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Introduction

This third volume of the Kansas Working Papers in Linguistics covers a diversity of topics which range from general linguistic theory to child language. To provide coherency, we have, therefore, grouped the papers into a number of major sections as reflected in the Table of Contents. What follows is our attempt to capture the major point of each paper, organized according to those sections.

The first paper is Ken Miner's "On the Notion 'Restricted Linguistic Theory': Toward Error Free Data in Linguistics." Miner maintains that linguistic theories must be more firmly grounded on secure data bases. He contends that the attempt to construct theories based on limited data from a few languages leads to serious errors. Rather than seeking to construct general theories, Miner advocates that we should limit ourselves to "restricted theories" which may be confined to one language family.

The Phonetics-Phonology section contains four very different papers. Geoff Gathercole's research demonstrates that instrumental evidence can play a crucial role in phonological analysis. His instrumental research on strong and weak stops in Kansas Potawatomi clearly indicates that the underlying contrast between these series is preserved even in final positions, not neutralized as heretofore supposed. In addition, the paper provides evidence for the interaction between stress and the syntactic structure of Potawatomi.

Mehmet Yavas' paper on the implications of borrowing for Turkish phonology provides a modus operandi for the analysis of languages which have lexicons replete with loan words. In the case of Turkish, previous analyses, though recognizing the importance of loan words, have neglected to incorporate them into their descriptions. Drawing evidence from borrowing, Yavaş proposes that current treatments of vowel and consonant harmony should be drastically revised: consonant harmony plays the pivotal role in determining the vowel choice, not conversely. By so analyzing Turkish, he is able to account for a wide range of data unaccounted for by treatments which assume the primacy of vowel harmony.

Robert Rankin's study of Quapaw as a dying language supports the evidence from child language acquisition, aphasia, and comparative linguistics that there exists a universal hierarchy of sound-type complexity. As Quapaw functioned less and less as a native language, principled changes occurred in its phonology: the types of series lost and the order in which they were lost were determined by their relative complexity, with the most marked being lost first.

Code-mixing is the topic of Maria Dobozy's paper. Taking a letter written by a bilingual American-Hungarian as her data, Dobozy describes the phonological rules that are operating in such a code-mixing, with special emphasis on vowel harmony. She demonstrates that vowel harmony is an important process in the system and plays a central role in the rendition of English words by such speakers.

The first paper in the Syntax-Semantics section is Gerald Denning's, "Meaning and Placement of Spanish Adjectives." Denning attempts to clarify the problems of the differences in the meaning and treatment of restrictive adjectives in three dialects of Spanish. He argues that a strict generative semantic approach will not handle the data and suggests an analysis within the framework of pragmatics.

Virginia Gathercole provides a cross-linguistic study of the use of the deictic verbs "come" and "go." She formulates the uses of "come" and "go" in eleven languages by extending Talmy's (1975) model for verbs of motion to include a presuppositional component. Gathercole divides the contexts in which "come" and "go" are used into (a) immediate deixis and (b) extended deixis. Her goal is to characterize the use of deictic verbs of motion in the eleven languages studied by a limited number of assertional and presuppositional components and thus suggest a possible universal framework for such verbs.

Whereas Denning and Gathercole focus on language related issues, Juan Abugattas takes a more general, philosophical approach in his discussion of speech acts. He claims that previous speech act analyses used the sentence as the basic unit. Abugattas believes, however, that we must go beyond the sentence: "social reality" dictates that we categorize sets of sentences into speech acts, which he calls "complex acts."

Kurt Godden's paper, "Problems in Machine Translation Between Thai and English Using Montague Grammar," brings us to a specific language oriented concern: how to mechanically translate sentences, in particular those containing restrictive relative clauses, from one language to the other. He enumerates the problems related to such a task and proposes a solution involving meaning postulates and context within a Montague framework.

Historical and Comparative Linguistics is represented by Karen Booker's "On the Origin of Number Marking in Muskogean." Booker reconstructs two proto-Muskogean number markers, one dualizer and one pluralizer which were first used with intransitive verbs of location and then generalized to locative transitives. Later these markers spread to intransitive non-locatives. Booker maintains that the highly complex suppletive verb system of Muskogean arose when these markers lost their original meaning.

Three papers, Esther (Etti) Dromi's analysis of the acquisition of locative prepositions by Hebrew children, Gregory Simpson's study of children's categorization processes, and John More's review of relative clause research, constitute the Child Language Acquisition section of the working papers. Dromi's study, which is one of the few published works in the acquisition of Hebrew, compares the order of acquisition of Hebrew locatives with Brown's (1973) order for English and also with Slobin's (1973) universals. Among her findings, Hebrew al ("on") is acquired later than English on. Her findings for Hebrew locatives are particularly interesting in that they allow a comparison of the acquisition of prefixes with that of full prepositions. Her conclusions point to the pivotal role that morphological complexity plays in the order of acquisition of locatives in Hebrew.

Gregory Simpson's major concern has to do with the process by which children form conceptual categories. He argues, on the basis of experimental data, that overextensions should not be taken as evidence for category formation. His data suggest a distinction between concept formation and object naming, a distinction not made in previous studies. "Function," what objects can do or what can be done to them, determines how that object is conceptualized, but an object's perceptual properties may determine the name given to it. Therefore, "the child may know that two objects don't really belong together, but gives them the same name until he has more evidence."

The acquisition of relative clauses has been a topic of great interest among psycholinguists. John More presents a valuable critical review of the recent literature with special emphasis on the debate between Dan Slobin (1971), Amy Sheldon (1974), Michael Smith (1975), Tavakolian (1977), and deVilliers _et al_. (1976). The _Minimal Distance Principle_, the _Noun-Verb-Noun Strategy_, the _Parallel Function Hypothesis_, and Slobin's operating principles are compared, along with the formulations of deVilliers and Tavakolian.

Five major topic areas are represented in this third volume of the _Kansas Working Papers in Linguistics_. Each paper in its own way is a contribution to linguistic scholarship: some provide evidence in new areas of inquiry, others bring new evidence to bear on old questions, while still others suggest future courses of research.

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STATIC AND DYNAMIC PROPERTIES AS BASES FOR CHILDREN'S CATEGORIZATION

Greg Simpson

In the study of the acquisition of word meanings, a central issue has concerned the basis on which children categorize objects in the environment, and how they extend names to these categories. What cues does a child use that allow him to group objects together under a common name?

Clark (1973, 1977), in outlining her Semantic Feature hypothesis, has argued that children name objects on the basis of common perceptual features. According to this theory, when the child first applies a word to some object, only a small subset of the features of that object determine the meaning of the word for the child. For example, use of the word dog for the child may be determined solely by the feature four-legged. Semantic development consists of acquiring additional features in the determination of the extension of words. Clark argues that the earliest features that the child uses in determining what objects may be named by the same word are perceptual in nature. That is, the same name is given to objects that are similar in appearance, most notably in shape, but also occasionally in other dimensions, such as size or texture.

Nelson (1974), on the other hand, has outlined a theory arguing that the child's early concepts are built up around a "functional core." Objects are categorized on the basis of what they do, and the ways in which they can be acted upon. For example, the first feature that a child might acquire in connection with a word such as ball is that he and his mother are able to roll it to one another. In Nelson's theory, static perceptual attributes are only important to the extent that they can be used to predict the functional or relational attributes of an object. In the example above, roundness may only be noticed because it is correlated with the ability to roll.

A good deal of the evidence bearing on this debate of the primacy of either perceptual or functional features has come from analysis of overextensions of concept names in children's speech production. Overextension refers to the tendency of a child to apply a name to a concept that is broader than the adult concept delimited by the same word (e.g., a child may call all four-legged animals "dog"). Most of the literature on overextension in production supports Clark's view (e.g., Bowerman, 1977). Such data have indeed shown that when overextension occurs, the child appears to be assigning objects a common name on the basis of similarity of appearance.

Although the two issues are closely related, care should be taken not to confuse the extension of a word to a category with the formation of the category itself. Clark (1973) and others (Dale, 1976) have warned that the features that a child uses to extend a word to a group of objects tells us nothing about what features the child is able to distinguish in the objects themselves. Anglin (1977) and Huttenlocher (1974) have noted that speech production data are biased toward the detection of overextensions, and that a comprehension task may be more sensitive to a child's ability to distinguish objects. In other words, the extension of a word may not always be an accurate reflection of the categorization process itself. This possibility should be taken into consideration in any attempt to explain the mapping of a child's developing linguistic abilities onto his knowledge of the world. We should try to understand what kinds of features the child uses to distinguish objects independent of linguistic factors. That is, of which attributes of objects is the child first aware?

McCauley, Sperber, and Roaden have examined the functions of properties in the categorization process itself, using a paradigm very different from the study of overextensions. Their subjects heard statements asserting object-property relationships that were either true (e.g., "A robin has wings") or false ("A robin has wheels"). The subjects were to decide upon the truth or falsity of these statements as rapidly and accurately as possible. Retarded adolescents were able to verify statements asserting dynamic property relations (e.g., "A robin can fly") more rapidly than those asserting static property relations ("A robin has wings"), but there was no difference between property types for normal adolescents. Although not a test of how normal children acquire word meaning, this study suggests that by using a measure other than overextension in production we may shed new light on the processes of categorization and extension of terms.

The task used in the present experiment was an extension of one used by Rosch, Mervis, Gray, Johnson, and Boyes-Braem (1976). In that study, children were shown sets of three pictures and asked to indicate which ones showed the "same kind of thing." Responses were considered correct if the child selected objects that belonged to the same semantic category. Performance of the younger subjects (three years old) was different at different levels of abstraction. While they were unable to group objects successfully at a superordinate level (e.g., Animals, Plants), they could group correctly at what Rosch calls the basic level (e.g., Birds, Flowers), which most closely reflects the correlational structure of objects in the world. Rosch et al. (1976) have also shown that objects within a basic level category share a large number of perceptual features, and also the motor movements that are used when interacting with them. Anglin (1977) has argued that the basic level is also the one at which children first learn names for objects, normally using words such as "dog" before either "animal" or "collie." Unfortunately, nothing in the developmental study by Rosch et al. allowed any statement to be made concerning the features children might have used in making their categorizations.

In the present experiment, two tasks were used. The first, which will be called the free sort, was the same as that used by Rosch et al.: Shown pictures, children were to select those that showed the "same kind of thing." In the other task, the property sort, the children were again shown sets of pictures and asked to select those that had some specific property in common, which was either static (something the object had) or dynamic (something the object did or that could be done to it). The static-dynamic distinction was used because, although it is very similar to the perceptual-functional dichotomy, the static and dynamic categories seem to be more mutually exclusive. For example, while movement is clearly a dynamic rather than a static property of automobiles, it is both perceptual and functional.

The present investigation was designed to test whether children would be better able to use either static or dynamic properties for grouping objects, and whether performance under these conditions would be better than when no property was given. Sorting trials were also divided into superordinate and basic level sorts to see if any difference between property types might vary as a function of the level of abstraction. Because of the relative ease of basic level sorts, and because of the commonality at the basic level of both perceptual attributes and motor movements (Rosch et al., 1976), the superordinate level may be more sensitive to any differences between property types that might exist.

Method

Subjects

Twelve subjects served in the study, four children each of ages three, four, and five years (mean ages: 3;6, 4;9, and 5;5, respectively), from a local preschool. The native language of all was English, and none had any known visual or auditory impairment.

Stimuli

The stimuli consisted of 24 color drawings from a set of materials for teaching reading.[2] Three superordinate categories were selected, each in turn containing two basic level categories. The superordinate categories, with their respective basic level categories were: Animals (birds and dogs), Plants (trees and flowers), and Vehicles (cars and boats).

Sets of four pictures were used for each of the sorting trials. Sets for superordinate sorts were made up of one picture from each of the basic level categories within the relevant superordinate (target items), and one picture from each of the other superordinate categories (distractor items). For the superordinate Plant, a set might consist of tree, flower, car, and dog. Four such sets were made for each superordinate so that each picture was used once as a target item and once as a distractor.

Basic level sets were composed of two pictures from the same basic level category and one picture from each of the other two superordinates. A set for the basic level category Flower might be composed of rose, tulip, car, and dog. Two sets were made for each basic level category (four in each superordinate).

Procedure

The children were tested individually in two phases on consecutive school days. In the free sort phase, they were presented with nine sets of four pictures, one set at a time. Three of the sets were to be sorted according to a superordinate category, and six according to a basic level category. The greater number of basic level sorts is due to the hierarchical organization of the categories. Each child therefore received one set from each of the nine categories.

On each trial a set of four pictures was placed in a random order in a row in front of the child, who was instructed to point to the pictures that were the "same kind of thing." After the child responded, the experimenter asked him why he had chosen as he had. In order to be scored as correct for that trial, the child had to indicate the proper pictures and state a taxonomic reason for doing so (e.g., "They're both birds.") If the child stated some other reason for responding as he had, he was again asked if there were any pictures that were the same kind of thing, and given another chance to choose and state a taxonomic reason.

In the property sort phase, each child was shown 12 sets of four pictures, one set at a time. Again, half of the sets were to be sorted at the superordinate level, and half at the basic level. At each of these levels the children were instructed to sort according to a static property on half of the trials, and according to a dynamic property on half. Presented with a set for the superordinate category Animals (e.g., bird, dog, tree, and car), the child might be instructed "Show me the pictures of things that have skin" (static), or "Show me the pictures of things that can walk" (dynamic). Presented with a set for the basic level category Birds (e.g., robin, duck, flower, and boat), the child might be instructed to indicate the pictures of those items that "have feathers" (static), or "can fly" (dynamic). All of the properties used in the study are presented in the Appendix. If the child did not correctly indicate the target items on the first try, the property was repeated and the child was given a second chance to select the correct pictures. Each subject received the twelve sets in a different random order. The association of picture set with property type was counterbalanced such that each set was sorted according to a static property by half of the subjects at each age, and according to a dynamic property by half.

Across subjects at each age, for both free and property sorts, each picture was used as a target item an equal number of times under each experimental condition. No two items ever appeared as a target pair more than once for a single subject.

Results

Free Sort

The percentages of correct superordinate and basic level sorts for each age group are shown in Figure 1. Quite clearly, the younger subjects were able to perform better at the basic level than at the superordinate, but for the five-year-olds there was no difference. There was improvement with age at both levels of abstraction, but this improvement was much more dramatic for the superordinate level.

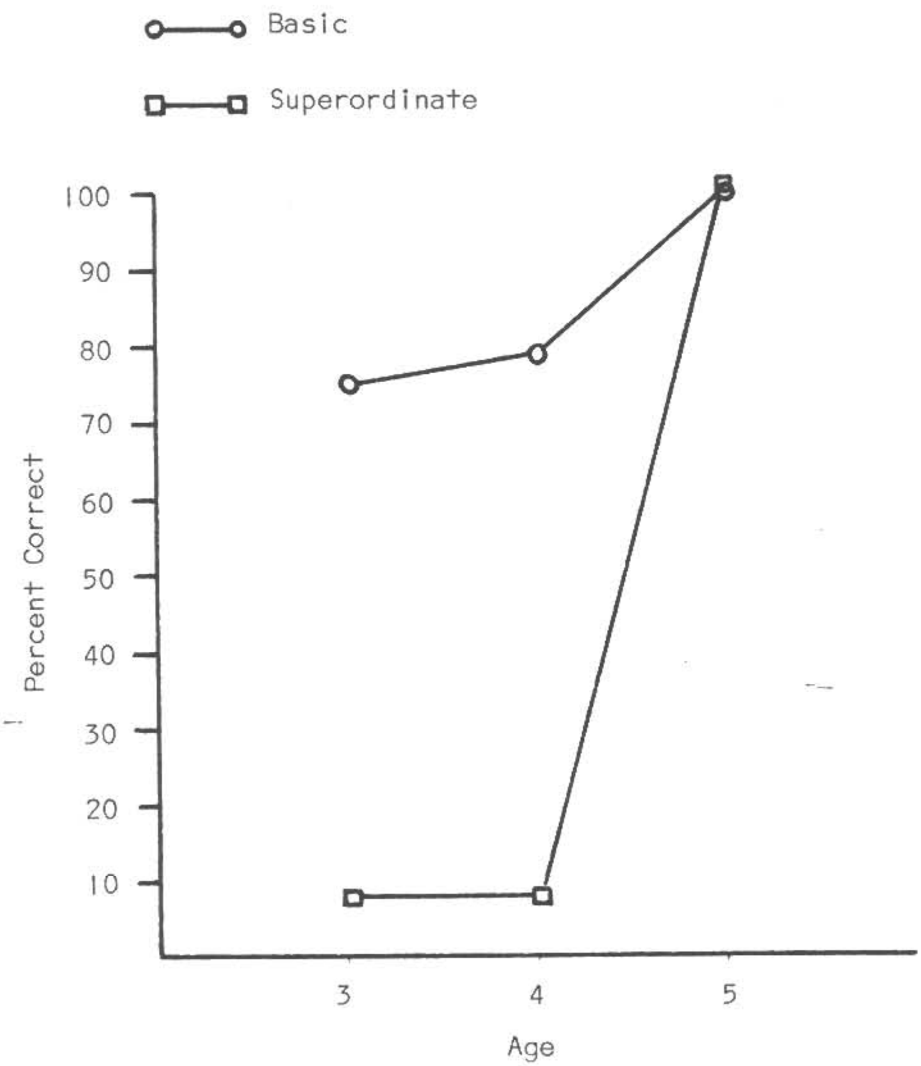

Figure 1. Percent correct superordinate and basic level free sorts by each age group.

These conclusions were supported by a 3 by 2 mixed analysis of variance performed on the arcsin transformation of the proportion-correct scores, with age (three, four, and five) as the between-subjects factor, and level of abstraction (superordinate vs. basic) as the within-subjects factor. The main effect of age is significant, $F(2,9) = 57.05$, $p < .001$. Tukey B pairwise comparison tests show that the five-year-olds performed significantly better than either the three- or four-year-old groups, which did not differ from one another. There is a significant main effect of level of abstraction, $F(1,9) = 45.89$, $p < .001$. Performance at the basic level was better than at the superordinate, but this effect is qualified by the significant interaction of level with age, $F(2,9) = 11.56$, $p < .005$. A test for simple main effects confirms what can be seen in Figure 1, and shows that for the two younger groups, basic level performance was better than superordinate, ($Fs(2,9) = 30.76$ and 37.95 for three- and four-year-olds respectively, both $ps < .001$), while for the five-year-olds there was no difference in performance at the two levels, $F < 1$.

Property Sort

Overall, the children performed better on the property sorts than they did on the free sorts. Across ages and levels of abstraction, 84% of the property sorts were solved correctly, while only 69% of the free sorts were.

A 3 by 2 by 2 mixed analysis of variance was performed on the number of correct sorts for each subject under each level of abstraction and property type. Age (three, four, and five) was again the between-subjects factor, and level (superordinate vs. basic), and property type (static vs. dynamic) were the within-subjects factors.

Overall, there is no difference among the three age groups, $F(2,9) = 3.25$, $p > .10$, probably due to the relative ease of the property sorts. Again, basic level sorts were easier than superordinate, $F(1,9) = 13.68$, $p < .005$. However, this effect is qualified by an interaction of level with age, $F(2,9) = 9.23$, $p < .01$. A simple main effects test of the level by age interaction shows that while basic level performance was significantly higher for the three-year-olds, $F(1,18) = 5.13$, $p < .05$, no difference is found between levels for four- or five-year-olds.

The difference between the property types is not significant, $F(1,9) = 2.00$, $p > .10$, nor is the property type by age interaction, $F(2,9) = 1.67$, $p > .10$. However, the interaction of level with property type is significant, $F(1,9) = 21.47$, $p < .001$. Analysis of the interaction shows that, at the superordinate level, dynamic properties lead to successful sorts significantly more often than do static properties, $F(1,9) = 27.43$, $p < .001$, while at the basic level, there is no difference between property types, $F(1,9) = 1.71$, $p > .05$. The nature of this interaction can be seen in Figure 2.

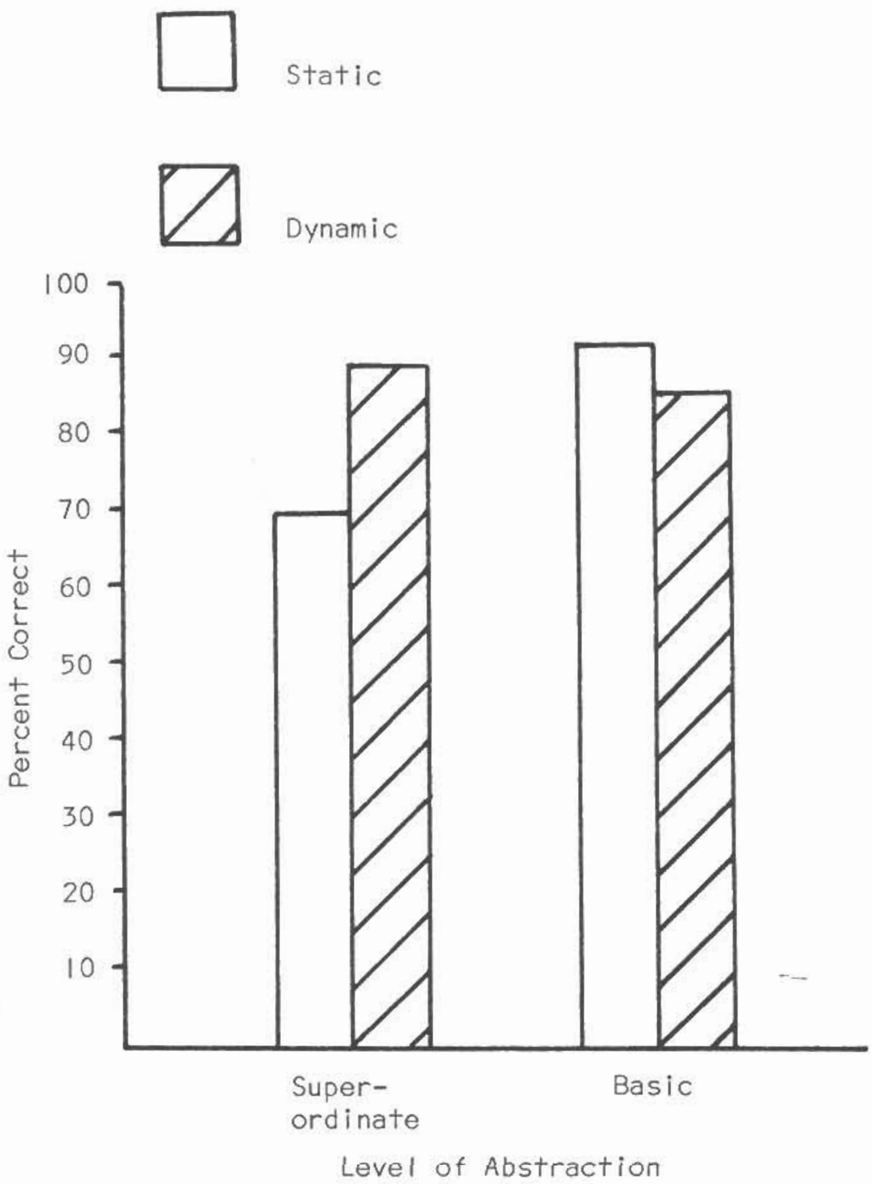

Figure 2. Percent correct superordinate and basic level property sorts with static and dynamic properties, averaged across age groups.

The differences between property types at the different levels of abstraction can best be understood in light of the significant three factor interaction of age, level, and property type, $F(2,9) = 15.63$, $p < .005$. This interaction was examined by performing simple main effects tests on the level by property type interaction separately for each age group. For the three-year-olds, dynamic properties resulted in better performance at the superordinate level, $F(1,3) = 30.63$, $p < .03$, but at the basic level, there is no difference between property types, $F(1,3) = 2.5$, $p > .05$. For the four- and five-year-olds, no differences can be seen between property types at either level. At the superordinate level, the three-year-olds correctly sorted 14 of the 24 property sorts. Of these, three (29%) were by static properties, while ten (71%) were by dynamic. At the basic level, however, 19 of 24 sorts were correct, 11 (55%) by static, and 9 (45%) by dynamic properties. The four-year-olds correctly solved 19 of 24 superordinate sorts, 9 (47%) of these by static and 10 (53%) by dynamic properties. They solved 20 of 24 basic level sorts, ten each by the two property types. Performance of the five-year-olds was perfect under all conditions.

Discussion

At least at the superordinate level of abstraction, the youngest subjects were better able to categorize pictures when they were given a property by which to group them than when they were not. Apparently, the children begin to become aware of the properties of objects in their environment before they are able to use those properties to define categories of objects.

Of the two kinds of properties, dynamic seemed to aid performance more than static. This superiority of dynamic properties, however, was present only in the youngest subjects.

This study concerned itself primarily with the formation of cognitive categories, and did not deal directly with the question of how words are extended to those categories. Although it would be ideal to say that children form and name concepts by the same means, we should be cautious about applying data from one process to the other. It may seem reasonable that the common name a child gives to a group of objects reflects some perceived similarity that has caused a concept to be formed encompassing those objects, but it is possible that this is not the case. The child's categories and their names may only partly overlap, and the child's apparent category names may not actually reflect the categories themselves. Anglin (1977) has noted that overextensions are much more prevalent in studies of production than they are in studies of comprehension. The child may know much more about the structure of the world than his words indicate.

Overextensions in production have led to the conclusion by many that names are extended to objects on the basis of perceptual similarity, while the present study has shown the possibility of developmental primacy of function in the categorization process itself. Taken together, these conclusions argue that children form concepts for objects on the basis of what they do or can be done to them, but give common names to objects on the basis of what they look like. The strength of the argument that overextension indicates that the child extends terms on the basis of perceptual similarity rests on the assuption that the child makes errors in word extension by the same process he uses when he correctly extends a word. It seems at least plausible, however, that the child may normally categorize objects on the basis of common function, and still show frequent overextension based on perceptual similarity. Upon encountering a new object, the child searches for a basis on which to categorize and name it. He may try first to discover the functional attributes that the new object has in common with objects he already knows. Functional similarity may often be less immediately apparent than perceptual similarity, however, and failing to find any functional attributes to guide him in his categorization and naming, the child falls back on perceptual attributes to find similarities with other objects. The child may know that two objects don't really belong together, but gives them the same name until he has more evidence. If this were the case, then overextensions may not really represent overinclusive concepts, but groups of uncategorized objects that happen temporarily to have the same name, and overextensions could thus become a biased reflection of how the child normally learns to categorize.

The fact that a property type difference only appeared at the superordinate level is not surprising in light of what we know about basic level categories. The basic level seems to be the first level at which children learn names for objects (Anglin, 1977), and even by three years of age a child may know a considerable amount about objects grouped at that level, both their perceptual and their functional properties. Also, Rosch et al. (1976) have shown that objects categorized at the basic level share a large number of perceptual features with other members of the same category, and also share the motor movements associated with interactions with them. That is, things that look alike also tend to do the same things, and be acted upon in the same ways. In the basic level property sorts, the type of property given may matter little because of this feature overlap. The properties predict one another so well that it becomes less critical which one is given by the experimenter.

This study employed a static-dynamic dichotomy rather than the perceptual-functional one usually discussed. The two distinctions overlap to a large degree, but it is easier to distinguish static from dynamic properties than it is perceptual from functional. The fact that some properties may be both perceptual and functional is again an indication of the high correlations among properties of objects. For adults, in fact, the relation between corresponding perceptual and functional properties may be so strong that it becomes hard to grasp a distinction between them. For example, the roundness of a ball and its ability to roll are so closely tied that they may be cognitively inseparable for adults. The fact that only the three-year-olds showed a difference in property types indicates that this high correlation of attributes is learned very early.

It seems likely that at some point the child will learn to categorize and name objects simultaneously according to a single consistent strategy. What will be needed is a number of converging measures, both in production and comprehension, that will be more sensitive to the bases that children use to categorize objects and extend names to them, and if the bases are discrepant at some early stage, when and how that discrepancy is resolved.

Footnotes

1 McCauley, O., Sperber, R. D., and Roaden, S. K. Verification of property statements by retarded and nonretarded adolescents. Manuscript submitted for publication.

2 Pictures were selected from two published sets of pictures for teaching language and reading: Word Making Cards, and Language Making Action Cards. Both sets are published by Word Making Productions, Inc., P. O. Box 1858, Salt Lake City, Utah 84110.

Appendix

	Property Type	
Category	Static	Dynamic
Superordinate		
Animals	Skin	Walk
Plants	Roots	Grow in ground
Vehicles	Seats	Take you places
Basic		
Birds	Feathers	Fly
Dogs	Hair	Run
Flowers	Stems	People smell
Trees	Branches	People sit under
Cars	Motor	Rides on street
Boats	Water all around	Rides in water

Properties used in the property sort task

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