

# The Syntagmatic-Paradigmatic Shift Revisited: A Review of Research and Theory

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Four classes of theories about the significance of the syntagmatic-paradigmatic shift in children's word associations are discussed: (a) associative strength, (b) syntactic, (c) semantic, and (d) cognitive theories. Qualifications regarding the generality of the phenomenon are pointed out. It is suggested that both a shift in conceptual organization and a change in children's interpretation of the task may account for the data.

In the history of psychology no problem has been more persistently studied and has more perfectly exemplified the changing course of theory and thought than the free word association experiment. From Galton and Cattell in the 19th century through Jung in the early part of the 20th to Deese and Clark in the last decade, free word association responses have been said to exemplify basic laws of the association of ideas, unconscious thought, the structure of meaning, and the linguistic structure of a transformational, generative grammar (Clark, 1970; Deese, 1965; Esper, 1973; Woodworth & Schlosberg, 1954). A special case of the general problem, that of the syntagmatic-paradigmatic shift, has been the focus of continuing research over the past 15 years and has been especially productive in terms of proliferating theoretical explanations for the data. No theoretical consensus has thus far emerged, however, and the time now seems ripe for a reevaluation of the data and theory in light of recent approaches to cognitive and linguistic problems.

The syntagmatic-paradigmatic (often syntactic-paradigmatic) distinction refers to the observation that responses to stimulus words in a free word association task tend to be

either from the same grammatical form class as the stimulus word (paradigmatic) or from a form class that is frequently found in contiguity with the stimulus word in a syntactic sequence (syntagmatic). The syntagmatic-paradigmatic shift refers to the fact that adults tend to give predominantly paradigmatic responses, whereas young children tend to give many syntagmatic responses, and a shift from younger to older response types seems to occur sometime within the 5-9-year-old age range. (The exceptions to this description are explored below.)

The shift is of interest both for its relation to general theories regarding word associations and for its implications regarding the cognitive and linguistic functioning of children. It is of special interest because it seems to coincide with qualitative shifts in other cognitive and linguistic domains, in particular that from preoperational thought to logical concrete operations (Piaget, 1970). It therefore appears relevant to the study of the relation between cognition and language during childhood. For example, does the syntagmatic-paradigmatic shift in word associations reflect a general cognitive reorganization at this time? Or does it reflect a strictly linguistic organization that is itself instrumental in cognitive restructuring? Or is development of other cognitive mechanisms, such as improved information processing and problem-solving strategies or the maturation of inhibitory mechanisms (White, 1965), responsible for the shift?

Considering these questions in their broadest terms, there is an obvious connection between

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language and cognition, or between what people say (to themselves or to others) and what they think. Often when we probe we seem to discern underlying structures that may not be the same for both systems, and we look for ways in which one system influences the other, some of the possibilities being:

$$\text{Cognitive}_1 \rightarrow \text{Linguistic}_2,$$

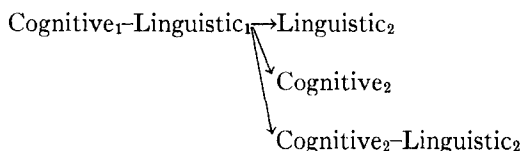
where the cognitive system at Time 1 determines the linguistic system at Time 2;

$$\text{Linguistic}_1 \rightarrow \text{Cognitive}_2,$$

where the linguistic system at Time 1 determines the cognitive system at Time 2; or

$$\text{Cognitive}_1 \leftrightarrow \text{Linguistic}_1,$$

where there is an interaction between the two, each influencing the other over time. Now obviously each of these schemes is too simple, and the true situation is probably something like:



that is, the interaction of the two at Time 1 influences both systems and their interaction at Time 2.

Many people have attempted to investigate these relationships by studying these systems in their development, and the syntagmatic-paradigmatic shift has been used to exemplify each possibility. It is therefore worth considering what relationships have actually been revealed for this case.

In order to understand the syntagmatic-paradigmatic shift, however, it is necessary to consider what meaning has been attributed to word associations in general. There are at least four contemporary theoretical interpretations. The first derives from the ancient tradition of the laws of associative learning, especially that of contiguity, and it emphasizes principles of frequency, commonality, and associative strength. A more contemporary view proposes that word associations reflect linguistic structure, in particular the structure described by a transformational, generative

grammar. A third view may be termed *cognitive-linguistic*, or *semantic*, because word associations are assumed to reflect the structure of the "subjective lexicon." Finally, there is a view that holds that word associations reflect conceptual structures or logical operations, and that their relation to linguistic structure or language use is indirect. Each of these general theoretical approaches is considered in conjunction with its developmental application. First, however, evidence for the existence of the phenomenon is presented, and some limitations on the possible interpretations are noted. In a final section, the relation of the phenomenon to other cognitive and linguistic abilities is considered, and a reconciliation of theory and data is attempted.

### Syntagmatic-Paradigmatic Phenomenon

Following the work of Galton, Cattell, and others (see review by Esper, 1973), a standard word association test was devised by Kent and Rosanoff (1910) consisting of a list of 100 "common nouns and adjectives." Administration of the task was and is simple; the subject is instructed to say (or write) the first word he thinks of as quickly as possible in response to the stimulus word. Associations to the list were standardized on 1,000 men and women and later, by Woodward and Lowell (1916), on 1,000 9-12-year-old children. A further study using this list employed 1,000 "men in industry." In reporting the comparison of the latter two groups, Woodworth and Schlosberg (1954) noted:

very few children give the opposite of *dark* or *soft*, while more than half of the "men in industry" do so. . . . A similar shift appears in the *coordinate* responses: table-chair, man-woman, and mountain-hill. The children tend to "stay by" the thing mentioned; they tell something about that thing, complete or enlarge upon the idea conveyed by the stimulus word; whereas the adults jump to a related, parallel idea." (p. 54)

For the children, the most common responses to the stimulus words above were: table-eat, dark-night, man-work, deep-hole, soft-pillow, mountain-high. These differences are representative of those between paradigmatic responses (often opposites, coordinates, synonyms) and syntagmatic responses. The child-

adult differences in the relative use of these types, however, remained relatively unexplored until two studies published almost synchronously in the early 1960s set the stage for a flurry of interest in the problem over the next decade.

Brown and Berko (1960) had priority of publication and considerable theoretical impact in terms of relating children's word associations to the acquisition of syntax. Although their study is representative of the data, several aspects of it differ from the subsequent standard paradigm. For one thing, they analyzed responses in terms of homogeneous (from the same form class, e.g., noun-noun) and heterogeneous (from a different form class, e.g., noun-verb) responses, which are not quite the same as paradigmatic and syntagmatic responses, as Entwisle, Forsyth, and Muus (1964) and Deese (1965) subsequently emphasized. The difference lies in the heterogeneous-syntagmatic parallel in that many heterogeneous responses may not represent word classes that do or may occur in syntactic sequences. For example, *hard*, a common response to *difficulty*, is heterogeneous (noun-adjective) but not syntagmatic. Nonetheless, most investigators have adopted the syntagmatic-paradigmatic terminology, even when the heterogeneous-homogeneous distinction would have been more appropriate or was the one actually employed.

A second difference in the Brown and Berko (1960) study is that they used six form classes instead of the more usual three (i.e., nouns, verbs, and adjectives), distinguishing mass nouns and count nouns and transitive and intransitive verbs and including adverbs.

They gave a sample of six, high-frequency words from each of the six form classes to a sample of first-, second-, and third-grade children and adults. Verbs were given in their infinitive forms. They found a consistent age trend toward homogeneous responses across all categories (see Table 1). Adults gave homogeneous responses at least  $\frac{3}{4}$  of the time to all categories except mass nouns, whereas first-grade children gave such responses less than  $\frac{1}{3}$  of the time to all categories except count nouns, for which homogeneous responses accounted for almost  $\frac{3}{4}$  of the total.

Over all groups, the order of form classes in frequency of homogeneous responses was as follows: count nouns, adjectives, intransitive verbs, transitive verbs, adverbs, and mass nouns. Brown and Berko also administered a usage test, which presented the child with a nonsense syllable in a sentence frame and required him to make up a new sentence using the new "word." Performance on this test was highly correlated with performance on the word association test by word class, and the order of classes was similar, except that adverbs and mass nouns were reversed.

On the basis of their study, Brown and Berko (1960) advanced the hypothesis that the shift from heterogeneous (or syntagmatic) to homogeneous (or paradigmatic) associations was a consequence of the child's "gradual organization of his vocabulary into the syntactic classes called parts of speech." They noted that

as utilization of syntax develops in children, syntactic similarity in words becomes an increasingly important determinant of word association and that the developmental trend from Htg. [heterogeneous] responses toward Hmg. [homogeneous] responses is a manifestation of this great step forward into syntactic operations. (p. 4)

This was the first major claim for an explanation of the syntagmatic-paradigmatic shift in linguistic terms. As might have been expected, it has been questioned especially from the point of view of its relation to the development of language use, despite the demonstrated correlation with the nonsense syllable usage test. Children are able to use words according to form class appropriately in sentences at least as early as 3 or 4 years, and Brown (1957) himself has shown also that children can assign new words appropriately to form class at this young age. Why then should word associations be reorganized into these classes only during middle and late childhood? Some explanation beyond the utilization of syntax seems to be required.

Before considering this and other explanations further, however, the nature and reliability of the phenomenon itself needs to be examined more closely. Ervin's (1961) study with children from kindergarten through sixth

Table 1  
*Mean Number<sup>a</sup> of Homogeneous Associations by Form Class and Age Group*

Group	Count nouns	Adjectives	Intransitive verbs	Transitive verbs	Adverbs	Mass nouns
Adults	5.10	5.00	4.80	4.45	4.95	2.35
3rd grade	4.65	3.65	3.40	2.95	1.95	2.40
2nd grade	4.55	3.90	2.75	2.40	2.25	1.90
1st grade	3.95	1.25	1.60	1.40	.80	1.20

*Note:* Adapted from "Word association and the acquisition of grammar" by R. Brown and J. Berko, *Child Development*, 1960, 31, 1-14. Copyright 1960 by the Society for Research in Child Development. Adapted by permission.

<sup>a</sup> Total of six possible per form class.

grade using stimulus words from the form classes, noun, transitive verb, intransitive verb, preposition, adverb, pronoun, determiner, question, and adjective in general replicated Brown and Berko's results. Most responses for the kindergarten children were syntagmatic, except those to noun stimulus words, and there was a significant increase in paradigmatic responses with increasing age. Ervin noted that there was an earlier increase in paradigmatic responding for words occurring more often in the final sentence position (i.e., nouns) than for those occurring in medial positions. She interpreted her results in terms of a theory of contextual similarity, in particular through training by forward contiguity of sentential associations in speech. That is, words become associated when they can occur in the same sentence contexts. This process was assumed to operate through a mechanism of anticipated completions; for example, hearing "we climbed," one might anticipate "the hill," but the actual completion would be "the mountain." Thus, *mountain* and *hill* would come to be associated. The decrease in syntactic associations and increase in paradigmatic associations was explained in terms of the increase in number and variety of sentential contexts with increasing language experience. In this way, Ervin combined the notions of traditional associationism and linguistic structure in her theory of contextual similarity.

Both Brown and Berko (1960) and Ervin (1961) found that their youngest groups (about 5 and 6 years old) gave predominantly paradigmatic responses to familiar count

nouns. They, as others later, interpreted this as an earlier shift for this form class toward the paradigmatic response mode. An alternative interpretation, however, is that nouns are always typically paradigmatic, so that no shift needs to occur. Entwisle et al. (1964) identified a phenomenon they termed the "primitive noun response," in which 4- and 5-year-old children give primarily noun responses to all words regardless of form class. These responses would of course be paradigmatic for nouns and syntagmatic for all other classes (see discussion below). Entwisle et al. also found multiword responses and many "clang" responses (i.e., rhyming or otherwise acoustically related words) in younger children's protocols. Regardless of the interpretation, it should be noted at this point that for all ages studied, the syntagmatic-paradigmatic shift, when it is found, is found primarily for word classes other than nouns and that in the typical list of highly familiar nouns and adjectives, it is found mainly for adjectives.

In another early study, Palermo and Jenkins (1963) identified changes in the word associations of fourth- and fifth-grade children over the time span of 1916 to 1961. They found, using identical word lists, that paradigmatic responding increased for both nouns and adjectives from the older to the newer norms by 10% or more. They noted that paradigmatic responding was associated with the increasing use of contrasts ("opposites" and "coordinates" in Woodworth and Schlosberg's (1954) terms), and they suggested that both effects were related to increasing familiarity with tests of this type and to a general in-

crease in linguistic skills among young children over this time period. Although this is a type of learning or frequency hypothesis, it does not identify the mechanism underlying the change, as Ervin (1961) attempted to do. For whatever reason, these data suggest that young children have become more "adult-like" in their responses over this 45-year time span.

A more recent study by Palermo (1971), using 100 familiar words from six form classes, shows the now-familiar effect of no change in paradigmatic responding for nouns from first to fourth grade but significant shifts from syntagmatic to paradigmatic responding for all other word classes (see Table 2) over this age range, with the greatest shift taking place between first and second grade. Palermo emphasized the correlated increase in frequency of the most popular responses over the same age range, as well as the increase in superordinate and contrast responses, and concluded that the younger children show weak "associative strength."

An important study by Deese (1962) with 100 adults presents some difficulty for a straightforward interpretation of the child data, however. He used 600 words from four form classes, systematically drawn to sample equally often from different frequency levels of the Thorndike-Lorge Word Count and carefully evaluated for form class by the sentence test-frame substitution method. Over all frequencies, Deese found a surprisingly high level of syntagmatic responding for all classes except nouns (see Table 3). Com-

paring Tables 2 and 3, it can be seen that Deese's levels were comparable to those of Palermo's second graders. This seemed not to be entirely the result of sampling low-frequency words, however, inasmuch as syntagmatic responses were significantly correlated with frequency only for adjectives. Deese pointed out in summarizing the results of his content analysis that the responses to verbs, adverbs, and low-frequency adjectives were determined primarily by sequential syntactic relations, whereas lexical relations were more important even for the heterogeneous responses to nouns. This is shown by the high frequency of response primaries (i.e., the concentration of responses in a few words) from a different form class, such as the pair *difficulty-hard*. Similarly, the high-frequency adjectives generated contrast (i.e., lexical) responses such as bad-good, early-late, fast-slow. Thus, paradigmatic or lexical responding was found to be general for nouns and for high-frequency adjectives, whereas syntagmatic or sequential responding was found at least as frequently as paradigmatic responding for low-frequency adjectives and for verbs and adverbs when the words were sampled from a broad range of frequencies.

A related study by Fillenbaum and Jones (1965) considered adult responses to a word list derived from the 100 most frequently used words in a sample of Thematic Apperception Test (TAT) protocols plus 5 adjectives and 4 nouns from the Kent-Rosanoff list included to balance form class numbers. They found a very high variation of same-form-class re-

Table 2  
*Weighted Percentages of the Five Most Frequent Responses Classified  
As Paradigmatic By Grade and Grammatical Class  
(Number of Stimulus Words in Parentheses)*

Group	Noun (44)	Adjective (18)	Adverb (5)	Verb (11)	Pronoun (7)	Preposition (5)
Grade 1	79.6	38.8	13.0	15.2	43.1	13.4
Grade 2	84.5	67.3	34.4	40.0	68.7	39.4
Grade 3	82.0	59.0	32.7	45.6	65.9	38.9
Grade 4	81.0	67.6	44.4	58.0	69.1	42.0

*Note:* Adapted from "Characteristics of word association responses obtained from children in grades one through four" by David S. Palermo, *Developmental Psychology*, 1971, 5, 118-123. Copyright 1971 by the American Psychological Association. Adapted by permission.

Table 3  
*Mean and Standard Deviation of Frequency of Syntagmatic Associates and Correlation with Thorndike-Lorge Frequency Count for 100 Adults*

Measure	Nouns	Verbs	Adjectives	Adverbs
Mean	21.4	48.1	49.9	72.8
Standard deviation	16.4	19.7	19.2	20.3
<i>r</i>	.01	.05	-.40	.13
Number of words	253	101	118	32

*Note:* Adapted from "Form class and the determinants of association" by James Deese, *Journal of Verbal Learning and Verbal Behavior*, 1962, 1, 79-84. Copyright 1962 by Academic Press. Adapted by permission.

sponding both within classes and between classes. The rate of paradigmatic responding ranged from 79% for nouns to 23% and 29% for articles and conjunctions, respectively. Only nouns, pronouns, adjectives, and quantifiers produced more than 50% responses from the same form class. They also summarized results from other studies in the literature for nouns, adjectives, and verbs, which showed that nouns reliably produced a high rate of same-form-class responding but that both adjectives and verbs produced lower rates, with adjectives being variable from study to study and verbs relatively stable at the lower end of the continuum.

Entwisle's (1966) data present the most complete analysis to date of the responses of children to a systematically selected and balanced word list. The stimulus list of 96 words was selected to represent nouns, adjectives, and verbs at three levels of frequency of use according to the Thorndike-Lorge J-count plus 8 each of adverbs, pronouns and "miscellaneous" words (prepositions, conjunctions, and 1 adverb) not stratified on frequency. Over 1,200 children from prekindergarten to fifth grade were seen individually or, for a small number of fifth graders, in groups. Table 4 shows the percentage of paradigmatic responding for each of the grade school groups and for a college sample.

In general, this table reveals the previously noted pattern of a high rate of paradigmatic responding to nouns for all groups and a marked increase in paradigmatic responding between first and third grades for adjectives, verbs, adverbs, and pronouns. Entwisle (1966) pointed out, however, that there is a re-

versal—to lower paradigmatic responding—between fifth grade and college for high-frequency nouns and verbs and all adjectives (the latter being true only in comparison to the individually administered school group). It is worth noting here too that the degree of paradigmatic responding is negatively related to frequency for the adult group for nouns but positively related to frequency for adjectives and verbs.

Entwisle suggested that there is an increase in *syntactic* responding as children grow older comparable to the increase in paradigmatic responding. This is revealed in the increase in responses of adjectives to noun stimuli between kindergarten and fifth grade, with verb responses (a less mature syntactic response) dropping in frequency and miscellaneous responses dropping out almost entirely. Similarly, there is an increase in both verb (paradigmatic) and adverb (syntactic) responses to verbs from kindergarten to fifth grade. She stated that "syntactic responding is *at its childhood peak* around first- to third-grade level for most words on our list but is still present at fifth grade" (1966, p. 65).

Entwisle argued that for young children, nouns predominate as responses to all form classes, and she distinguished between noun responses for 4- and 5-year-olds to noun stimuli (the primitive noun response referred to above) and those of older children (paradigmatic). The evidence for this distinction is slight, however. An analysis of a small sample of upper-middle-class 4-year-olds showed noun responses of 62.3%, 56.7%, 39.2%, 26.9%, and 44.4% for nouns, adjectives, verbs, adverbs, and pronouns, respectively. In

comparison, 41.3% of the responses to adverbs were verbs. In general, the 4-year-olds showed considerable sensitivity to form class; their responses were far from randomly distributed across classes or concentrated solely in the noun class.

Entwisle concluded with the suggestion that associations to a given word may evolve through stages determined by increasing exposure to the word as follows:

Anomalous (noun)      Early syntactic      Paradigmatic      Late syntactic.

She stated:

All words may go through similar stages of development at a rate that depends on exposure but is modified by discriminability of stimulus and by contextual clues. . . . A word acquired very early like "chair" yields paradigmatics even though the subject may be four years old. Thus it is *not* that associations are a function of age of the subject, with four-year-olds giving anomalous responses, six-to-eight year-olds giving syntactic responses and older

subjects giving paradigmatics. Instead at any age all kinds of responses are found because at all ages words are being acquired and consolidated linguistically . . . so-called adult syntactics are of a different genre from the early syntactics based on grammatical contiguity. They are enlargements in meaning, a more flexible and richer interpretation of a concept. Thus, "bright" appears in response to "color" and "yellow" appears in response to "butterfly" for adults. The meaning of a word is interpreted less rigidly and the associative structure seems to be undergoing an enrichment process. (1966, p. 74)

Entwisle also emphasized that differences between words in the same form class make the analysis by form class membership only a first approximation. For example, contrast verbs (add-subtract, give-take, sell-buy) show a sudden shift toward paradigmatic responding, like that of the contrast adjectives, between first and third grades. On the other hand, noncontrast adjectives (yellow, thirsty) show a gradual pattern of increasing paradigmatics that looks more like that of the verb. Thus, word characteristics other than form

Table 4  
*Percentage of Paradigmatic Responses*

	Kinder- garten	First grade	Third grade	Fifth grade (individual adminis- tration)	Fifth grade (group adminis- tration high-IQ)	College
High-frequency nouns	56.6	59.7	65.7	72.0	72.5	69.2
Med.-frequency nouns	65.7	63.8	72.8	77.0	83.1	76.9
Low-frequency nouns	61.3	64.5	80.3	85.4	87.5	85.1
Total nouns	61.2	62.7	72.9	78.1	81.0	77.1
High-frequency adjectives	17.5	34.2	78.9	83.0	53.1	70.7
Med.-frequency adjectives	19.2	33.3	68.2	73.4	56.9	60.9
Low-frequency adjectives	13.7	27.6	64.6	79.2	56.9	65.9
Total adjectives	16.8	31.7	70.6	78.5	55.6	65.8
High-frequency verbs	18.8	22.6	60.5	68.6	60.0	58.1
Med.-frequency verbs	17.5	18.8	40.4	51.5	48.8	59.6
Low-frequency verbs	13.6	19.7	41.6	58.6	59.4	62.3
Total verbs	16.6	20.4	47.5	59.6	56.1	60.0
Adverbs	8.6	17.9	51.2	62.1	57.5	78.9
Pronouns	16.5	29.8	65.4	65.2	60.0	78.0

*Note:* Responses per entry are: 1,600 for kindergarten, fifth-grade individual, and college samples; 2,240 for first- and third-grade samples; 160 for fifth-grade, high-IQ, group administration sample. (Adapted from "The word associations of young children" by Doris Entwisle, Johns Hopkins University Press, 1966. Copyright 1966 by Johns Hopkins University Press. Adapted by permission.)

class (in this case, the existence of a contrast response) must be called upon to explain the course of evolution for particular words. Entwistle leaned strongly to a developmental or evolutionary theory of lexical acquisition, although she believed that the age correlation was only coincidental, reflecting the fact that many words become "consolidated" at the same time.

It appears, then, on the basis of both adult and child data, that the frequency of syntagmatic and paradigmatic responding is conditioned at least by form class, frequency, and by the particular characteristics of the words sampled. The syntagmatic-paradigmatic shift is observed most dramatically for high-frequency adjectives, whereas nouns tend to be paradigmatic at all ages and verbs tend to be more strongly syntagmatic. With these facts in mind, the dominant theoretical explanations for the phenomenon can be examined.

### Theories of Word Association

#### *Associative Theories*

The most basic theory of the production of word associations is that of contiguity, or the frequency of associative pairing in language use. This theory (in many variations) proposes that responses are associated with stimulus words in a word association task because they have been frequently experienced together in the past. In this tradition, for example, is Palermo's (1971) statement that the low frequency of contrasts, common responses, and paradigmatic responses are all the result of "low associative strength" in young children. This type of explanation cannot account for the way paradigmatic associations gain strength, although it may account for some syntagmatic associations. An effort at such an explanation, however, was made by Ervin (1961) in the theory outlined above. This theory has two essential parts: (a) Paradigmatic associations are formed through the occurrence of erroneous anticipations to the completion of sentences; and (b) increasing variety of sentential contexts leads to a decrease in syntactic responses and an increase in paradigmatic responses.

Initial support for these ideas was provided in an experiment by McNeill (1963), who

trained subjects on the syntactic pairing of nonsense syllables in frames such as "He said there's a KOJ fly on your (MAF or ZON)."

The subject learned 10 sentence frames for each pairing of adjective and two noun syllables and was later asked to recall the two nouns when given the adjective, and when given one of the nouns, to respond with a free associate (i.e., another noun syllable [paradigmatic], the adjective [syntagmatic], or neither). Number of trials varied, and he found that there was a significant increase in recall of associated nouns between 20 and 40 trials but that the significant increase in paradigmatic responding occurred only between 40 and 60 trials, thus suggesting that forward recall of speech sequences antedates the association of syntactic equivalents.

McNeill recognized, however, that this experiment did not provide a strong test of the Ervin (1961) argument but only of the proposal that any two words that share associates become associated, a standard mediated association theorem. Particular untested problems with the Ervin thesis include the fact that many common frames are nonspecific, such as "see the \_\_\_\_" whereas distinctive frames that might lead to erroneous anticipations seem to be relatively infrequent. Further, many common associates do not frequently occur in the same linguistic context, although they may occur frequently together in nature, such as table and chair; and some can occur in a single natural context but not together, such as shallow *or* deep water. These considerations led McNeill to abandon the Ervin version of association by contiguity and erroneous anticipations and to construct a theory based on linguistic structure.

#### *Language Structure Theories*

McNeill's (1966) revised theory of the syntagmatic-paradigmatic shift utilized the notion of semantic features, or markers, based on the linguistic theories of Chomsky (1965) and Katz and Fodor (1963). Variations and generalizations of this account have been proposed by others since. In essence, the theory assumes that each lexical item in the lexicon can be specified by features that determine its meaning, as well as its syntactic privileges of occurrence and selectional restric-



tions. For example, flower might be represented in the dictionary by a syntactic feature (*common noun*) and a collection of semantic features such as (*physical object*), (*living*), (*small*), and (*plant*). McNeill's proposal is that children do not learn all of the features associated with a lexical item when they first acquire the item, but only gradually build up their feature entries. A further assumption (and the crucial one for the feature hypothesis) is that word association responses "match their stimuli semantically," that is they share common features. When few features have been acquired, associations will be relatively unconstrained. In fact, at first they may cross form boundaries and yield "pseudo" syntagmatic associates.

Clifton (1967) generalized McNeill's feature-matching hypothesis and distinguished syntagmatic responding as the matching of contextual features (indicating in what sentence context the word can appear) with inherent features and paradigmatic responding as the matching of whole sets of features. He also introduced the notion that associates are pairs of words "whose sets of features contrast, or differ, only minimally."

Clark (1970) extended and strengthened this argument by suggesting that there are a number of different rules that may be followed in generating word associations from linguistic structure. Among the paradigmatic rules he suggested are the minimal-contrast rule (given above), the marking rule (a subcategory of the minimal-contrast rule, suggesting that the usual order is from unmarked to marked values of opposites, e.g., from man to woman), feature deletion and addition rules, and a category preservation rule, all of these representative of a general simplicity-of-production or least-change rule. Syntagmatic rules include the selectional feature realization rule (as in Clifton, 1967) and the idiom completion rule. The advantage of Clark's discussion is that it can account for individual differences of the kind to be discussed in the next sections by assuming that different people tend to rely on different feature-changing rules.

It is hard to see, however, how the feature-matching hypothesis can account for differences in the extent to which syntagmatic and

paradigmatic responses are produced by adults for different substantive form classes. Nor does it seem able to account for the kinds of interclass differences found in response patterns, especially those that seem to be neither paradigmatic nor determined by selectional restrictions. Ervin (1963) gave several common examples from her data that fit this category, such as "swim-water," "walk-feet," "relax-chair," "eat-fat," "see-blind (or eye)," "write-pen (or pencil or paper)."

Further, the theory seems to attribute far too little semantic knowledge to the young child who uses familiar words quite appropriately in context. Similarly, the original linguistic theory of Brown and Berko (1960), which attributed the syntagmatic-paradigmatic shift to a consolidation of syntactic (specifically form class) knowledge, seems to attribute too little *syntactic* knowledge to children who have for years been forming and interpreting sentences correctly. Consider in this connection, Clark's (1970) claim that

*the word-association game is . . . important not because it is interesting in itself, but because it reveals properties of linguistic mechanisms underlying it. Our ability to produce associations is presumably derived from our ability to understand and produce language. For this reason, language must play a central role in the explanation of these associations. (p. 272)*

Here Clark has turned on its head the old empiricist's claim that language structure is derived from associations with the counterclaim that associations are derived from language structure. If this were the case, however, we would need to explain how children are able to produce and interpret complex utterances at a time when their word association data appear to be insensitive to the syntactic and semantic features required for meaningful sentence production. Although they may produce nonsense, unrelated, idiosyncratic, or clang responses to the word association stimulus words, they do not habitually *speak* ungrammatical nonsense.

It seems more likely that in fact word associations are produced according to different principles than are sentences. The fact is that language serves different purposes. In addition to speech and communication, the intra-individual functions of memory and symbolic thought must be considered. Indeed, because of its very lack of structure, the word associa-

tion task (one of the oldest and simplest tasks) has led investigators from Cattell to Jung to Deese to assume that it must be tapping unconscious organizations of meaning and that the structure of associations is equivalent to the structure of memory and thought. Let us consider at this point some contemporary formulations of this claim.

### *Theories of Associative Structure*

The theory that word associations represent the way in which semantic or cognitive information is structured in memory is the modern extension of ancient association theory, as Anderson and Bower (1973) have emphasized in presenting their version of human associative memory. The contemporary contribution, however, is crucial because it adds the notion of structural principles to the basic principle of contiguity. For example, Deese (1965) concluded his study of "the structure of association in language and thought" by emphasizing:

Observers of human thought processes were aware of associative structures at least as early as they were aware of grammatical relations, so the topic of associative organization runs through the whole of the history of psychology and epistemology. However, the persistent stress throughout that history upon contiguity both as description of the nature of any given associative sequence and as the cause of the sequence itself has obscured the structural nature of the events underlying association. . . . While we do not know how associative processes relate to [concept formation and problem solving], we find that at least the solution to this problem becomes feasible when we abandon the view of association as laboriously learned sequences in the language and view them as generated from structural types or schemata. (p. 177)

Modern work within this framework has relied primarily upon such latent structure techniques as factor analysis to reveal the structure underlying the "subjective lexicon" within particular semantic domains. Deese (1965) was a pioneer in this field. Related analyses have been reported by Fillenbaum and Rappoport (1971), Henley (1969), Michon (1972), Miller (1969), and others. The assumption is that there is a psychological structure of semantic memory to be discovered that is not necessarily isomorphic with linguistic or logical structure. The work

is nonetheless comparable with other approaches to the characterization of semantic memory, such as those derived from artificial intelligence (e.g., Collins & Quillian, 1969) or from cognitive models of categorical or subjective organization in recall (e.g., Mandler, 1967; Tulving, 1968). From this viewpoint, the study of word association structures is but another approach to the organization of semantic memory, a subject worthy of study on its own terms, without regard to its connection to linguistic or cognitive function.

Much of the work on associations from this perspective has assumed implicitly that associations reflect semantic *similarity* (see Miller, 1969), much as Clark's theory does. However, the definition and function of *similarity* may be quite different from that assumed in the linguistic model. A standard model of semantic memory has employed the notion of features arranged hierarchically in a way that is very similar to the linguistic notions, for example, Collins and Quillian (1968). The features encoded in such models, however, are conceptual attributes rather than features necessary to sentence construction.

In one experiment within this tradition, Anderson and Beh (1968) presented data to support the notion that the paradigmatic shift in children's word associations derives from the acquisition of an adultlike lexical coding system, effecting an economy over a "word dictionary." They asserted that the direct listing of words in memory will drop out as the "more efficient" generic, or feature, coding system replaces the old word dictionary. To test this proposition, they employed a false recognition technique that has since been used widely in similar studies. They presented a word list of 70 items (written for adults, oral for children) to first and second graders and adults; they then tested recognition of the old words when embedded in a list containing distractor words that were either paradigmatic or syntagmatic associates of the old. The adults and second graders made more errors in recognizing as old words paradigmatic associates than syntagmatic associates by a ratio of two to one. The first graders made fewer false recognition errors altogether than the second graders, but more

of their errors were syntagmatic. Anderson and Beh asserted that paradigmatic errors are inescapable because of the structure of memory. The experiment provides only weak and indirect support for the lexical feature theory, however.

More recent models of semantic memory incorporate the notion of propositions or functional relationships in place of atomic features, thus broadening the range of kinds of information and relationships that can be employed in assigning meaning (see, e.g., Anderson & Bower, 1973; Kintsch, 1974; Norman & Rumelhart, 1975). Miller (1969) proposed a similar explanatory mechanism to account for type and direction of word associations, suggesting that word associations essentially derive from the kinds of predication that can be made about the word. In doing so, he made a claim that is reminiscent of Clark's:

We first learn how to produce and understand sentences, and that explains why we give the word associations we do. . . . When we talk we generally designate some topic and then ascribe some property to it. The basic subject-predicate union characterizes the propositional content of all illocutionary acts. . . . we might even assume that all predicates *impose* organization on the names, just as *is a* imposes an inclusion relation and *has a* imposes a part-whole relation . . . we will not find that word associations per se play any important explanatory role in it [a theory of sentence processing] but, on the contrary, patterns of word association should fall out as a special and rather artificial by-product of machinery designed for a much more important purpose. (p. 235)

The difference between this claim and Clark's, however, is that the mechanism proposed here is derived from language *function* (learning and use) rather than from language structure, and the two yield different principles. If we were to apply Miller's notions to the change in children's word associations, we would need to look for changes in the kinds of predication that children make. Although this step has not yet been taken, it comes close to the question of the relation of word associations to cognitive development and logical thought.

In a related investigation, some experiments using clustering techniques to discern the development of lexical memory and taxo-

nomic feature structures have been reported by Anglin (1970). They showed lack of form class use for similarity judgments by children under 10 years, but they also showed little relation of similarity judgments to association structures, and they did not bear on the questions implicit in Miller's conclusion regarding predication. Some very limited observations by Michon (1972) on six subjects who made similarity judgments of eight animal pictures found well-defined hierarchical relationships for children as young as 4 years, but unlike the taxonomic structures of adults, those of the children tended to be idiosyncratically based on "biologically irrelevant phenotypical features" or behavioral characteristics, such as flying, swimming, and the like. This hints at the same kind of finding that has turned up in related research on the importance of perceptual or functional properties in children's concept formation and equivalence judgments (e.g., Bruner, Olver, & Greenfield, 1966). This kind of finding is in turn related to much of the research reported in the following section.

### *Cognitive Development Theories*

In 1916 Woodward and Lowell pointed out that the value of the word association test lay not in determining "how much" mind a child has, as was implied by its proposed use as an intelligence measure, but rather "what kind of mind the child has." It presented, they felt, "one of the best pictures of his mental constitutions that can be quickly obtained." By that date there were already as many as 10 studies of children's word associations and several theories as to the meaning of the differences apparent between children's and adults' responses. Woodward and Lowell, however, spent little effort in distinguishing "kinds" of minds in their sample of 9-12-year-old children, but rather emphasized the differences between the adult and child groups. Mainly these were found in the greater frequency among the adults of superordinate, coordinate, and contrast responses. Among the children there were also more of the type of responses that had been called "predicative" by Goett (1911, cited in Woodward & Lowell, 1916), based on a distinction

originally made by Jung and characterized as all judgments, characteristics, or activities that are in any manner related to the stimulus word as subject or object. In the Woodward and Lowell study, these were adjective-noun, noun-adjective, verb-object, and were more common among the children (as were also contiguity responses and verbs). Goett had found that children under 12 years produce more of these predicative types than do those over 12, and children of the "proletariat" more than those from "better circles." These distinctions, while obviously similar to the paradigmatic-syntagmatic distinction, emphasize logical, or conceptual, relations on the one hand and predications on the other. These logical relations continued to be emphasized in subsequent years until the attempt to explain word associations in strictly linguistic terms became the predominant goal in the 1960s.

In a study that embedded logical relations in a linguistic framework, Stolz and Tiffany (1972) proposed that the basic shift in word association responding is from distant to logical responses. Logical responses include synonyms, coordinates, contrasts, and superordinates, all involving implicit set operations. These contrast with syntactic responses and unscored, or distant, responses. In a test of this hypothesis with adults, Stolz and Tiffany used familiar adjectives and their relatively unfamiliar synonyms for stimulus words. They reasoned that if the shift from unrelated to logical responding were a function of the acquisition of more knowledge about words and their relations, then the same shift should be observable in the responses of adults to familiar and unfamiliar adjectives (this assumption is supported by Deese's 1962 study summarized above). They found that logical responding increased with greater familiarity, but counter to the hypothesis, syntactic responding also increased, whereas unrelated or distant responding decreased. They also presented evidence that syntactic responding stabilizes relatively early in the familiarization process, whereas logical responding continues to increase after the respondent knows the meaning of the word. Although they presented their theory within the framework of

generative linguistics and the feature-matching hypothesis, it does not seem to be especially well suited to that framework. Certainly, the notion that the acquisition of knowledge about the outcome of logical set operations relevant to particular words is the primary motivation for the shift in responding would seem to fit more naturally into a cognitive operations theory such as Piaget's. It is certainly important that logical responses increase over the same age period as the shift to concrete logical operations is taking place. This hypothesis was specifically addressed by Moran (1966, see below).

One investigator who has consistently emphasized logical relations is Riegel, who stated (1970):

For the stimulus TABLE, for instance, the class of paradigmatic responses might include FURNITURE (superordinate), CHAIR (coordinate), WOOD (substance), LEG (part), KITCHEN (location), etc. Each of these responses implies a specific subrelation (indicated in parentheses) within the general paradigmatic relation. These subrelations can serve to determine meaningful subclasses within the larger class of nouns. As our results have shown, . . . changes in the preference of these specific response classes and the relations on which they rely are more important indicators of developmental and aging processes than the gross, grammatical classification into paradigmatic and syntagmatic responses. (p. 383)

Although Riegel's investigations have been wide ranging both in terms of tasks and ages, he has studied the abilities and response tendencies primarily within the framework of restricted association tests. The comparison of these results with free word association data has shown an increasing reliance on coordinates, contrasts, and similars among older subjects in free word association, whereas all possible relations appear in the responses of younger subjects, including the logical relationships used by older subjects and also superordinates, qualities, functions, and parts. Riegel emphasized the numerous different relationships that can exist among words and the differences in responses that may be expected on the basis of whether the task is "meaningful" or "meaningless" (like free association). In the latter case, he believes that the subjects' choice of response "will be primarily determined by the item most often represented in the repertoire and most strongly

connected with the stimulus" (p. 317). But under all circumstances, responses will bear a meaningful relation to the stimuli.

This proposition implies that what subjects do in the word association task does not measure what they are able to do, but tells us only what they are disposed to do under the meaningless conditions that we impose upon them. Because of this, conclusions about underlying cognitive abilities appear to be unwarranted on the basis of word association responses; therefore, it would seem that word association results may be more relevant to the measure of cognitive style, type, or set, which is in line with the original suggestion by Woodward and Lowell (1916). There are several studies that have been undertaken from this perspective. It is notable that they tend also to incorporate ideas about developmental changes in cognitive style or type.

Moran and his associates developed the notion that individuals provide for themselves a set to respond in a particular way in the word association task. He defined the concept of an *idiodynamic set*, a characteristic associative principle observable when a person consistently uses one type of response set and excludes others. Moran, Mefford, and Kimble (1964) originally identified three characteristic sets on the basis of factor analyses of the responses of normal and schizophrenic subjects, given repeated tests with 500 familiar words. The responses were scored as synonym, contrast, coordinate, superordinate, subordinate, or distant (not logically related). They found three factors, which they termed, respectively, (a) *functional* (or object referent), indicating a concrete, denotative attitude toward words; (b) *conceptual referent* (synonym-superordinate responses), indicating an abstract, conceptual attitude; and (c) *speed set* (contrast and coordinate responses), indicating a set to respond as fast as possible. Not only did they find that different subjects consistently exhibited different sets but they found that different words had a tendency to elicit different types of responses. Moran (1966) constructed two new lists of 40 words that were equally distributed with respect to their tendency to elicit responses of one or another type. (Both lists

consisted primarily of nouns, although many of these could also serve as verbs, with a scattering of adjectives.) He identified the same three sets and added a new one, a "predication type" following Jung, exhibiting a strong tendency to give noun responses to adjective stimuli, also termed *perceptual referent*. He also replicated the same four factor findings with Spanish-speaking Mexican college students. Moran concluded that these four dominant response types (although all were represented among college students) reflected a hierarchy of more sophisticated responses, from the predicative (or perceptual-referent) type at the lowest end to the functional (or object-referent) type to the synonym-superordinate (or conceptual-referent) type and finally culminating in the coordinate-contrast, which he now referred to as a dimensional-referent, type. He suggested that these might represent developmental stages corresponding to Piaget's stages of logical operations—from the stage of perceptual invariance at age 2 through preoperational or functional to the concrete operational, in which bases for equivalence relations are recognized, to the stage of logical operations based on purely logical propositions.

This developmental scheme was tested by Penk (1971), who used only the original three factors (object referent, concept referent, and dimensional referent) with a controlled word list derived from Moran (1966) of mainly common nouns or verbs and adjectives. The subjects were 100 children ranging in age from 7 to 11 years. The findings do not support the clear developmental trend that Moran had predicted. Word types interacted with sex of subjects and in no case showed the quadratic trends expected. All response types appeared to be present at all ages, and although concept-referent responses dropped from age 10 to 11 and dimensional responses rose, the curves prior to that point were too irregular to be interpreted. Thus, the conclusion from this study was that growth patterns do not appear in the form of hierarchical rankings corresponding neatly to Piaget's stages in the development of thought.

In a related study, Sullivan and Moran (1967) found that the same factor strategies

identified in the adult samples were apparent for a sample of "bright" 6-year-olds, with the exception that functional associates were positively related to predicative associates. However, the idiodynamic sets of these young children did not predict differential effects on commonality of response or reaction time, as they did with adults.

A study by Cramer (1974) employed the false recognition paradigm to test the hypothesis that the type of memory errors a child makes in a recognition test is determined by the associative response dimension that predominates at his developmental level, with the expectation that younger children will show a relative dominance of object-referent over dimension-referent errors and older children will show the reverse. Her word association results show a relatively clear developmental order, with kindergarten children giving more responses in the order object referent > dimension referent > concept referent, whereas second and sixth graders reversed the order to dimension referent > concept referent > object referent. False recognitions of functional associates or coordinates in the test list, however, reflect a different relationship with kindergarten subjects producing more false recognitions to coordinates (dimension referent) than functional associates (object referent) and older children showing no difference between the two. Whichever way these results are interpreted, they clearly do not support the *a priori* assumption that coordinate responses represent a more advanced, dimensional-referent cognitive set.

More recent work by Moran (1974; Moran and Huang, 1974) has employed a somewhat different classification scheme and extended the analysis to children below the age of 6. Here he distinguished four categories: iconic (e.g., apple-red), enactive (e.g., apple-eat), functional (e.g., table-chair), and logical (synonyms, superordinates, contrasts, coordinates). He found that Japanese, American, and Taiwanese Chinese children under 6 years, when tested in their native languages, were all predominantly enactive in their responses. In contrast, he reported that Japanese adults tested in Japanese were predominantly iconic and North American adults

tested in English were primarily logical. Thus, although there is an indication here of developmental change, there is also a suggestion of culture-specific or language-specific differences.

These efforts have highlighted the possible subsystems that may be masked by the gross grammatical characterization of the syntagmatic-paradigmatic shift, but they have not substantially advanced our knowledge of the developmental factors that may be involved, despite the *a priori* plausibility of the perceptual, functional, conceptual, or dimensional differentiation. There is no consistent relation between these categories and the syntagmatic-paradigmatic category, and the two classifications have not been compared within a single experiment. They have, however, shed more light on individual and group differences in the disposition to respond in particular ways.

Additional insight into possible group differences come from Entwisle's (1968, 1970) reports on differences between inner-city black children and suburban white children. In first grade, inner-city black children give *more* paradigmatic responses than do white children. However, by fifth grade, suburban white children give more adultlike responses (i.e., paradigmatics) than do either inner-city black children or inner-city white children. Entwisle suggested that the schools fail to capitalize on an initial advantage shown by the younger black children. This suggestion relies on the assumption that paradigmatic responses are symptomatic of more mature thinking, but as the discussion above has revealed this assumption is too simple.

Relatedly, Sharp and Cole (1972) reported on word associations among the Kpelle tribe in West Africa. They studied educated and uneducated groups at three age levels to evaluate the effects of schooling on paradigmatic responding. Their conclusion is as follows:

There are small but consistent enhancing effects of both increased age and educational status on the proportion of paradigmatic responses, but the effect of increased education is not uniform at all age levels. At the lowest age level (8 to 9 years) there is little effect of education. The difference between 12-14 year old educated and non-educated groups is larger and the difference between 18 to 21 year old

educated and non-educated groups is by far the largest. . . . There is less effect for nouns and verbs than for adjectives. (p. 61)

In another experiment with educated subjects who spoke both English and Kpelle, the older subjects gave more paradigmatic responses than the younger, and those responding in English gave somewhat more than those responding in Kpelle. Thus, language, schooling, and age all seemed to affect the disposition to respond paradigmatically.

These results have recently been replicated with literate and nonliterate children and adults from Mayan- and Spanish-speaking groups in the Yucatan peninsula in Mexico (Sharp & Cole, Note 1). They found that secondary school students in contrast to younger children and uneducated adults produced response sets of greater commonality and with a greater predominance of paradigmatic responses. They also found a significant effect of instructions on type of response, which is considered below.

One of the influences that has been proposed to operate through schooling is training in giving synonymic definitions for words, replacing the functionally based sentence definitions used by young children. In a test of this hypothesis, Masters (1969) gave a word association task and a definition task using different words to children between 4 and 9 years. He found a correlation with age for both syntagmatic responding and functional definitions. The correlation between the two variables was positive and significant but low (.27). A study with somewhat older children (Grades 4, 6, and 8) by Shepard (1970), however, found no correlation between syntagmatic responses and functional definitions for the same words. Further, functional definitions increased over this age range when complex functional definitions incorporating synonyms were included.

Although these two phenomena (functional definitions and syntagmatic responding) may be related, it seems unlikely that training in definitions is the unique contribution of schooling to word association responding. Some more fundamental, common causal factor might be looked for. In this pursuit, the simultaneous application of several tasks, all

designed to probe the same underlying structure, is a reasonable strategy. Cramer's (1972) study using the false recognition method found that different organizational factors were important for different tasks. A later study using the same methodology (Cramer, 1973) found a developmental shift in the extent to which generalization errors are made to synonyms (young) or antonyms (older), which seems to implicate a shift within the paradigmatic structure. Hall and Halperin (1972), using a similar method with preschool children (mean age 41 months), found a significant tendency to make false recognition errors to both verbal associates and superordinates, and, in another experiment, to acoustically related words as well.

Three recent studies have attempted to use a variety of related tasks probing children's memory and semantic abilities in order to shed light on the meaning of the syntagmatic-paradigmatic shift. In the first of these, Lippman (1971) presented a 12-word list (6 nouns and 6 adjectives) for both free association and a word-pair task in which each word was paired with its most common adult response (in most cases a contrast response) and the child was asked to give the reason that the two words "go together." The subjects were kindergarten, second, fourth grade, and college students. Lippman found the expected increase in paradigmatic and contrast responding in the word association task, which was especially marked between second and fourth grade, and a related increase in nominal word-pair-belonging relations for nouns ("they're both rulers, animals, furniture") and dimension (length, size, temperature) or opposite relations for adjectives. There was also a more gradual increase in relational responses to nouns ("chair can slide under table," "cats chase dogs"). Perceptual reasons, focusing on a shared perceptual attribute, and functional reasons, mentioning what each thing does although they are different ("dogs bark, cats meow"), declined for nouns over the age range studied, as did examples and other inadequate adjective responses. Paradigmatic and contrast responding were, not surprisingly, correlated with age and with nominal, opposite, and dimensional reasons.

Lippman interpreted her results as supporting McNeill's (1966) theory of semantic feature acquisition, in particular as demonstrating the importance of the acquisition of superordinate features (e.g., animals) as found in the nominal reasons for the noun word pairs. Her results dovetail with findings from other cognitive tasks showing a decrease in the reliance on perceptual or functional bases for categorization (e.g., Inhelder & Piaget, 1964; Olver & Hornsby, 1966). Her results seem to be more reasonably interpreted, however, as indicating the increasing ability of the child to *use* superordinates in cognitive and linguistic tasks of different types rather than in the acquisition of the semantic feature associated with the superordinate. It has been shown that preschool children will falsely recognize superordinates (Hall & Halperin, 1972, cited above) and that they can generate category members when given the superordinate (Nelson, 1974b). Recall also that Riegel (1970) found more superordinate word association responses with younger children. The question then becomes one of why coordinate category members come to be elicited in the word association task, rather than taking the word association results to mean that the categories have not been acquired.

Francis (1972), in another study using different tasks as an approach to the meaning of the word association results, required 7-year-old children to identify which of two words were alike from three that differed in form class (e.g., noun-verb-verb) and were either semantically related or not. In another task, children were given two words from the same form class and asked to give another like them. She found that children were able to match words and to make associations on the basis of semantic class similarities but were also able to use other paradigmatic associations. Francis argued that

the syntagmatic-paradigmatic shift is caused by a lengthy reorganization of the mental filing system of the preschool child based on abilities to *isolate words from sentences* and to make comparisons across related constituents. Preschool associations are based on making sense together in possible *functional* or *descriptive* sentences wherein the semantic relations between referents are the glue. Later, paradigmatic

associations come to include those based on thoughtful operations of comparison and inclusion. (p. 956)

This hypothesis of cognitive-linguistic reorganization is considered further in the following section.

A final study employing a variety of tasks was designed by Winokur and Tweney (Note 2) to test McNeill's hypothesis of semantic feature acquisition. They used a word association list of common nouns with children between 5 and 9 years of age. In addition to the word association test, they were given a definition task, a classification task (name other words belonging with the stimulus word and give a common feature), a superordinate feature task (give other items that belong with the superordinate word associated with the noun), and a minimal contrast task (give an item most like the stimulus word). They did not find a syntagmatic-paradigmatic shift with their word list; rather they found an increase in both paradigmatic and syntagmatic responses and a decrease in miscellaneous responses with age. (Recall that Entwisle, 1966, found a similar phenomenon in her study, although this has generally been ignored by subsequent researchers.) Using a multiple regression analysis, they found a difference in the types of definitions given by paradigmatic and syntagmatic responders (superordinate definitions given by paradigmatic responders and functional definitions given by syntagmatic responders). However, syntagmatic responding increased significantly with the number of correct superordinate definitions and number of correct superordinate feature matches, indicating that syntagmatic responders know and can use superordinate features to cross-classify lexical items. Winokur and Tweney's (Note 2) conclusion is worth quoting:

McNeill's theory appears correct only in the broad sense that syntagmatic responders provide different responses to some semantic tasks. However, contrary to his theory, not only do syntagmatic responders have a great deal of information appended to lexical items, but both they and paradigmatic responders appear to have similar semantic information available. Hence, these findings suggest that paradigmatic and syntagmatic responding may reflect differences in the child's *utilization* of similar information, rather



than differences in the amount or kind of information present in the lexicon. (p. 6)

### Discussion

The burden of evidence reviewed thus far suggests that the syntagmatic-paradigmatic shift, to the extent that it occurs at all, represents a reorganization of existing knowledge or a difference in the utilization of information, rather than the acquisition of new information about the semantic features of syntactic classes of words. The two principal surviving proposals as to what the changing characteristics of children's word associations may signify are (a) a change in the child's conceptual organization and (b) a change in the nature of the child's interpretation of the task, that is, a shift in the meaning of the word association data. Let us consider each in turn.

Miller (1969) concluded that the word association task reflects predication such as *X is Y* or *X has Y*. Similarly, many recent models of memory (e.g., Anderson & Bower, 1973) have proposed that semantic information is stored in propositional form. On the basis of stored knowledge, one can make inferences about objects and events that permit predictions about new inputs, both linguistic and nonlinguistic. This stored knowledge will be of many kinds: perceptual, functional, relational, logical, and even episodic. Let us assume that some part of this knowledge is elicited when the person is asked to give free word associations. Presumably such responses will represent the most salient level or the topmost level of knowledge for any given word concept. Various conditions will be expected to influence which stored information may be aroused at any given time, including recency of acquisition, frequency of use, instructions to respond, personal interest, and whatever is meant by cognitive style.

From this point of view, word association data will tell us less about what children have or have not learned about the language or the world (as the language and memory structure theories would have it) than about what aspects of the information associated with different concepts is most salient at different ages. What kinds of predication are children

most inclined to make? Here the logical analyses of Riegel or the cognitive analyses of Moran and his colleagues are more relevant than are the syntagmatic or paradigmatic classifications. If certain kinds of predication *never* show up, we may ask whether that is because they *cannot* show up or whether they simply are not salient. In this regard, recall that Riegel (1970) found that younger children used *all* possible logical relationships and older children concentrated on only a few of these (e.g., coordinates, contrasts, and similars). It may be, then, that the increasing use of paradigmatics among older school children reflects a more sharply defined hierarchy of relationships that has become salient to a larger segment of the population.

Do form class differences make sense within this framework? We have seen that nouns tend to elicit paradigmatic responses at all age levels, whereas adjectives shift from syntagmatic to paradigmatic and verbs tend to remain dominantly syntagmatic throughout development. Many writers have assumed that nouns must undergo a similar syntagmatic-paradigmatic shift, but at an earlier age than has usually been studied, despite Entwisle's (1966b) data showing "primitive noun responses" among preschoolers. There are few data available for children under age 5. Moran's (1974) report on young Japanese, Taiwanese, and American children, however, found enactive responses dominating, implying a syntagmatic stage for nouns. Moreover, unpublished pilot data collected by Halperin (Note 3) from 20 children between 3 years 4 months and 4 years 4 months, using 44 words from the Entwisle (1966) and Palermo and Jenkins (1964) norms, found as great a tendency for nouns to elicit syntagmatic responses at this age period as for other word classes; about 85% of the responses to both groups of words were syntagmatic. This is one of the highest percentages of such responses found for any form class at any age, and it may indeed be a reflection of that often elusive syntagmatic stage.

More important, it may be an indication of a significant conceptual development. As noted above, the kinds of logical relationships

that nouns enter into would appear to be primarily paradigmatic (i.e., categories or coordinates, part-wholes). But situational relations (actions, functions, locations) are likely to be syntagmatic. In the pilot study just cited, over half of the high-frequency responses were actions or functions of the stimulus word, whereas only 18% were noun responses and 5% were attributes. Thus, these young children did seem to be primarily set to give responses that reflected how things were used, or their relations in the real world rather than in logic or language. The implication is that their words at this point are not organized linguistically or semantically but according to conceptual relationships derived from active perceptual experiences. That this derivation and its involvement in semantic organization is not confined to young children is implicit in Bransford's (1974) recent argument regarding the interpenetration of real-world relations and propositional meanings, as well as the arguments put forth by Schank (1976) about the importance of episodic knowledge in conceptual organization.

It is apparent, however, that by school age or later, children use logical classifications at least some of the time, and these begin to appear in word associations to some degree at this time. Superordinate, as well as coordinate, associations appear in the data, exemplifying predications of the type *X* has a *Y* (part-whole) or *X* is a *Y* and necessary inferences such as *X* and *Y* are both *Z* or *X* is in the same class as *Y*. At this time, too, adjectives as responses to nouns increase (Entwisle, 1966), indicating a new interest in the properties of objects, perhaps the shared properties of objects from the same class.

The evidence accumulated by Moran (1966), Penk (1971), and Cramer (1974) in regard to the kinds of relations reflected in children's word association data is relevant to this hypothesis. Recall that Moran originally proposed four types of relations that would appear in a developmental sequence: perceptual (apple-red), functional (pipe-to-bacco), concept related (school-building), and dimension related (hot-cold). The developmental sequence has not, however, been verified. Dimension relations have appeared

importantly in experiments with 6-year-olds, whereas perceptual relations seem actually to be a more advanced form of response, if one takes the occurrence of noun-adjective versus noun-verb responses as a rough measure of perceptual and functional relations.

A possible explanation of these discrepancies is the lack of clarity in regard to the expected development of concepts and conceptual relationships. Some classifications (e.g., perceptual, enactive, functional) are based on the properties, functions, and relations of instances of the *single* concept named by the lexical item. Others (relational, synonyms, coordinates, and contrasts) are based on relations between *two* concepts. Superordinate, whole-part, and nominal pairing are intermediate in this scheme in that they relate a concept at one level to its dominating category or to a part of the thing named, which is itself a lexicalized concept. That is, they represent vertical rather than horizontal relations between concepts (see Figure 1). Thus, on the one hand, there may be a progression from responses related to *single* concepts (their properties, qualities, and functions) to *vertical* relations *between* concepts, relating them to superordinates, subordinates, parts, and wholes, to *horizontal* relations between concepts, in which concepts that are both included in the same superordinate category will be related to each other. Note that this implies building relations between coordinates *through* the superordinate relation, contrary to the usual "bottom-up" theories of classification.

On the other hand, the *kinds* of concept properties and functions that are salient in the child's memory may also undergo change with development. Although many investigators have suggested a shift from perceptual to functional to relational or nominal (e.g., Bruner et al., 1966; Kagan, Moss, & Sigel, 1963) as the basis for relating or categorizing objects, this does not show up in the word association data. It is likely that much of the inconsistency here is in the definition of terms. *Function* may refer variously to what things do (dog-bark), what they can be used for (pipe-smoke), and how they are related to other things (pipe-tobacco). Things may be

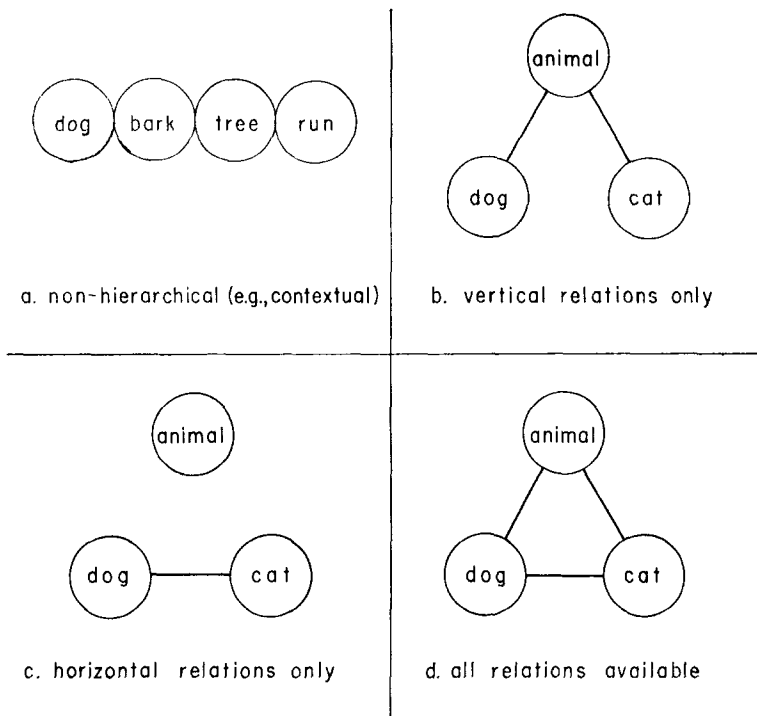


Figure 1. Relationships between words revealed in word association responses.

defined functionally in relation to the responder (ball-throw), in which case the response is also enactive, or, at the other extreme, functionally based classifications may be highly sophisticated and abstract (e.g., lion-carnivorous). The term *perceptual* is almost as multidimensional and ambiguous as *functional*. Further, not all of these possible applications or definitions will apply to any given concept domain. Not only does the kind of information stored with a concept vary with conceptual development but concepts differ among themselves in the appropriation of kinds of information. For the most obvious case, for example, adjectives that do not have opposites (e.g., colors) will not have dimensional contrasts stored with them, and such contrasts will not, therefore, be elicited on word-association tasks.

On the basis of these observations, we can outline a probable course of development of semantic and cognitive memory that is being partially reflected in the word association data as follows. From the earliest stage of word learning, words become associated with

concepts that have stored possible functional relations and definitional perceptual attributes on the basis of the child's episodic experience (cf. Nelson, 1974a). These conceptual structures form the basis of possible sentences incorporating the word. If word association data could be obtained at this age, they would likely reflect actions, locations, possessors, and objects in their experienced spatial or temporal contiguity with the object-concept in question. Schank (1976) has in fact presented some examples of natural associations of this kind from his 2-year-old daughter, representing her first and most salient associations with the word concept. The responses from preschool children, as Halperin's (Note 3) data indicate, would represent real-world situational information associated with the single concept represented by the word.

It is not the case, however, that the concepts of young children are totally uncoordinated with one another; the child builds up many common and natural categories, such as animals, vehicles, clothing, and furniture, and these can be elicited either by direct question-

ing (e.g., Harris, 1975; Nelson, 1974b) or through indirect means (e.g., Hall & Halperin, 1972; Steinberg & Anderson, 1975; Higgins, McGarry, & Huttenlocher, Note 4). Thus, some use of vertical hierarchical relations is found in the preschool period, and this is reflected also in the early appearance of superordinates in word association data.

Young children do seem to have difficulty, however, coordinating group members, that is, operating on more than one member of a category at the same hierarchical level at the same time. Consider the response given in Lippman's (1971) task in which the young child is asked to say why dogs and cats are alike: "dogs bark and cats meow." The child in this case has not found a single attribute that is common to both; rather he has hit on a dimension along which they differ. Both *dog* and *cat* are subsumed under the category *animal* through the animal-sound function, but the child cannot yet coordinate them; he is not able to consider their relation to each other through the animal category explicitly, although he can make the connection implicitly. This is consistent with the fact that coordinates appear later in word association data than do superordinates.

In short, the present proposal is that the child has many layers of relations, properties, and functions available for any concept at any stage in development. What will be elicited in the word association task will depend upon the salience of particular relationships for a particular word concept. As the child becomes able to operate explicitly with coordinate concepts during the school years and as these operations are reinforced by the kinds of tasks required by the school, these relations will become more salient and will tend to be elicited by the word association task, thus leading to an increase in contrast and coordinate (both paradigmatic) responding for nouns and dimensional (including opposites) responding for adjectives.

Although the word association task can be expected to reflect this general development, it does not seem to be a very sensitive indicator of development, at least as it has been used thus far. A basic reason for this is that up to this time, words

from word association tasks have been chosen on the basis of the common responses they elicit, their form class, frequency of use, and use in previous word association lists. If one wants to know which relations are most salient in the child's semantic memory, however, the list to be tested must be carefully constructed so that it may elicit such relationships as coordinates, superordinates, functions, and properties with equal probabilities. Stimulus words as well as response words should be classified according to their conceptual relationships.

More important, however, the word association task should be considered only one of many tasks that may reflect the organization of conceptual memory. Construction of additional tasks that will elicit information about the characteristics of semantic memory, particularly for use with preschool children, is a job of the first priority. As Blank (1974) has emphasized, we have put so much stress on the inadequacies of the preschool child in using language that we have lagged far behind in understanding the real progress that is being made and the actual developments that are taking place during this period. Certainly the course of development outlined above indicates the need for renewed study of verbal relationships during this age range. What the limited word association data from preschool children seem to reflect, however, is not only conceptual development but probably also a change in interpretation of the task.

There is ample evidence that young children interpret task demands in ways that differ systematically from those of older children and adults. For example, Flavell (1970) and his colleagues have concluded that for the preschool child, there is no difference between perceiving (or attending to) something and remembering it. The young child does not employ deliberate strategies of memorization. This means that many of the comparisons that one would like to make in regard to ability or competence are invalid because of performance limitations.

Interestingly, shifts in children's task interpretation or task strategy are most often found in the preschool to early school years,

that is, between 4 and 8 years of age. The syntagmatic-paradigmatic shift for adjectives, where it is clearest and most dramatic, tends to occur between the first and third or second and fourth grades, that is, between 7 and 9 years of age. Both age ranges suggest an effect of schooling, and this suggestion is bolstered by Sharp and Cole's (1972; Note 1) data from the Kpelle and Yucatan groups (cf. Scribner & Cole, 1973). If schooling has an effect, it is likely to be an effect derived from the child's general experience with verbal tasks and teacher demands.

A change in interpretation of the task demands is also implicated in some of the studies that have shown effects of instructions on word association responses. Sharp and Cole (Note 1) found that giving noun-noun examples in instructions greatly increased noun responses for all subjects over a condition in which mixed examples were given, but the effect was especially marked for the older schooled subjects. An even more striking effect was produced by Bugelski (1970), who asked college students to respond with the first "thing" they thought of, rather than the first word, and reported a preponderance of image rather than verbal responses. This effect has important implications for interpreting the responses of young children, whose differentiation between words and the things they refer to is often in doubt.

A common response to the problems children have in operating on a purely verbal level is to use pictures rather than words to represent concrete objects, and one of the few published studies of word association with preschoolers (Albright & Albright, 1951) used pictures rather than words as stimuli. However, as Blank (1974) has emphasized, young children will rely on visual-spatial information whenever it is available, rather than on language, and the task of associating to pictures is probably a very different matter than is associating to words, even for older subjects, as Bugelski's (1970) data imply. Furthermore, young children have particular difficulty with word association tasks, which are not personally meaningful and are in fact deliberately meaningless. They are likely to interpret the task in an egocentric, but mean-

ingful, fashion regardless of what instructions they are given; or, they will interpret the task playfully and produce "silly" responses. Thus, a very likely explanation of multiword responses, primitive noun responses, and clang responses is that they result from a different interpretation of the word association task and represent attempts either to make sense or to be playful, the two available modes of interaction that the child has thus far acquired.

By 7 or 8 years of age, however, most middle-class children in our society have probably acquired, in addition to the meaningful and playful modes, a "task" mode, which is available when they are confronted with the word association task. Therefore, it is probably safe to conclude that the shift in response types that is observed between 7 and 10 years does reflect cognitive reorganization or increased availability of conceptual information of the types discussed above. It may be, as suggested earlier, that some of the differences observed at earlier ages also stem from this kind of development, but to determine this would require more sensitive experimentation that would directly test hypotheses as to the nature of the younger child's organization.

### Conclusion

In summary, two explanations for the shift in word association responses seem to be needed, one concerned with the child's changing ability to deal with nonmeaningful verbal tasks and the other, with probable changes in the availability of hierarchical conceptual relationships. Additional word association data employing word lists that are better controlled for possible logical relationships of the stimulus words might shed new light on these issues.

However, we began this review with the hope of discerning the meaning of the syntagmatic-paradigmatic shift, whether cognitive, linguistic, or both. We end on a note not far removed from Galton's (cited in Esper, 1973) view that associations "lay bare the foundations of a man's thoughts with a curious distinctness" (p. 88). At the same time, we conclude, in agreement with Kintsch (1972),

that "association is a fairly complex phenomenon which needs to be explained in terms of more elementary processes" (p. 251), and the elementary processes have been explored at length above. In the course of this exploration, the syntagmatic-paradigmatic shift, once seemingly so clear and reliable, has tended to dissolve or resolve into unanticipated, complicating elements. A theoretical synthesis of the parts has been suggested, and its value remains to be tested with new data and new paradigms.

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