Bulletin of the Psychonomic Society
1989, 27 (2), 127-130

Young children's knowledge of names and uses of common tableware

PAUL NGO
University of Notre Dame, Notre Dame, Indiana

and

ALBERT GOSS
Rutgers—The State University, New Brunswick, New Jersey

Young children named and described uses of nine kinds of common tableware across four sets that differed in shape and color nested in shape. Using tableware from two sets, some children were trained on conventional names and specific uses of all kinds of the same shape but different colors (within-shape condition) or of all kinds of different shapes and colors (across-shape condition); children in the activation condition saw and talked about the kinds in all four sets. After within- and across-shape training, percentages of appropriate names and labels of uses increased by varying amounts from very low percentages of names given before training and sometimes higher, but still low, percentages of uses. The activation condition did not increase percentages of names, but did increase percentages of uses, but less than for within- and across-shape conditions. These increases and other findings imply that young children can and do abstract sensory invariants/criterial attributes of multidimensional stimuli.

For nine kinds of tableware common to European and European-influenced cultures, Table 1 shows three of their physical attributes and specific uses. Shape, both overall and of specific pieces, is one attribute set. For example, the perimeter may be smooth or wavelike, as well as generally circular, elliptical, and so forth. Except for platters, which have elliptical perimeters, the pieces of tableware listed in Table 1 have circular perimeters. The perimeter of one set is smooth, and that of the other set is wavelike. When present, rims may be flat or descend toward the center. The descent may be linear or in an arc, and there may or may not be fluting, which, in turn, may be straight or curved inward from the outer edge of the rim.

Overall diameter from the outer rim edge to the opposite outer edge and the width of the rim are two interdependent attributes of size from which diameter of the top center area and the resting base may be approximated. Height perpendicular to the resting surface directly to the top of the rim edge is another size attribute, as is the angle between the resting surface and a line or chord from the resting base to the outer rim edge. For diameter and height, two of the attributes in Table 1, specific values are included for each kind of tableware of each perimeter type.

Tableware also may vary in color and in geometric patterning and/or in object representation, in surface details such as embossing, and in presence or absence of handles, knobs, and provision for the cup base. Collectively, these attributes of tableware, and the values they may assume, correspond to and expand the typical shape, color, and/or size attributes of the simpler two- and three-dimensional stimuli of many traditional studies of conceptual behavior (Goss, 1961; Smith, 1984).

Referring to findings with these simpler stimuli, Anglin (1977) asserted,

> It has been shown that children are particularly deficient in abstracting out a set of sensory invariants that make a group of objects similar.... Since preschool children appear to be deficient in abstracting criterial attributes, it would seem that some other conceptual mechanism must be at work to account for such observations. (p. 11)

Diameter and height, as well as presence or absence of a handle and of provision for the cup base, largely determine the kinds of tableware listed in Table 1 and their uses. These attributes and their values are the sensory invariants or criterial attributes to be abstracted.

Accordingly, young children gave the name and use of each kind of tableware across irrelevant sets of shape and color attributes. Occurrence of appropriate names and functions would indicate discrimination by diameter, height, handle, and provision for the cup base. These sensory invariants/criterial attributes had to be "abstracted"; shape, color, and possible other attributes were irrelevant. No other conceptual mechanism was at work. Training on these names and uses followed, after which the children were again asked to provide the names and uses.

Barbara Howley assisted in observation and recording, and in the coding of responses and their transformation to forms for optical scanning.
Address correspondence to Albert E. Goss, 25 Hillcrest Drive, Piscataway, NJ 08854.

Table 1
Kinds/Names of Tableware, Their Diameters (Ds) and Heights (Hs) (in cm), and the Specific Use for Each Shape

	Smooth Perimeter		Wavelike Perimeter		
Kind/Name	D	H	D	H	Use
Dinner Plate	28	3	27.5	3.5	Main course, e.g., meat
Soup Bowl	16	5	17.5	5.5	Soup
Salad/Dessert Plate	20	2.5	20.5	3	Salad, dessert
Fruit Saucer	14	4	15	5	Fruit, vegetables
Bread & Butter Plate	16.5	2	15	2.5	Bread & butter
Cup	9.5	6.5	9.5	6.5	Coffee, tea
Saucer	15	2	15.5	2.5	Hold cup
Open Vegetable Bowl	23.5	7	20	6.5	Main course, salad
Platter: Long Axis	33.5	4	39	4	Main course, dessert
Short Axis	25		34		

METHOD

Children

Twelve females (36–67 months, $M=50$) and 18 males (39–64 months, $M=53$) were drawn from among children enrolled at the Douglass-Psychology Child-Study Center of Rutgers University, a university-sponsored training and research daycare facility. The children and their parents were heterogeneous in color, race, ethnicity, nationality, and religion, and the parents were relatively homogeneous in having advanced educational levels and managerial or professional occupations.

Stimuli

One set of tableware with smooth (S) perimeters was green (G), the other cranberry red (C). One set in the wavelike (W) shape was black (B), the other yellow (Y). The surfaces of the former sets were smooth; those of the latter sets were embossed with lotuses. The purchase of these sets of Metlock tableware was partly subsidized by The China Closet of Flemington Cut Glass (Flemington, NJ).

The four sets were laid out left to right along the front of two joined tables in the order WY, SG, WB, and SC. Within each set, placement was dinner plate, salad/dessert plate, and platter from right to left. The soup bowl was behind the salad/dessert plate and to the upper left of the dinner plate. The fruit saucer was behind and between the salad/dessert plate and the platter, and the bread and butter plate was farther behind, between the fruit saucer and soup bowl. The cup and saucer were behind the dinner plate, and the open vegetable bowl was at the extreme upper left. The tables were covered by off-white, blank newsprint paper, and illuminated by overhead, incandescent lights in shaded fixtures.

The children were moved back and forth in front of the tables to view and respond to each set from directly in front. Order of viewing/responding varied among the children in permutations of four events.

Procedure

Each child's names for and labels for uses of the tableware were assessed before and after training, as were their names for the colors, shapes, and sizes of the tableware. The before-training, training, and after-training sessions took place during successive weeks.

Before Training. Names and uses were elicited for each kind of tableware in all four sets. Pieces within sets were responded to in different random orders, which also varied among the children. Responses were recorded as closely to verbatim as possible.

Each of the four colors was then named twice. The pairs of kinds of tableware whose colors were named were counterbalanced, as were the left-right orders of their presentation. Recording was verbatim.

The dinner plate, soup bowl, bread and butter plate, and open vegetable bowl were presented to obtain names for shape, diameter, and height. Rows of Latin squares counterbalanced presentation of and order of occurrence of one dish type from each set. For shape, platters from both smooth and wavelike sets were presented last. Recording was verbatim.

Training. In one training condition, the kinds of tableware of each color within the smooth shape were combined and the kinds of each color within the W shape were combined. One of these combined sets was presented so that training was with both colors within one or the other shape. The 18 kind/color combinations within each shape were responded to first in one random order, and then in a different random order. These pairs of orders varied among the children.

In another condition, training was across shape. Dinnerware of one color from one shape set was combined with dinnerware of one color from the other shape set. They were paired in the four possible ways: SC and WB; SC, WY; SG, WB; and SG, WY. The 18 combinations of kind and shape/color within each of these pairs were presented in two different random orders, which varied among the children.

As each kind of tableware of the pairs of sets of the within-shape or across-shape conditions was pointed to, the child was to name it. The child was then told its appropriate name, the name provided in the left-most column of Table 1. The child repeated this name. Next, the child went through the same sequence for the often similar label for the use of kind of tableware, as shown in the rightmost column of Table 1.

The within- and across-shape conditions allowed for posttest transfer or generalization from the stimuli of the training sets not only to those stimuli, but also to the two sets of stimuli that had not been used for training. This simulates extralaboratory experiences in which learning is with one or several sets of tableware, and subsequent demands are to generalize names and uses to kinds within new, different sets.

The third condition did not involve experimenter-specified appropriate names and uses. Instead, the child looked at and said as much as possible about each of the nine kinds of tableware within and across each of the four sets. This "activation" condition controlled for activation of already-acquired names of and labels for uses of kinds of tableware.

After Training. The before-training session was repeated with 4 boys and 7 girls of the within-shape condition, 5 boys and 5 girls of the across-shape condition, and 3 boys and 6 girls of the activation condition. These numbers are unequal because more girls were available initially than boys, and also because of differential availability for the after-training session. Only the data for children participating after training were analyzed.

RESULTS

Names and uses given for each kind of tableware before and after training are described in some detail. Names for shapes, colors, diameter, and height are described briefly. Because they were tangential, training data are ignored.

Names and Uses

Names were scored "0" if the child gave no name or use, said "don't know," or gave an inappropriate name or use. A name for each kind of tableware is appropriate at several levels. "Plate," "bowl," and "cup" define two levels of appropriate names. At the lower level, these names occur but not discriminatively among tableware of

low, medium, and high height and, for those of high height, between those without and with a handle. At the higher level, plates with lower height are distinguished from bowls and cups with higher heights.

Occurrences of the training names, the names in the leftmost column of Table 1, define three higher levels. The lower is occurrences of these names but without discrimination by diameter or height. At the next level, they occur discriminatively by height but not by diameter. At the highest level and score possible, they also discriminate among diameter and, within "platelike" kinds, between those that do and do not provide for the cup base.

Several levels of uses are defined in similar fashion. At the second level are general uses such as "to eat off" or "for food." At the next level, "eating off" and "serving from" are distinguished. At the lower of three higher levels, appropriate more specific uses are mentioned but not discriminatively. The uses in the rightmost column of Table 1 define the two higher levels. At the lower level, uses are not discriminative by diameter or height and between eaten off and served from. At the next level, specific uses occur discriminatively by height but not by diameter. At the highest level and score, they occur by height, diameter, and provision for the cup base.

The analyses presented here for names and uses are for their discriminative occurrence at the highest level, the Table 1 kinds/names and specific uses of training.

For each kind of tableware for children of the within-shape, across-shape, and activation training conditions during the pretest and posttest, Table 2 shows the percentages of appropriate names and uses given by the subjects. Before training, most of the children of all three conditions knew the name and use of cups. None or only a few of the children named the other kinds of tableware appropriately. The highest percentage was 22 for saucer for children of the across-shape condition. The percentages for uses were considerably higher for dinner plate, soup bowl, saucer, open vegetable bowl, and platter, but equally at none or small values for salad/dessert plate, fruit saucer, and bread and butter plate.

After training, the percentages of names across all kinds of tableware increased over threefold for within-shape and doubled for across-shape; they barely changed for activation. The increases in percentages of uses were about equal for within-shape and across-shape and considerably greater than the increase for activation. For the within- and across-shape conditions, the percentages for names for each kind of tableware had increased consistently by values of 5 to 52, except for the open vegetable bowl in the across-shape condition. Except for cup, the percentages for the activation group remained at their very low before-training values.

For dinner plate, soup bowl, salad/dessert plate, bread and butter plate, and platter, percentages of uses for within- and across-shape increased more than those for activation and were higher by differences of from 12 to 55. For cup, there were slight increases from the high before-training percentages for within- and across-shape, and a greater increase for activation to essential parity. The percentage for open vegetable bowl increased for within-shape but decreased for the other two conditions. For fruit saucer, the increase from 0 to 23 for within-shape was appreciable; the increases for the other conditions were slight, and that for activation was both larger and

Table 2
Percentage of Appropriate Names and Uses Before (B) and After (A) Training for Each Kind of Tableware in Each Condition

	Condition					
	Within-Shape		Across-Shape		Activation	
Kind	B	A	B	A	B	A
			Names			
Dinner Plate	0	45	2	40	0	0
Soup Bowl	0	43	5	42	0	3
Salad Plate	0	20	5	12	0	0
Fruit Saucer	0	18	5	10	0	0
Bread & Butter Plate	0	34	5	25	0	0
Cup	95	100	88	95	89	97
Saucer	14	55	22	45	0	0
Open Vegetable Bowl	0	23	5	0	0	0
Platter	0	52	12	32	3	3
All	12	43	17	34	10	11
			Uses			
Dinner Plate	43	80	8	65	11	25
Soup Bowl	20	57	28	70	31	44
Salad/Dessert Plate	0	18	8	20	6	3
Fruit Saucer	0	23	2	5	3	11
Bread & Butter Plate	0	34	2	28	0	3
Cup	91	100	85	95	75	97
Saucer	73	77	68	82	47	72
Open Vegetable Bowl	30	52	50	38	42	31
Platter	45	66	40	58	31	33
All	34	56	32	51	27	35

to a higher percentage. The increase for saucer was greater for activation than for the other conditions. Nonetheless, the percentage for activation was still somewhat lower than for the other conditions.

Across kinds of tableware, analyses of variance indicate greater increases in names from before- to after-training percentages and higher percentages for within- and across-shape conditions than for activation condition [$F(2,27) = 7.36, p < .01$; $F(1,27) = 30.18, p = .0001$, respectively]. For uses, the percentages for within- and across-shape conditions were higher than those for activation [$F(1,27) = 25.39, p = .0001$]. The F for the before-after × conditions for uses and the Fs for before-after × conditions × kinds for names or uses were not significant.

Regardless of training conditions, there were differences in names and uses among kinds of tableware both before and after training. However, shape of the tableware and their nested colors made no difference either across or in interactions with other variables.

When analyzed, gender made no difference. Although percentages of names and uses were generally higher for children of 50 months and older, age did not usually interact with training, conditions, or other variables. For brevity, details of these comparisons are omitted.

Shape, Color, Diameter, and Height

Almost without exception, shapes of the five kinds of tableware presented were described appropriately. Before training, 26 children did so on four or more of six opportunities and 14 did so on all six. After training, 29 did so on four or more opportunities and 22 did so on all six. Discriminative names by S and W did not occur.

Across the two repetitions of the four colors, 23 of the children were correct on all eight opportunities before training and 27 were after training. Five more children and one more child were correct on six of eight or more opportunities before and after training, respectively. Occurrences of names across colors cannot be attributed to inability to distinguish among the colors.

Before training, 25 children discriminated between tableware of small or large diameter, and 17 did so between tableware of short and tall height. These same numbers obtained after training. A majority of the children, by these other measures, distinguished differences in diameter and height.

DISCUSSION

Before training, the children were essentially unable to give the conventional specific names for the different kinds of tableware, except for cups and far less often for saucers. This was not because they were unable to discriminate by diameter and height; many were able to do so, at least by extremes. The requisite relationships between kinds and names either had not been activated or, more likely, had not yet been established by training.

For cups, and to a considerable degree for saucers, children were able to provide conventional specific uses. This also held, but at smaller percentages, for dinner plate, soup bowl, open vegetable bowl, and platter. Children as young as these, even those from relatively sophisticated homes, may have had little or no previous experiences with these kinds or their specific uses. However, at the daycare center they were attending, they had had considerable experience with soup bowl, open vegetable bowl, platter, and, perhaps misleadingly, salad/dessert plate used for the main course. Fruit saucers were often used for fruit desserts, but they were also used for other desserts. Bread and butter plates were sometimes used for desserts such as cake or ice cream cake. This is also somewhat misleading relative to the uses scored as appropriate at the highest level.

Training under the within- and across-shape conditions apparently increased occurrences of specific appropriate names. The after-training percentages were somewhat to markedly higher among the different kinds of tableware, except the open vegetable bowl for across-shape children. Activation did not produce an increase in names for the activation condition, except for cups.

The increases in percentages of uses were greater for the within- and across-shape conditions than for the activation condition; however, they were often appreciable for the latter condition. Although before/after training and conditions interacted significantly with names, they did not with uses. Activation was also facilitative.

The significance of these findings is only partly that young children, when taught, can master new names and uses and can improve on the complex relationships of attributes and attribute values of multidimensional stimuli to those names and uses. More importantly, these findings show that, with at least some multidimensional stimuli, stimuli that are familiar specifically or by close similarity, they abstract out sensory invariants/criterial attributes (Anglin, 1977, p. 11). Another conceptual mechanisms is not needed; existing analyses (Goss, 1961) suffice.

Many researchers investigating conceptual behaviors of children and adults have overlooked at least one likely explanation of apparent deficits in abstracting sensory invariants/criterial attributes. Often in investigations of conceptual behaviors, simple geometric shape/form and color have been the irrelevant dimensions, and size the relevant dimension. However, shape and color are often the attributes to which children and adults respond initially. Thus, acquisition of conceptual behavior based on size may be quite difficult.

Most tableware is circular with a smooth perimeter. However, its specific shape is irrelevant to kinds/names or uses. This is also true of color. Thus, initially strong relationships between these attributes or their values and names or uses are unlikely. In within- and across-shape training, these attributes were irrelevant.

Differences with respect to diameter and height had almost certainly been of some importance previously in the children's experiences with tableware. Diameter underlies uses to "eat off" or to "serve from." Liquids are best eaten from and served from tableware of higher height.

Analyses that were run but not described earlier indicated that even before training the children distinguished consistently and markedly between plate-like and bowl-like tableware and their uses. They discriminated by height. Also, the names and uses of cups had already been substantially mastered.

For 2-, 3-, and 4-year-olds, Smith's (1984) stimuli were familiar things or models thereof. Variations in color and size provided what Smith termed the attributes and dimensions with which the children's conceptual behavior was assessed. Under her "follow-the-leader" procedure, even the youngest children were able to choose by color or size attributes. The 3- and 4-year-olds were also able to choose by dimensions. Under her "Simon-says" procedure, understanding of color attributes was shown by some 2-year-olds and by almost all or all 3- and 4-year-olds. Size was difficult for children at all three levels. From 60% to 100% of the 3- and 4-year-olds responded correctly by color and by size dimensions. From these outcomes, Smith also concluded that "quite young children, then, represent objects dimensionally" (p. 376). She then proposed answers to "Why are so many dimensional tasks so difficult for them?"

REFERENCES

ANGLIN, J. (1977). *Word, object, and conceptual development*. New York: Norton.

Goss, A. E. (1961). Verbal mediating responses and concept formation. *Psychological Review*, **68**, 248-274.

SMITH, L. (1984). Young children's understanding of attributes and dimensions: A comparison of conceptual and linguistic measures. *Child Development*, **55**, 363-380.

(Manuscript received August 19, 1988.)