-cognitive relationship, however, is not completely understood and a current focus of controversy involves the primacy of linguistic

(Whorf, 1956; Chomsky, 1957, 1965) as opposed to cognitive (Piaget, 1954; Furth, 1966) factors during the early stages of language acquisition. Factors involving semantic and cognitive development may include, among others, language, culture, environment, and schooling (Bruner and Olver, 1963; Olver and Hornsby, 1966; Maccoby and Modiano, 1966; Greenfield, 1966; Reich, 1966).

METHOD

Subjects

The sample consisted of one hundred subjects, fifty from each of two different first language groups, English and Spanish. The fifty subjects of each first language group were comprised of ten subjects at each of five different grade levels investigated in the study: kindergarten, grade 2, grade 4, grade 6, and an adult group composed of elementary classroom teachers. All school-age subjects were randomly chosen from a pool of eligible subjects in one McAllen, Texas, elementary school. McAllen was chosen as a site for the study because of its location on the Mexican border in an area where both languages flourish and are used for the same purposes. Care was taken to choose a school with a homogeneous socioeconomic population, in this case lower middle class, in order to control the socioeconomic variable between and within the two language groups (Entwisle, 1970).

Procedure

All subjects were interviewed individually in their first language by a native speaker of that language. An equivalence formation task ("How are these two words most alike/most different in

meaning?") was used to tap the subjects' semantic structuring. In order to perform this task successfully, subjects must isolate separate, salient features of their personal meanings of the lexical items in order to match or contrast them with separate features of other lexical items. For example, "ball" and "apple" are alike because both are round or because both can be thrown. Lexical items from four semantic domains were presented to the subjects orally in all possible pairwise comparisons within each domain. The number of lexical items and the number of domains were determined by the memory and the attention span of the youngest subjects. All responses were taped for later transcription and coding.

Lexical Items

The semantic domains and the lexical items within each were kinship (mother, father, sister, brother), food (chicken, tomato, apple, milk), speech (talk, sing, yell), and movement (walk, run, jump). Comparable Spanish lexical items were used for the Spanish-speakers.* The kinship and food items were nouns and the speech and movement items were verbs. Items were chosen on the basis of their inclusion within a narrow range of meaning , but also on the basis of some clear meaning differences among them. All items were predetermined to be easily recognizable by the youngest subjects.

Coding of Responses

The features of meaning used by the subjects in the equivalence

* kinship (madre, padre, hermana, hermano), food (pollo, tomate, manzana, leche), speech (hablar, cantar, gritar), and movement (andar, correr, brinçar).

formation task were classified according to the general type of feature used.

1. Perceptible: use of immediate phenomenal qualities such as color, size, and shape.
2. Functional: use or purposes of the items, considering either what they can do or what can be done to them.
3. Nominal; use of an accepted term in the language for that kind of thing referred to.
4. Fiat: statement that the terms are alike or different without further explanation.
5. Failure: inability to tell how the items are alike or different.

Statistical Analyses Applied

A chi square analysis of the significance of proportional differences in the total responses in the various attribute categories was made (1) between all age levels within each language group for noun and verb responses and (2) between corresponding age levels of both language groups for noun and verb responses. In each analysis, the level of significance was set at .05.

RESULTS

Analysis of General Attributes

Table 1 presents the number of responses to noun and verb stimulus items within both language groups for the three major response categories of Perceptible, Functional, and Nominal attributes. (Fiat and Failure responses, which are not types of features used by subjects in the equivalence formation task but rather measures of the

Table 1

Total Responses in the Perceptible, Functional, and Nominal Attribute Categories for Noun and Verb Items

	K		2		4		6		Adult	
	N	V	N	V	N	V	N	V	N	V
English Perceptible	130	58	84	66	81	95	83	103	33	102
Spanish Perceptible	93	53	95	49	76	89	40	103	55	110
English Functional	11	8	55	22	65	32	61	16	37	20
Spanish Functional	38	3	60	14	77	6	77	6	56	28
English Nominal	36	1	93	0	105	2	122	0	209	24
Spanish Nominal	63	0	78	1	94	2	147	0	192	15
English Total	177	67	232	88	251	129	266	119	279	146
Spanish Total	194	56	233	64	247	97	264	109	303	153

inability of subjects to perform the task successfully, decrease to negligible levels by grade 4.) Response frequencies are converted into percentages for each language group and are graphically depicted in Figure 1.

The results of the chi square analyses of responses in these three attribute categories for noun and verb items, between all age levels, and within each language group are reported in Table 2. Severe limitations were placed on the comparisons for the verb items, both English and Spanish, because of many low frequency counts in the totals. According to Cochran's (1954) guidelines, the chi square statistic can be validly applied provided that no fewer than 20 percent of the cells have expected frequencies less than five and that no cell contains an expected frequency less than one.

The chi square analyses between corresponding age levels (1) within each language group between noun and verb responses and (2) within form class responses between language groups are contained in Table 3.

Figure 1 indicates highly similar developmental trends for both language groups and dissimilar response patterns for the noun items and the verb items. Kindergarten and grade 2 subjects responded to both nouns and verbs with predominantly Perceptible attributes. However, at the grade 2 level in the English language group and at the grade 4 level in the Spanish language group, subjects' responses to noun items became increasingly and predominantly Nominal in nature. The use of Perceptible attributes decreased as subjects grew older, becoming the most infrequently used type of response by adults in both

Figure 1

Percentages of Total Responses in the Perceptible, Functional, and Nominal Attribute Categories for Noun and Verb Items by Language Group

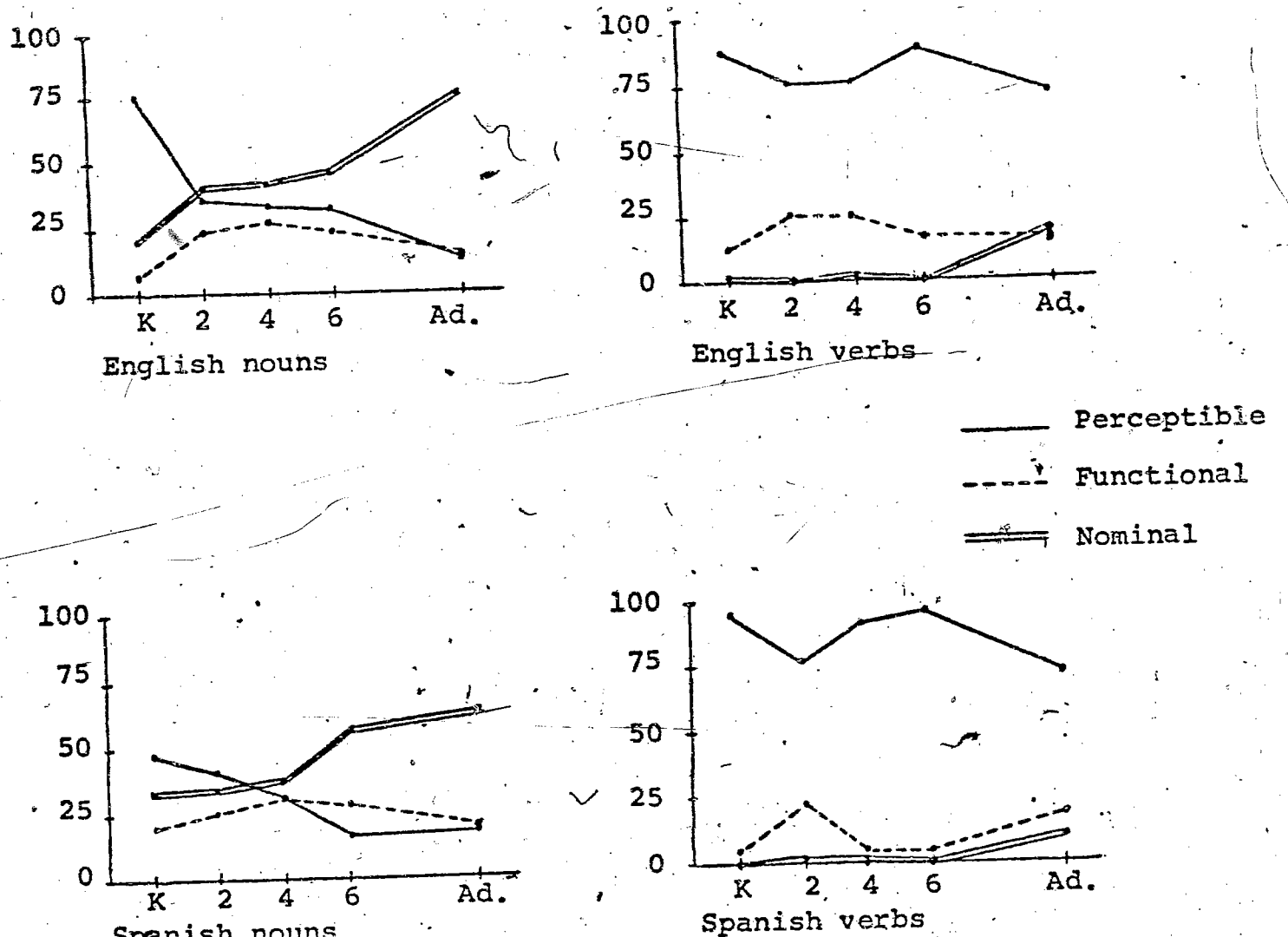


Table 2

Chi Square Analyses of All Possible Grade Level Comparisons for Noun Items and Verb Items for Both Language Groups

English Nouns

df=2	K	2	4	6	Adult
2	X^2= 58.061**	-	-	-	-
4	X^2= 72.898**	X^2= .869	-	-	-
6	X^2= 77.136**	X^2= 1.916	X^2= .990	-	-
Adult	X^2=180.165**	X^2= 66.549**	X^2= 61.034**	X^2= 50.015**	-

** p < .01

Spanish Nouns

df=2	K	2	4	6	Adult
2	X^2= 3.019	-	-	-	-
4	X^2= 14.903**	X^2= 5.305	-	-	-
6	X^2= 58.617**	X^2= 43.914**	X^2= 22.287**	-	-
Adult	X^2= 57.314**	X^2= 50.660**	X^2= 34.923**	X^2 9.018*	-

* p < .05

** p < .01

Table 2 (continued)

English Verbs

df=2	K	2	4	6	Adult
2	N/A	-	-	-	-
4	N/A	N/A	-	-	-
6	N/A	N/A	N/A	-	-
Adult	X^2= 10.554**	X^2=18.575**	X^2=20.661**	X^2=21.926**	

**p < .01

Spanish Verbs

df=2	K	2	4	6	Adult
2	N/A	-	-	-	-
4	N/A	N/A	-	-	-
6	N/A	N/A	N/A	-	-
Adult	X^2 12.841**	X^2= 4.589	X^2=14.580**	X^2=22.717**	-

**p < .01

N/A Frequencies too small for computation

Table 3

Chi Square Analyses for Noun Items and Verb Items Between Corresponding Grade Levels of Both Language Groups

English Nouns and English Verbs

df=2	K	2	4	6	Adult
	X^2= 14.516**	X^2= 55.803**	X^2= 80.633**	X^2=110.419**	X^2=161.411**

Spanish Nouns and Spanish Verbs

df=2	K	2	4	6	Adult
	X^2= 39.783**	X^2= 32.793**	X^2=104.362**	X^2=206.789**	X^2=145.406**

English Nouns and Spanish Nouns

df=2	K	2	4	6	Adult
	X^2= 27.659**	X^2= 2.207	X^2= 1.749	X^2= 19.204**	X^2= 9.128

English Verbs and Spanish Verbs

df=2	K	2	4	6	Adult
	N/A	N/A	N/A	N/A	X^2= 1.974

N/A Frequencies too small for computation

** $p < .01$

language groups. Subjects' responses to verb items, on the other hand, remained predominantly Perceptible at all age levels, while the use of Nominal attributes, which were so frequently used to respond to noun items, was negligible and at times even nonexistent, except at the adult levels of both language groups.

The major developmental patterns of responding to noun items are similar for both language groups, but appear to occur at different times. The kindergarten to grade 2 period marks a sharp and statistically significant change in patterns of responding to nouns in the English language-group. This sharp change is not present in the Spanish language group during that period, but may possibly have occured in a pre-kindergarten period. Another time of major change for the English language group is the grade 6 to adult period. That same major change pattern seems to occur earlier for the Spanish language group, in the grade 4 to grade 6 period. The periods of non-significant growth occur during the grade 2 to grade 4 and the grade 4 to grade 6 period for the English language group; and somewhat earlier, during the kindergarten to grade 2 and the grade 2 to grade 4 periods, for the Spanish language group, indicating a slowing of semantic development during those age levels.

For verb items, the greatest period of change in patterns of responding for both language groups appears to occur between the grade 6 and adult levels where there is an increase in the use of Nominal attributes and a corresponding decrease in the use of Perceptible attributes. Perceptible attributes, however, remain by far the most frequently used. The statistical significance of these differences

could not be tested at all age levels because of low count frequencies in some categories.

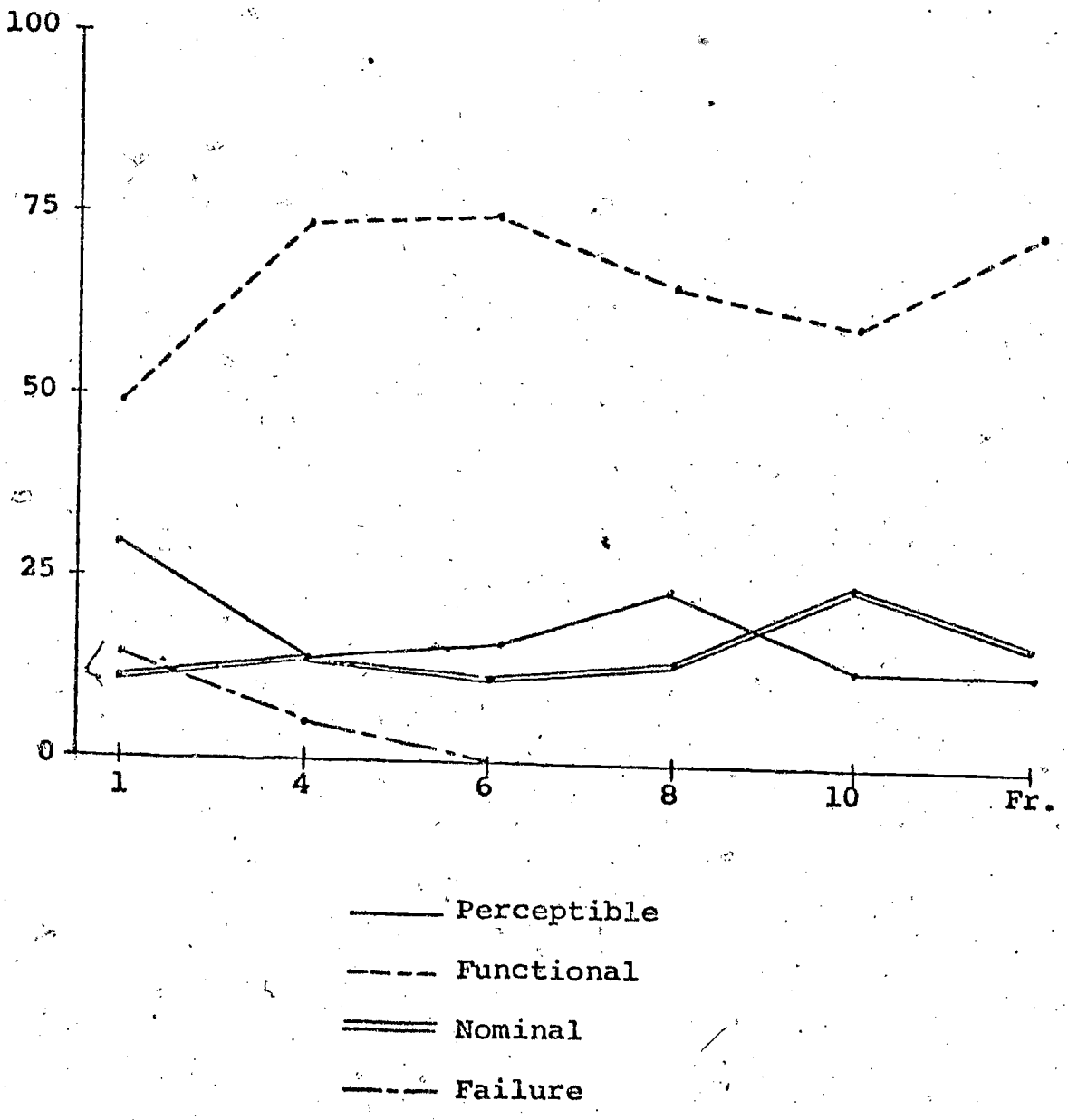
The comparison between the responses of corresponding age levels shown in Table 3 also reveals the dramatic difference of response patterns to noun and verb items and the highly similar response patterns of both language groups. The differences between noun and verb responses within each language group are all highly significant, with the differences tending to be greater at the higher age levels of the study. On the other hand, comparisons within each form class of the responses of the two language groups reveal a great degree of similarity. For noun responses, only at the kindergarten and grade 6 levels are the response patterns of the two language groups significantly different. Some low frequencies precluded most age level analyses of verb responses of the two language groups. Yet the one comparison possible, at the adult level, showed no significant difference.

Comparison with Other Equivalence Formation Studies

A similar equivalence formation study is reported by Bruner and Olver (1963) and by Olver and Hornsby (1966). It was conducted among upper middle class native English-speaking subjects in suburban Boston. Subjects in grades 1, 4, 6, 8, 10, and college freshmen were presented with two lists of nouns, things that are ingestible and things that carry a message, and were asked how the words were most alike or most different in meaning. Features used to equate or differentiate lexical items were coded according to the same five categories used in the present study -- Perceptible, Functional, Nominal, Fiat, and Failure. Figure 2 represents the results of that study in terms of

Figure 2

Percentages of Total Responses in the Perceptible, Functional, and Nominal Attribute Categories for the Bruner and Olver Study (1963)



percentages of responses in each attribute category.

The subjects of the Bruner and Olver study responded predominantly with Functional attributes at all age levels, and there seemed to be a generally increasing trend in this direction as the subjects became older. Perceptible and Nominal responses played a relatively minor role at all age levels. These findings stand in sharp contrast to those of the present study in which responses to noun items changed from predominantly Perceptible among younger subjects to predominantly Nominal among older subjects. Responses to verb items in the present study were predominantly Perceptible at all age levels. As could be expected, a chi square analysis of the proportional differences of responses at corresponding age levels of the two studies for both language groups revealed statistically significant differences at all levels. In comparing the results of the two studies, however, the different backgrounds of the subjects and some procedural differences in the two studies must be considered.

Another equivalence formation study was conducted in Mexico among Spanish-speaking subjects by Maccoby and Modiano (1966). Two different groups of subjects, one from a rural village and the other from a Mexico City school, were presented with a list of nouns. Only two age levels were investigated in each group, 8 to 10 years of age and 12 to 13 years of age. The findings of this study are reported in a manner different than those of the present study and the Bruner and Olver study. Results are reported in terms of the percentage of subjects responding in the various attribute categories, rather than

the percentage of responses in each attribute category. The percentages are reported in Figure 3.

Major differences in response patterns may be noted between the two population samples of the Maccoby and Modiano study. While the urban child decreased his use of Perceptible attributes and became more abstract, the rural child actually became more perceptually oriented. The researchers speculate that this difference in response patterns is caused by differing cultures and life styles. The child who lives in the industrialized, technological setting of a large urban center is taught to develop the ability of abstraction to a high degree in order to cope with his many-faceted, changing life style. On the other hand, the child of a rural village whose life is simpler and more constant does not need great facility in abstraction and instead develops and refines his perceptual abilities which are helpful in determining such important aspects of his life as crop conditions, weather, and other individuals.

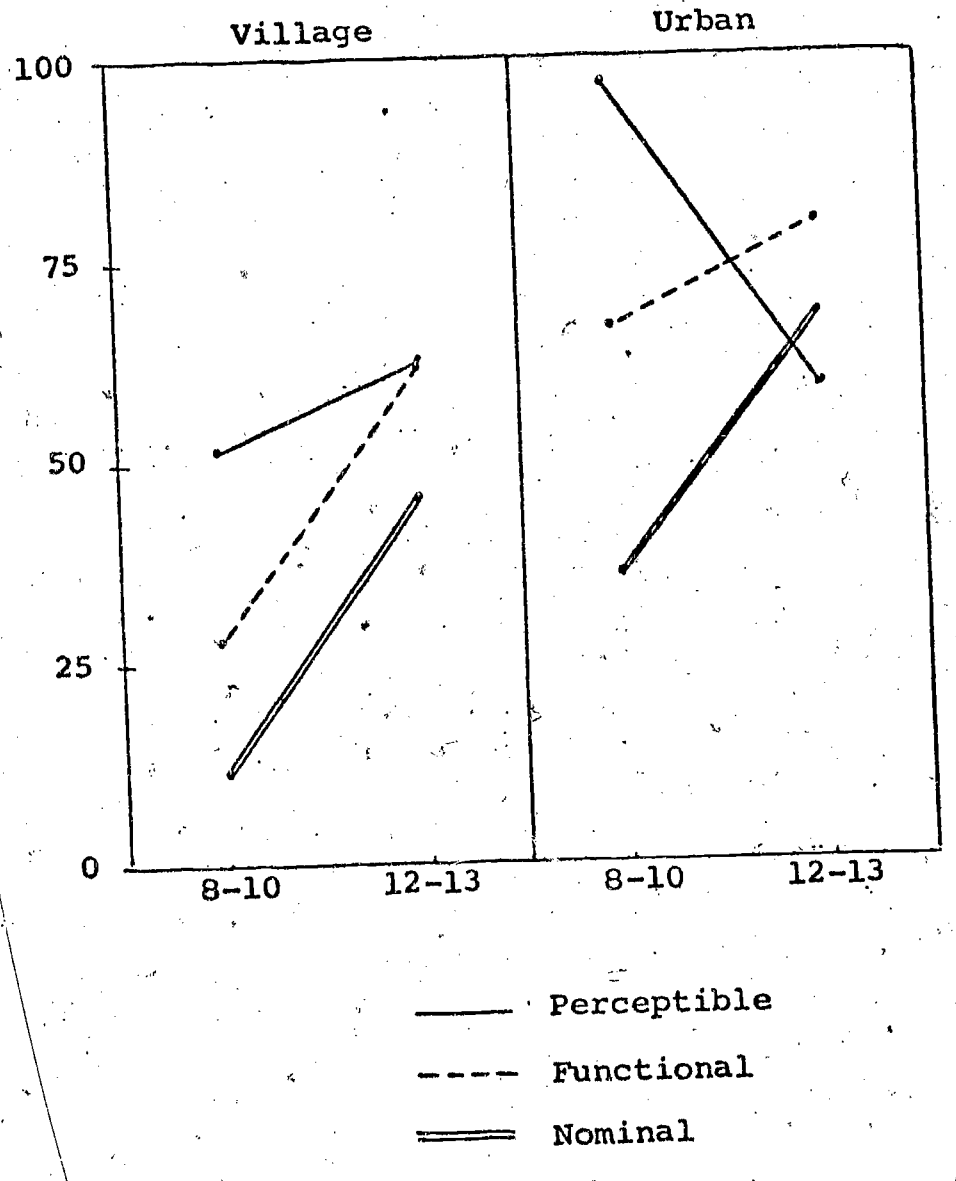
The response patterns of the Mexico City children are somewhat similar to those of the corresponding age levels of the Bruner and Olver study whose subjects are also from a large urban center in a highly technological society. Yet they are different from the results of the present study in that their responses become predominantly Functional rather than Nominal at the older age levels.

DISCUSSION

The results of the study indicate that age is indeed a major factor in semantic development. Semantic development of certain

Figure 3

Percentages of Subjects Using Perceptible, Functional, and Nominal Attributes in the Two Age Groups of the Maccoby and Modiano Study (1966)



individual lexical items does continue throughout the elementary school years and beyond. While the rate of development varies at different times both within and between the language groups of the study, growth trends are evident and in a generally consistent direction.

A second major finding of the study reveals widely divergent responses -- and semantic development -- in regard to noun items and verb items. In short, younger subjects responded to noun items predominantly with Perceptible features, but at older age levels the proportion of Perceptible responses decreased and subjects' responses became increasingly and predominantly Nominal. Subjects' responses to verb items were predominantly Perceptible at all age levels. The use of Nominal attributes was negligible or non-existent at all age levels, except the adult level, where there was also a slight corresponding decrease in the use of Perceptible attributes. This change in response patterns to verb items at the oldest age level of the study could possibly indicate the beginning of a Perceptible-to-Nominal shift similar to the trend evident in the noun responses. This Perceptible-to-Nominal development corresponds with the concrete-to-abstract development of many cognitive development theories, particularly that of Piaget (1954), and also with Moffett's (1968) developmental discourse theory.

A third major finding of the study is the fact that two different native language groups experience highly similar semantic development patterns, apparently indicating that in this case native language is not a factor in the results of the study. These results

stand in direct contrast to the findings of Reich's (1966) study of semantic development in bilingual Wolof children. His subjects used different types of semantic features when responding in French than they did when using their native Wolof dialect. In the present study, however, the similar semantic development of the two language groups can be accounted for by the similar experiential backgrounds of the subjects of both groups. All school-age subjects of the study came from the same neighborhood, were at the same socioeconomic level and many played together or walked to school together. These similar experiences with the world would be important factors in producing similar types of semantic development.

Possible reasons for the differences between the results of this study and those of the Bruner and Olver and the Maccoby and Modiano studies are many and, because of the nature of the available data, are impossible to isolate. A slightly different experimental procedure was used in the earlier studies. Lexical items which differed in form class and semantic domain were employed. For example, Bruner and Olver's two lists of words, things that are ingestible and things that carry a message, are Functional (what the items can do or what can be done to them) by their own definitions. Thus, the semantic domains may well predetermine responses to a great extent. Additional differences between the studies involve characteristics of the subjects studied (geographic location, environment, socioeconomic status, language, and culture).

In short, from the results of this and similar studies, major factors affecting semantic development in elementary school children

emerge. Semantic domain and form class are prime factors of the lexical items themselves. In regard to individual language users, their age, or more accurately their level of cognitive development, and their individual perception of the phenomenon represented by the lexical item are major factors.

The results of this study contain several implications for language learning in the classroom. First, the traditional notion of vocabulary development as the acquistion of new terms must be broadened to include the concept that meanings already acquired will continue to develop and change as various semantic features are acquired and predominate at different times. It also seems apparent that instructional materials to aid this semantic growth could be devised.

Further research should focus on the verbal interaction between teachers and students in the classroom and on commercially published instructional materials in order to discover whether or not adult educators are aware of the nature of the semantic structuring of young children. This awareness or lack of it would be most clearly revealed in language events such as definitions or comparisons. In addition, this study should be replicated in order to study semantic development involving secondary grade level students, different socio-economic levels, and lexical items from other semantic domains.

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