Cognitive Development, 3, 285–297 (1988)

Children's Identification of Actors and Patients in Prototypical and Nonprototypical Sentence Types

Roberta Corrigan
University of Wisconsin-Milwaukee

This research examined if children organize language categories around a prototype. Based on previous research with adults, the hypothesis held that the prototypical transitive sentence contains an animate actor and patient and a highly prototypical verb. The question of interest was if factors that contribute to adult judgments of sentence prototypicality (such as actor–patient animacy and verb prototypicality) affect young childrens' accuracy in correctly identifying sentence actors and patients. That is, are children more likely to make correct identifications in prototypical sentences? Sixty-four 2- and 4-year-old children were trained to identify sentence actors and patients in prototypical or nonprototypical sentences and then tested for generalization to sentences of other types. Two factors, verb prototypicality and animacy of sentence participants, combined to influence children's accuracy in actor/patient identification. Regardless of training condition, children produced more correct responses to sentences with animate actors than to sentences with inanimate actors. There was an interaction with verb prototypicality such that it was more typical for inanimate actors to act upon animate patients with what are otherwise low prototype verbs (e.g., low in action, low in intentionality). The results of the study are consistent with the view that similar cognitive mechanisms operate in language and in other nonlinguistic cognitive domains.

INTRODUCTION

It has been suggested that similar cognitive mechanisms might operate in language and in other cognitive domains (e.g., Anderson, 1983). One basic cognitive mechanism is categorization (Bornstein, 1983). Recent research on categorization suggests that not all members of a category are logically equivalent (Rosch, 1983). Instead, members of categories have features that are more

---

This research was supported in part by NIMH Grant #MSMA 1 R03 MH40433-01A1. An earlier version was presented at the Society for Research in Child Development, Baltimore, MD, April, 1987. Special thanks go to Fredrika Harper for acting as experimenter and to John Surber and an anonymous reviewer for careful reviews of earlier drafts of the manuscript.

Correspondence and requests for reprints should be addressed to Roberta Corrigan, Department of Educational Psychology, University of Wisconsin-Milwaukee, Milwaukee, WI 53201.

Manuscript received June 30, 1987; revision accepted December 24, 1987

or less characteristic of the category. Central members of a category are prototypes that are most similar to other category members and most distinct from contrasting categories. Evidence that categorization is based on representativeness rather than formal class logic involving criterial attributes comes from many domains, including the learning, memory, and structure of color terms (Rosch, 1973, 1975), common objects such as furniture or animals (Rosch & Mervis, 1975), or personality traits (Cantor & Mischel, 1979).

Categorization is also basic to human language. There is some evidence that categorization in language may also be based on representativeness rather than criterial attributes for grammatical categories (Bates & MacWhinney, 1982; deVilliers, 1980), locatives (Erreich & Valian, 1979), and sentences (Corrigan, 1986). The research presented in this paper examined if children use the same cognitive principles to categorize sentences as has been demonstrated for other natural categories; that is, do they organize their categories around a prototype, with other category members resembling the prototype to a greater or lesser amount based on shared properties?

The assumption in this research is that one interesting class of sentences describes events. Children's event representations allow them to make predictions about what is likely to occur and to organize their own actions and language around these predictions (Nelson, 1986). The literature offers contradictory suggestions as to what constitutes a prototypical event schema. Slobin (1981) suggested that the prototypical event contains an animate actor who intentionally brings about a physical and perceptible change in the location or state of an inanimate patient by means of direct body contact. This prototypical event is then translated into the prototypical, simple, active declarative sentence (Slobin & Bever, 1982) with animate actor and inanimate patient (Chapman & Miller, 1975; Corrigan & Odya-Weis, 1985). In contrast, Huttenlocher, Smiley, and Charney (1983) suggested that an event in which the self performs a characteristic movement (such as walking or running) is the prototype, which is extended only gradually to include others as initiators of action. Still another view was presented by deVilliers (1980), who assumed that declarative sentences involving two animate beings and a reversible action were prototypical in English. Further support for this hypothesis comes from Corrigan (1986) who had adults rate 512 sentences as to their goodness of fit to the category "English transitive sentence." In general, the most prototypical sentences contained animate actors and animate patients, whereas the least prototypical sentences contained inanimate actors acting upon animate patients.

Although the literature is contradictory about what constitutes a prototypical sentence, it is clear that event schemas and their corresponding sentences include information about multiple factors, including the typical participants, their animacy, and the nature of the action in which they are participating. Features suggested to be important in the prototypical actor include humanness, animacy, motion, and control (MacWhinney, 1982; Osgood & Bock, 1977; Lakoff, 1977).

Factors important to the prototypicality of the verb include action and the ability to produce changes in the patient with no obvious transition between the beginning and completion of the action (deVilliers, 1980; Hopper & Thompson, 1980, Slobin, 1981). In the Corrigan (1986) study described previously, verbs in prototypical sentences tended to be punctual in duration, high in intentionality, high in physical activity, and high in surface contact between nouns leading to a perceptible change in the patient.

There is only a little information about whether or not the same factors influence children's comprehension of sentences. Using a technique adapted from Braine and Wells (1978), Corrigan and Odya-Weis (1985) trained children to place differently colored and shaped tokens on the actor and patients in pictures depicting sentences. Following deVilliers (1980), different groups of children were trained on sentences with different combinations of actor/patient animacy and then tested for generalization to sentences that differed in animacy from those on which they had been trained. Corrigan and Odya-Weis found that the actor category was acquired earlier for sentences with animate actors and inanimate patients (AI) sentences than for sentences with inanimate actors. Unfortunately, the study assumed that AI sentences would be the prototype and therefore did not train children on sentences with animate actors and animate patients (AA). In another study, which was also lacking in all the training groups necessary to provide complete information on all animacy combinations, deVilliers (1980) trained different groups of children to produce passive or cleft sentences about pictures involving AA sentences or AI sentences with either high or low prototype verbs. She found that children in all training groups made the greatest number of major structural modifications when imitating the prototypical AA sentence type; that is, they made more attempts to produce AA sentences.

The present study used the same training technique that had been successfully employed with 2-year-olds in the Corrigan and Odya-Weis (1985) study, but included a group of children trained on AA sentences. The research investigated if factors such as actor and patient animacy and verb prototypicality that contribute to adult judgments of sentence prototypicality affect young children's ability to accurately identify sentence actors and patients. That is, were children most likely to make correct identifications of actors and patients in prototypical sentences?

Method

Subjects. The children were 32 volunteers in each of two age groups, 2 years (M = 2,7; r = 2,1 to 2,11) and 4 years (M = 4,3; r = 3,11 to 4,5), who were solicited through the university day care center and through birth announcements in the local newspaper. There were equal numbers of males and females in each group. Children in each group were randomly assigned to one of four training conditions. An additional 9 children (M = 2.5; 1 to 3 children per training group) did not complete the study because they failed to reach criterion during training.

Materials. There were four different sets of stimulus training materials. Each set consisted of nine training pictures depicting a transitive event in which an actor caused a change in the location or state of a patient. Animacy of the sentence participants varied as follows, where A = animate and I = inanimate: (1) AA, (2) AI, (3) II, (4) IA. The verbs for the sentences were chosen from those comprehended by very young children in previous studies (Chapman & Kohn, 1978; Chapman, Dolloghan, Kenworthy, & Miller, 1982; Corrigan & Odya-Weis, 1985; deVilliers, 1980; Huttenlocher, Smiley, & Charney, 1983). All four sets of training sentences used the same verbs. Verbs were restricted, therefore, to those that could take both animate and inanimate actors and patients. The training sentence components are shown in Table 1.

Within the constraints of the different animacy pairings, pictures were as similar as possible across the four stimulus sets. For example, the two pictures shown in Figure 1 were used in four training groups. Picture A accompanied the sentences, "The woman covers the blocks" and "The blanket covers the blocks" for the AI and II training groups. whereas Picture B accompanied the sentences, "The woman covers the baby" and "The blanket covers the baby" for the AA and IA groups.

As shown in Table 2, a total of 16 generalization pictures included four new sentences of each of the four animacy types described above. Sentences describing the pictures varied the prototypicality of the verbs. Half the verbs were classified as high and half were classified as low prototype verbs, based on results from previous research (Corrigan, 1986; deVilliers, 1980).

For both the training and generalization pictures, following Corrigan and Odya-Weis (1985), participants in the pictures varied in size and left–right orientation such that the actor was sometimes smaller than the patient and sometimes on the lefthand side of the page. This ensured that children did not use those pictorial characteristics as a clue to identify actors and patients. All pictures were black and white to avoid color cues. All pictures contained an actor, a patient, and a third distractor item. The distractor item helped to ensure that children were not just attending to the pictures but were also processing the sentences. For example, in the pictures shown in Figure 1, the most likely choice if the children were attending only to the picture would be to place the actor token on the woman. In two of the training groups, however, the token had to be placed on the blanket.

Four sets of line drawings of objects, vehicles, people, and animals were used to test vocabulary comprehension. Each set consisted of 16 pairs of pictures depicting vocabulary items that children were not exposed to during the training

Table 1. Sentence Components for Training Stimuli

Group	Sentence Parts		
	Verb	Actor	Patient
AA	pull	boy	cat
	lift	man	baby
	chase	girl	boy
	bump	bird	woman
	carry	monkey	elephant
	rock	man	baby
	scratch	bird	boy
	hold	elephant	girl
	cover	woman	baby
AI	pull	boy	boat
	lift	man	bike
	chase	girl	car
	bump	woman	ball
	carry	monkey	balloons
	rock	man	cradle
	scratch	bird	rock
	hold	elephant	banana
	cover	woman	blocks
II	pull	string	boat
	lift	truck	rock
	chase	car	truck
	bump	boat	ball
	carry	bike	balloons
	rock	cradle	scissors
	scratch	scissors	rock
	hold	box	banana
	cover	blanket	blocks
IA	pull	boat	boy
	lift	truck	bird
	chase	car	girl
	bump	ball	woman
	carry	balloon	monkey
	rock	cradle	baby
	scratch	rock	boy
	hold	box	cat
	cover	blanket	baby

Note. A = Animate, I = Inanimate.

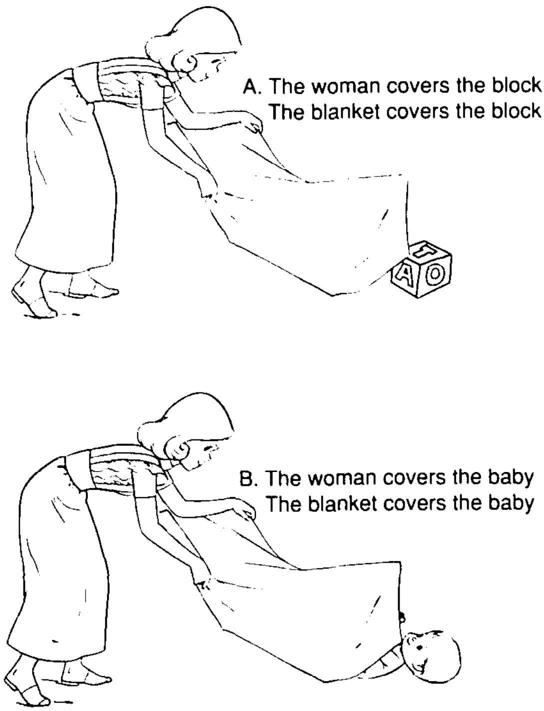

Figure 1. Sample training pictures and accompanying sentences

phase of the study, but that would appear in the generalization pictures. The entities depicted in the vocabulary drawings were not engaged in actions and were not paired with the same entities that they would be paired with in the transitive sentences used for testing generalization.

Procedure. Each child was individually videotaped in a playroom furnished with a small child's table and chair. One or both parents were present during the sessions. Each of the one to three sessions lasted approximately 30 min. Session 1 consisted of a vocabulary training segment and a token-placement training segment. Subsequent sessions (when necessary) continued token-placement training and tested children for generalization to new sentences once they reached criterion on the training phase of the experiment.

In the vocabulary training segment, children were asked to point to the picture in a set of two pictures that matched the experimenter's label: "Can you show me where the _____ is? Which is the _____?" If the child did not correctly identify the labeled item, the experimenter labeled the item and the item was repeated later during the vocabulary segment.

Table 2. Animacy and Verb Prototypicality of Generalization Sentences

Sentence	Animacy	Verb Prototypicality
The girl kisses the boy.	AA	high
The man picks up the bird.	AA	high
The boy watches the girl.	AA	low
The girl brings the boy.	AA	low
The monkey pushes the rock.	AI	high
The girl throws the balloon.	AI	high
The baby smells the banana.	AI	low
The fish blows the bubbles.	AI	low
The firetruck rinses the car.	II	high
The rock hits the window.	II	high
The boat touches the bike.	II	low
The soap washes the ball.	II	low
The water splashes the girl.	IA	high
The wagon moves the cat.	IA	high
The box hides the boy.	IA	low
The car hurts the elephant.	IA	low

Note. A = Animate, I = Inanimate.

During token-placement training, children were given two wooden shapes, a blue diamond and a yellow square. Extra shapes were placed nearby on the table. The tokens were placed on the actors and patients in pictures depicting transitive events. Pictures were presented one at a time accompanied by the sentence describing them. One-fourth of the children were trained on each of the four sentence types, which varied animate and inanimate participants.

The experimenter introduced the training segment to the child by telling the child that they were going to play a game with the tokens. "This (indicating the blue diamond) is a doing piece. This piece bumps, hits, pushes, and does things (demonstrating motion with the doing piece). We're going to put this piece on the part of the picture that's doing something." The experimenter then demonstrated token placement on the actor in the picture. For example, the experimenter showed the child a picture of "the truck lifts the bird" and said (while placing the token on the picture), "We're going to put this piece on the truck because it's the truck that's doing the lifting." The experimenter then demonstrated the placement of the patient token, and said, "The bird gets this shape because the bird is being lifted" (while placing the yellow shape on the patient).

Five stimulus pictures were used to demonstrate the task, with explicit instructions (both verbal and nonverbal) as to where to put the correct token. After the child was successfully prompted to complete the third picture, the experimenter removed the tokens and said, "If I take these shapes off, can you remember where they go?" The child was then asked to repeat the placement of the tokens on that picture and to place the tokens on subsequent pictures. If the tokens were placed incorrectly, the experimenter corrected the child. On the third pass through the pictures, an additional four pictures were interspersed between the old stimuli, again with the experimenter correcting the child for any incorrect token placements. In all presentations, the form of the sentences was varied so that half were in active voice and half, in passive voice. This was done to ensure that children were not simply placing the actor token on the first noun they heard mentioned. On day 1, training continued until the child correctly placed the tokens on seven out of nine consecutive sentences or for seven in a row or until the child appeared to be losing interest in the task due to fatigue. For some of the 4-year-olds, the next phase of the experiment—generalization—immediately followed the training segment on day 1. However, most of the children required a second or third session to reach criterion.

When a second session was necessary, training was repeated, beginning with all nine pictures immediately. If the child reached criterion within 15 min, the experimenter proceeded to the generalization phase. If not, training was repeated on a third day. Failure to reach criterion within 15 min on the third day resulted in the subject's exclusion from the experiment.

During the generalization phase of the experiment, the child was asked to do the same token placement task on 16 new generalization pictures. Four new sentences of each sentence type (AA, AI, II, IA) were presented, once each, with no corrective feedback given. Half of the sentences contained high prototype verbs and half contained low prototype verbs.

Results

The children's token placements were recorded by the experimenter during the generalization phase of the experiment and were later checked for accuracy from the videotapes by a second observer. Reliability was .99. Children were given a 1 if they comprehended a particular sentence type and a 0 if they failed to comprehend. They were scored as having comprehension of a particular sentence type only if they correctly placed both tokens for both sentences of each type. That is, they had to place all four tokens correctly to receive a 1. This strict criterion was chosen to minimize the possibility that token placement was at chance level. With four independent token placements and three places on which each token could be placed (actor, patient, or distractor) the probability of getting a score of 1 by chance alone was .0123.

A Pearson *r* was calculated between the number of trials that it took children to reach criterion on the training phase of the experiment and the number of sentence types that they responded to correctly during the generalization phase of the experiment. There was a significant negative correlation, $r = -.63$, $df = 62$, $p < .01$, indicating that the more trials it took to reach criterion, the worse the children performed on the generalization sentences. All training groups showed the same effects ($rs(14) = -.66, -.70, -.63$, and $-.65$ for the AA, AI, II, and IA training groups).

A 2 (age) × 4 (training group) × 2 (verb prototypicality) × 4 (sentence type) ANOVA with repeated measures on the last two factors was calculated on the number of generalization sentence types on which all tokens were placed correctly. The only significant between-subjects main effect or interaction was the main effect of age, $F(1,56) = 60.63$, $p < .0001$. Four-year-olds produced more correct responses ($M = .57$) than did 2 year olds ($M = .12$).

The significant within-subjects factors were a main effect of sentence type, $F(3, 168) = 5.77$, $p < .001$, and the simple main effects of sentence type for each type of verb prototypicality, $F(3, 168) = 5.95$, $p < .001$ for high prototype verbs and $F(3, 54) = 7.07$, $p < .001$ for low prototype verbs. As shown in Figure 2, post hoc Tukey HSD tests indicated that, overall, children were correct in their token placements significantly more often for AA and AI sentences (*M*s = .414, .406) than for II and IA sentences (*M*s = .273, .285). For sentences with high prototype verbs, only AA and IA sentences differed significantly in token placement (*M*s = .44(AA), .34(AI), .33(II), .19(IA)). For sentences with low prototype verbs, IA sentences were not different from AA and AI sentences. (*M*s = .39 (AA), .47 (AI), .22 (II), .39 (IA)). That is, children were more accurate in token placement for AA and AI sentences for both high and low prototype verbs, suggesting that AA and AI sentences are more prototypical. Children were less accurate in token placement for II sentences for both high and low verbs but were lower for low prototype verbs. IA sentences with high prototype verbs were the least prototypical of any sentences (as measured by token placement accuracy), but IA sentences with low prototype verbs were equivalent to AA and AI sentences. Inanimate actors more prototypically act on animate actors with low prototype verbs.

The time (in seconds) that it took the children to place the tokens on the sentences was recorded from the videotapes. Using a stopwatch, two observers

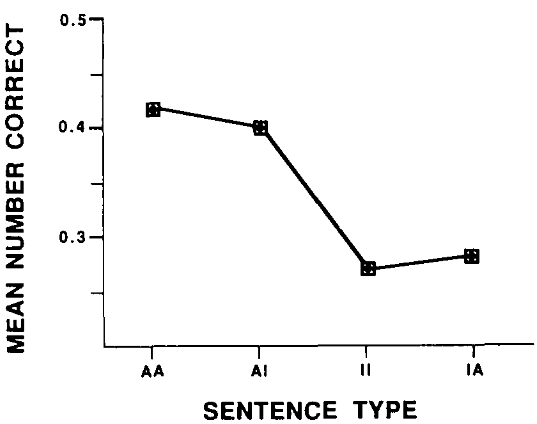

Figure 2. Mean number of correct token placements for each generalization sentence type

independently measured the amount of time from the offset of the experimenter's production of the sentence until the child completed his or her second token placement. Times within 1 s were considered equivalent. Interobserver reliability (number correct/number correct + number incorrect) was .94.

Because there was wide variation in the exact time for individual subjects and because the time that it took for token placement on one sentence type relative to another was the variable of interest rather than the absolute number of seconds required, each subject's scores were transformed to z scores based on individual means. That is, each subject is actually compared against his or her own mean reaction time across sentence types. The resulting scores have a mean of 0, with positive values representing token placements slower than the mean and negative values representing placements faster than the mean.

A 4 (training group) × 2 (verb prototypicality) × 4 (sentence type) ANOVA was computed on the transformed data for the 4-year-olds. The 2-year-olds were excluded from this analysis because they had too many sentences with token-placement errors, resulting in too many empty cells to calculate the ANOVA. Missing data were still problematic for the older children. Wrong answers thus were coded as 0s. This resulted in a more conservative analysis, because resulting means were brought closer to 0, reducing the spread between groups.

There was no significant main effect or interaction for the between-subjects variable. There was a significant simple main effect for verb prototypicality for the different training groups. This was accounted for by the group trained on IA sentences, where sentences with low prototype verbs ($M = -.24$) were responded to faster than sentences with high prototype verbs ($M = .073$), $F(1,27) = 4.53$, $p < .05$. There was a significant main effect of sentence type, $F(3,81) = 4.18$, $p < .01$. Children responded fastest to AA sentences, then AI sentences, then IA sentences, with II sentences significantly slower than the others (Ms = −.245, −.064, −.037, .119). Analysis of the simple main effects of sentence type for the various groups showed that only the group trained on the most prototypical AA sentences showed time differences in their token placements. Results for this group are shown in Figure 3 (Ms = −.273, −.27, .277, .20).

DISCUSSION

The results of this study suggested that the same factors that enter into adults' judgments of sentence prototypicality, animacy of sentence participants and prototypicality of verb, also affect children's ability to accurately identify sentence actors and patients. As expected, 4-year-olds did better than 2-year-olds. But, at both ages, regardless of training group, children did best on sentences with animate actors and worst on sentences with inanimate actors. For sentences with high prototype verbs, children performed significantly better on AA sentences than on IA sentences. These results support findings from research on adult judgments of sentence prototypicality (Corrigan, 1986), which suggested

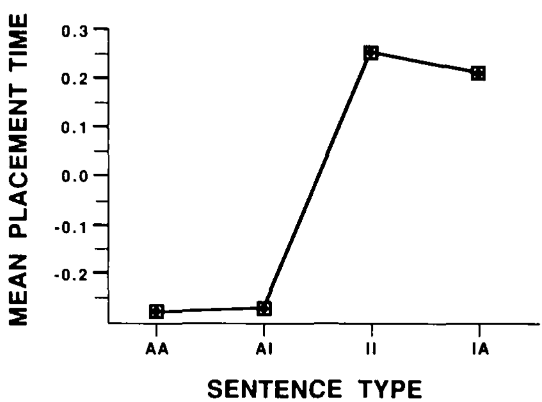

Figure 3. Mean number of seconds for correct token placements on each generalization sentence type by 4-year-olds trained on AA sentences

that AA sentences were most prototypical and IA sentences were least prototypical. However, with low prototype verbs, II sentences were least prototypical.

Similar results were also obtained with a second dependent measure, the time (in seconds) it took 4-year-olds to place the shapes on the pictures. Children were quickest to place tokens on sentences with animate actors and slowest, on sentences with inanimate actors. With this measure, there was no sentence type × verb prototype interaction, perhaps due to the crudeness of the measure or, perhaps, because of scoring problems due to missing data.

This study is of methodological importance because it provides a means for investigating sentence comprehension with very young children. Because the type of sentence on which they were trained had no effect, we infer that training was simply giving the children a means to express what they already knew about sentence categories rather than teaching them new categories. That is, if children trained on sentences with inanimate actors and animate patients had been learning new categories during training, then they would have done best on that type of sentence during testing. Instead, they did worst on the sentence type that they had been trained on and best on sentences with animate actors and animate patients, just like all the other children.

The use of a reaction-time methodology with such young children is also a methodological innovation that provides additional cues that the children were paying attention to the factors identified as important for sentence processing. Even when children eventually placed the tokens correctly, they had to think about it longer for nontypical sentences, indicating that they were paying attention to factors like animacy.

These findings support the notion that an event in which an animate actor acts upon a patient is the prototypical event schema. There is a suggestion that, at least for some verbs, AA sentences are more prototypical than AI sentences. Although this appears to contradict conclusions of previous research (Corrigan &

Odya-Weis, 1985), in which AI sentences were viewed as prototypical, several factors may account for differences in results. First, the earlier study did not train children on AA sentences. That is, AI sentences were found to be more prototypical than sentences with inanimate actors, but the relationship between AA and AI sentences could not be tested. Second, in this study, children performed only slightly worse on AI sentences than on AA sentences and only for some measures. Perhaps, differential responses to AA and AI sentences hinge on the type of verb that is contained in the sentence. In the study of adult judgments of prototypicality described previously (Corrigan, 1986), AA sentences were judged to be prototypical overall. However, some AI sentences were ranked higher, depending on the verb. In the adult study, all animacy combinations occurred with every verb so that comparisons across animacy could be made with verb held constant. This was confounded in the current study where each verb occurred with only one animacy combination. Work is currently underway to investigate further the interaction of particular verbs with different animacy combinations.

Another area for further work involves the changes in verb meaning that may be produced when the animacy of the sentence participants changes. If a child's schema for an event first includes only the sense of the verb involving a typical animate actor, then understanding changes in verb meaning requires an extension of the schema to include nonprototypical participants. Suppose, for example, that the child's schema for the event of hitting involves physical contact between the hands of one participant and the body of another. To understand the sentence, "the rock hits the window," the child must expand his sense of "hit" to include any physical contact. Similarly, a verb such as "hold" may signify active interaction when it involves animate participants such as mothers holding babies and passive containment when it involves boxes holding bananas. Word meanings for verbs cannot be viewed in isolation, but must be interpreted in the context of the other participants in the event schema. The use of the terms high- and low-prototype verbs in this paper and in other literature is, therefore, somewhat misleading. The characteristics usually associated with high-prototype verbs (e.g., high in intentionality, high in action) are describing those verbs in the context of animate actors. A prototypical verb in a schema with an inanimate actor may be low in intentionality and low in action.

In conclusion, children do appear to organize their sentence categories around a prototype, with other category members resembling the prototype to varying degrees. The degree of resemblance of the sentence to the prototype affects both children's ability to make correct identifications of sentence actors and patients and also the amount of time that it takes for that identification to proceed. This research adds yet another piece of evidence in support of the pervasiveness of categorization based on representativeness rather than criterial attributes, in language as well as in other types of cognitive tasks. The results presented here are consistent with the view that similar mechanisms operate in language and nonlinguistic cognitive domains.

REFERENCES

Anderson, J. (1983). *The architecture of cognition.* Cambridge, MA: Harvard University Press.

Bates, E., & MacWhinney, B. (1982). Functionalist approaches to grammar. In E. Wanner & L. Gleitman (Eds.), *Language acquisition: The state of the art.* Cambridge, MA: Cambridge University Press.

Bornstein, M. (1983). A descriptive taxonomy of psychological categories used by infants. In C. Sophian (Ed.), *Origins of cognitive skills.* Hillsdale, NJ: Erlbaum.

Braine, M., & Wells, J. (1978). Case-like categories in children: The actor and more related categories. *Cognitive Psychology, 10,* 100–122.

Cantor, N., & Mischel, W. (1979). Prototypes in person perception. *Advances in Experimental Social Psychology, 12,* 3–52.

Chapman, R., Dolloghan, C., Kenworthy, D., & Miller, J. (1982). Microcomputer testing and teaching of verb meaning: What's easy and what's hard? In Wilkinson, A. (Ed.), *Classroom computers and cognitive science.* New York: Academic.

Chapman, R., & Kohn, L. (1978). Comprehension strategies in two- and three-year-olds: Animate agents or probable events? *Journal of Speech and Hearing Research, 21,* 746–761.

Chapman, R., & Miller, J. (1975). Word order in early two- and three-word utterances. Does production precede comprehension? *Journal of Speech and Hearing Research, 18,* 355–371.

Corrigan, R. (1986). The internal structure of English transitive sentences. *Memory and Cognition, 14,* 420–431.

Corrigan, R., & Odya-Weis, C. (1985). The comprehension of semantic relations by two-year-olds. An exploratory study. *Journal of Child Language, 12,* 47–59.

deVilliers, J. (1980). The process of rule learning, a new look. In K. Nelson (Ed.), *Children's language (Vol. 2).* New York: Gardner Press.

Erreich, A., & Valian, V. (1979). Children's internal organization of locative categories. *Child Development, 50,* 1071–1077.

Hopper, P., & Thompson, S. (1980). Transitivity in grammar and discourse. *Language, 56,* 251–299.

Huttenlocher, J., Smiley, P., & Charney, R. (1983). Emergence of action categories in the child. *Psychological Review, 90,* 72–93.

Lakoff, G. (1977). Linguistic gestalts. *Chicago Linguistic Society Papers, 13,* 236–287.

Macwhinney, B. (1982). Basic syntactic processes. In S. Kuczaj (Ed.), *Language development (Vol. 1).* Hillsdale, NJ: Erlbaum.

Nelson, K. (1986). Event knowledge and cognitive development. In K. Nelson (Ed.), *Event knowledge: Structure and function in development.* Hillsdale, NJ: Erlbaum.

Osgood, C., & Bock, J. (1977). Salience and sentencing: Some prediction principles. In S. Rosenberg (Ed.), *Sentence production: Developments in research and theory.* Hillsdale, NJ: Erlbaum.

Rosch, E. (1973). On the internal structure of perceptual and semantic categories. In T. Moore (Ed.), *Cognitive development and the acquisition of language.* New York: Academic.

Rosch, E. (1975). Cognitive reference points. *Cognitive Psychology, 7,* 532–547.

Rosch, E. (1983). Prototype classification and logical classification: The two systems. In E. Scholnick (Ed.), *New Trends in conceptual representation.* Hillsdale, NJ: Erlbaum.

Rosch, E., & Mervis, C. (1975). Family resemblances: Studies in the internal structure of categories. *Cognitive Psychology, 7,* 573–609.

Slobin, D. (1981). The origin of grammatical encoding of events. In W. Deutsch (Ed.), *The child's construction of language.* New York: Academic.

Slobin, D., & Bever, T. (1982). Children develop canonical sentence schemas: A cross-linguistic study of word order and inflections. *Cognition, 12,* 229–265.