Are Preschoolers’ Renamings Intentional Category Violations?

Eve Mendelsohn and Susan Robinson
Harvard Project Zero,
Cambridge, Massachusetts

Howard Gardner
Harvard Project Zero and Boston Veterans Administration

Ellen Winner
Boston College and Harvard Project Zero

A classification task was devised to determine whether preschoolers’ unconventional namings (e.g., calling a streak of skywriting a “scar”) reflect intentional category violations (and hence are metaphors) or simply reflect one of several “literal” ways in which preschoolers classify (and hence lack the overriding of boundaries necessary to metaphor). In the classification task, elements could be matched according to conventional category or by a visual similarity that cut across conventional categories. Fifty-four children between 4.0 and 5.0 were given a target stimulus along with three choices from which to select a match for the target. The choices consisted of a conventional match, a visual match that cut across conventional categories, and an unrelated match. Items were presented in three conditions: picture (target and choices both pictured); verbal (target and choices both named); and picture-verbal (target pictured, choices named). In all conditions, conventional classifications outnumbered visual ones, and this difference was significant in the verbal and the picture-verbal conditions. This result demonstrates that preschoolers choose to classify conventionally even in the face of a perceptual similarity that cuts across conventional boundaries. Thus, their predominant mode of classification is conventional. This finding provides strong support for the claim that preschoolers’ unconventional namings reflect intentional category violations rather than one of several literal modes of classification.

Preschool children frequently give unconventional names to objects. Piaget’s 4½-year-old daughter noticed a piece of grass slipped into a wider stalk and announced, “Look, it’s spectacles in a spectacle case” (Piaget, 1962, p. 127). Another 4-year-old called a streak of skywriting a “scar,” and a third called a yellow baseball bat “corn” (Winner, McCarthy, Kleinman, & Gardner, 1979).

This research was supported by grants from the National Science Foundation (BNS 79-24440) and the National Institute of Education (G-78-0031).

We would like to thank the directors, teachers, parents and students of the following schools for their help and support in carrying out this project: Buckingham, Browne, and Nichols Lower School, Radcliffe Child Care Center, The Newtowne School, Garden Coop Nursery School, Beacon Hill Nursery School, the M.I.T Day Care Center and the John Winthrop School. We would also like to thank Beverlee Seronick for her skill and patience in drawing the pictures used in the study and both Erin Phelps and Joseph Walters for their help in data analyses.

Requests for reprints should be sent to Ellen Winner, Psychology Department, Boston College, Chestnut Hill, Massachusetts 02167.
According to this "metaphor hypothesis," the child who calls a baseball bat "corn" does so because he recognizes that these two objects are similar in color and shape. He knows that the bat is not really corn, but chooses this name in order to underscore the similarity. His utterance is not intended literally. According to this view, the child who labels the bat as "corn" is creating a genuine visual metaphor. Although this metaphorical renaming is a rudimentary one, based on a rather obvious visual similarity, it is not fundamentally different from visual metaphors found in literature such as, for instance, when Shakespeare speaks of the sun as "the eye of heaven" (Sonnet 10), or when Donne likens a rounded bank of a river to a "pillow on a bed" ("The Ecstasy").

In order to qualify as metaphorical usage, a word that is usually applied to one referent must be applied to another (and novel) referent. There must be some kind of similarity between the conventional and the novel referent (e.g., they may have the same shape or color). Finally, a metaphor must cut across previously established category boundaries. That is, the conventional and novel referent must not normally be classified as belonging to the same category. Thus, if the child believes that all long yellow objects belong to the same category, he has not violated a boundary when he calls the bat "corn." Only if he recognizes that baseball bats and corn belong to separate categories (toys and food) will such an unconventional usage qualify as metaphorical.

During the initial stages of language acquisition, the mistake hypothesis seems the most plausible one. Before the age of 3 or 4, children may well have category boundaries that are broader (or different in some way) from those of the adult (Anglin, 1977). Unconventional names may simply reflect this "deficiency." However, during the middle preschool years, as vocabulary blossoms (Carey, 1977), children become able to classify at the basic object level (Rosch, Mervis, Gray, Johnson, & Boyes-Braem, 1976). At this age, then, the question of whether an unconventional name is a deliberate or a mistaken lexical extension becomes a genuine issue. Thus, the controversy between those who favor the mistake hypothesis and those who favor the metaphor hypothesis becomes particularly acute with respect to children around the age of four (cf. Vosniadou and Ortony, 1983).

There are at least two ways to determine whether early unconventional names are mistakes or metaphors. One method is to examine both the context in which unconventional names occur and the child's prior lexical knowledge. If such naming is accompanied by laughter or pretend gesture (pretending to eat the yellow baseball bat and then calling it "corn"), or if the child has previously called the renamed object by its literal name ("baseball bat"), the metaphor hypothesis gains support (Billow, 1981; Marti, 1979, Snyder, 1979, Winner, 1979; Winner, McCarthy, Kleinman, & Gardner, 1979). When these criteria are applied to spontaneous speech samples, many (and in some cases most) of the unconventional names have been shown to be deliberate metaphors. The majority of these early metaphors are based on visual similarities between objects, primarily by similarities in shape, or shape and color combined, less often by similarities in color alone.

Additional evidence for the metaphor hypothesis can be obtained by examining how children sort objects. It is important to determine whether, when given a choice, preschoolers prefer to classify objects according to adult conventions (grouping yellow baseball bats with tennis rackets) or according to perceptual similarity irrespective of conventional categories (grouping yellow baseball bats with corn). Previous research has demonstrated that 4-year-olds can sort conventionally at the basic object level when given triads of objects (Rosch et al., 1976). However, in this study, children were not given a choice between a conventional and an unconventional mode of classification. It is possible that preschool children are equally willing to sort according to conventional categories and to sort across conventional boundaries according to visual likeness. If these two modes of classification are equally prepotent, then preschoolers' renamings cannot be seen as genuine metaphors, since they entail less overriding than do those of the adult. If, however, given such a choice, preschoolers choose the conventional classification, support will be gained for the metaphor hypothesis. This result would reveal that preschoolers classify objects
in the same way as do adults. Thus, when they dub a yellow baseball bat “corn,” we can rule out the possibility that this response simply reflects one of the child’s two means of literal classification. Instead, we gain evidence that they can willfully violate a previously established category boundary. On the other hand, if preschoolers classify either according to perceptual similarity, or according to both principles, support will be gained for the mistake hypothesis.

In order to determine which mode of classification is preferred by 4-year-olds, we presented children with a classification task in which stimuli could be matched to targets according to either conventional categories or according to visual similarities that cut across conventional categories. The task was presented in three modes. In order to capture the natural situation in which naming occurs, in one condition the target was presented pictorially and the choices were presented verbally. In a second condition, both target and choices were presented pictorially. It was hypothesized that the use of a purely pictorial mode would bias the child toward a visual classification. If even under such circumstances children sort conventionally, strong support for the metaphor hypothesis would be gained. Finally, in a third condition the task was presented entirely verbally. Conventional sortings were hypothesized to be most likely in this condition, given the absence of pictures to underscore the visual similarities.

In addition to the effect of the mode of presentation, we were interested in several other questions. To determine which form of visual similarity would be the stronger lure, visual matches were based on either color, shape, or color and shape combined. It was hypothesized that visual matches based on two features would outnumber those based on only one. Moreover, since the unconventional names found in spontaneous speech are rarely based on color alone (Winner, 1979), the color matches were expected to be the least frequent.

There are two ways in which objects are conventionally grouped—by taxonomic category and by association. Because we did not know which mode would be more appealing to 4-year-olds, conventional matches were based on either taxonomic category (e.g., chocolate bar and lollipop—both are candy) or association (e.g., bread and butter). The taxonomic category formed was one level above the level of the basic object (Rosch et al., 1976). We elected to use taxonomic categories at this level of abstraction in order to avoid confounding visual and conventional grouping. Had children been asked to group two objects at the basic level (e.g., two lollipops), it would have been impossible to determine whether they were sorting by taxonomic category or by visual likeness.

Method

Subjects

Fifty-four children between the ages of 4.0 and 5.0, equally divided between boys and girls, were randomly selected from preschool classes. Subjects were drawn from middle-class backgrounds.

Materials and Procedure

A matching task was constructed in which subjects were presented with a target element (e.g., a cherry lollipop) along with three choices and were asked to match one of the three choices to the target. The choices were constructed so that subjects could make a conventional match (grouping the cherry lollipop with another candy, a chocolate bar), a visual match (grouping the cherry lollipop with another object of similar shape and color, a stop sign) or an unrelated match (grouping the cherry lollipop with the sky at night).

In half of the items, the conventional match was an associate of the target; in the remaining half, the conventional match was a member of the same taxonomic category. For each item, three visual matches were constructed, one based on color, a second based on shape, and a third based on color and shape combined. These visual choices were rotated across items. That is, for any given target, one group of subjects received a color match, one group received a shape match, and one group received a color-shape match. (Table 1 presents two sample items.)

To investigate the effect of mode of presentation on classification, the task was presented in one of three forms. In the picture condition, items were presented in pictorial form, in the verbal condition, items were presented verbally, and in the picture-verbal condition, targets were presented pictorially and choices were presented verbally. Color illustrations were drawn by an artist on separate 3 x 5 cards. To ensure that the drawings were not biased to look more or less like one another, the artist was not informed of the purpose or design of the study.

Thus, there were two within-subjects factors (type of conventional match and type of visual match) and one between-subjects factor (condition). To carry out this study, it was necessary to select items that could be understood by young children and that made sense to adults. This required extensive pretesting using a different set of subjects from those who were given the final task. In all, 70 subjects participated in various aspects of the pretest. First, it was necessary to ascertain that 4-year-olds could recognize each picture and were familiar with the name of each pictured
The 18 items on the test were then presented in random order, counterbalanced across subjects. The task, which was administered individually to children, took about 20 minutes.

In order to determine whether children were better able to explain conventional or visual matches, subjects were asked to justify their selections on the final two items. Justifications were not requested for all items, since it was feared that articulating a reason might have biased further responses.

### Scoring

The number of conventional, visual, and unrelated choices, as well as the number of “no responses,” was tabulated for each subject. Within the visual choices, the number of color, shape, and color/shape choices was tabulated.

The reasons were scored in one of four ways: (a) appropriate reason for a conventional choice, (b) inappropriate or no reason for a conventional choice, (c) appropriate reason for a visual choice, (d) inappropriate or no reason for a visual choice. Reasons given after selecting the unrelated choice were not scored. Ninety-four percent interjudge reliability was achieved on one third of the reasons.

### Results

A two-way (Condition × Response Type) analysis of variance (ANOVA) revealed that children picked significantly more conventional than visual matches, $F(1, 51) = 41.7$, $p < .001$. Conventional matches were chosen more than twice as often as visual ones ($M = 7.63$ vs. $3.15$). Response type interacted with condition, $F(2, 51) = 4.54$, $p = .012$. Post-hoc Newman-Keuls tests revealed that conventional choices significantly outnumbered visual choices in the verbal ($p < .01$) and picture-verbal conditions ($p < .01$) but not in the picture condition. Even in the picture condition, however, although the difference was not significant, conventional matches outnumbered visual ones. Figure 1 shows the mean number of conventional and visual responses in each condition.

Two further tests examined the effect of the type of visual match and the type of conventional match. To determine the relative appeal of color, shape, and color-shape matches, the percentage of each kind of match (out of the total number of visual responses) was computed. The percentages were 33% (color), 27% (shape), and 39% (color-shape). A two-way (Condition × Percentage Visual Response Type) ANOVA revealed no significant main effects or interactions. Thus, even though early
spontaneous unconventional namings are rarely based on color alone, 4-year-olds are able to sort across categories on the basis of color when given the opportunity to do so. To determine the relative appeal of associations versus taxonomic matches, a binomial test was performed (Siegel, 1956). As predicted, associative matches were selected more often than taxonomic ones ($z = 1.78, p < .03$).

To determine whether children were better able to supply an appropriate reason for a conventional or for a visual choice, percentages of appropriate reasons for each type of choice were computed. Since many more conventional than visual choices were picked, subjects had more opportunities to give reasons for conventional matches. Obviously children who chose conventional choices for both items did not have the chance to give a visual reason and consequently could not be compared to children who chose at least one visual alternative. Nonetheless, clear trends emerged. Twenty-three children gave conventional responses to both of the last two items, and were able to give appropriate reasons for 83% of them. Only three children gave visual responses for both final items, and 67% of these were explained appropriately. A two-way (Condition $\times$ Percent Reason) ANOVA revealed this difference to be significant, $F(1, 21) = 8.046, p = .01$. The fact that children find it easier to explain conventional than visual responses buttresses the finding that children's dominant mode of classification is conventional rather than visual-metaphoric.

**Discussion**

The results of the study indicate that young children classify familiar objects in much the same way as do adults. Through the use of alternative instructions, it was established that 4-year-olds are able to sort both conventionally and across conventional categories by visual similarity. However, to assess the status of preschoolers' renamings it is necessary to determine whether both modes of classification are equally appealing or whether one mode is perceived as dominant. To answer this question, neutral instructions were used, and conventional classifications proved most frequent.

As one would expect, the use of pictures highlights visual similarities; hence, visual matches were more frequent in the two picture conditions than in the verbal condition. But even in the picture condition, visual choices did not outnumber conventional ones. It should be stressed that the picture-verbal condition mirrors most faithfully the situation in which spontaneous unconventional names are uttered: the child sees an object (e.g., a yellow bat) and gives it a verbal label ("corn"). The fact that conventional classifications predominated in this condition lends strong support to the metaphor hypothesis. Children also found it easier to explain conventional than

![Figure 1 Mean number of conventional and visual responses](image-url)
visual choices. This result suggests that this is either the mode of classification with which they are most familiar, or the mode which they find easiest to articulate in words, or both. Consistent with earlier findings (e.g., Bruner, Olver, & Greenfield, 1966), associative matches proved easier than taxonomically based ones, quite possibly because knowledge of superordinates has not yet been fully consolidated at this age.

It was surprising that children chose the three types of visual matches with equal frequency. One might have expected that the combined ground (color-shape) would elicit more responses than the other two visual choices. The fact that this result did not occur suggests that a simple visual similarity triggers the response of visual matching and that there does not seem to be a cumulative effect caused by additional visual features in common.

In conclusion, when preschoolers rename, they are overriding the predominant way in which they have come to classify objects. These results provide additional evidence in support of the metaphor hypothesis, buttressing the evidence gleaned from contextual studies of the child’s spontaneous renamings (Billow, 1981; Winner, 1979). We can now assert with considerable confidence that preschoolers’ renamings are genuine perceptual metaphors.

References


Received November 30, 1982

Revision received December 15, 1982