Categorization and Naming: Basic-Level Sorting in Eighteen-Month-Olds and Its Relation to Language

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GOPNIK, ALISON, and MELTZOFF, ANDREW N. *Categorization and Naming: Basic-Level Sorting in Eighteen-Month-Olds and Its Relation to Language.* CHILD DEVELOPMENT, 1992, **63,** 1091–1103. 2 studies investigate whether 18-month-old children spontaneously sort objects into basic-level categories, and how this ability is related to naming. In Study 1, 18-month-old children were given spontaneous sorting tasks, involving both identical objects and objects with basic-level intracategory variation. Children were scored as having passed the tasks if they produced "exhaustive grouping," that is, physically grouped all the objects of one kind into one location and the objects of the other kind into a different location. The children also received means-ends and object-permanence tasks. Children's parents received a checklist of early names. Children who produced exhaustive grouping used significantly more names than those who did not, in both identical and basic-level cases. There was no such relation between object-permanence and naming or between means-ends performance and naming. In Study 2, children received arrays of the same objects, with either identical objects or objects with basic-level variation in each group. No significant differences were found between the identical and basic-level tasks. However, as in the previous task, performance on both types of categorization was related to naming. Children who produced exhaustive grouping were reported to produce more names than those who did not. There appears to be a close relation between object categorization and naming in young children. The theoretical implications of this empirical association are discussed.

These studies address two central questions: (1) What is the nature of the 18-month-old child's categorization abilities? In particular, will infants of this age spontaneously and actively sort objects into basic-level categories? (2) Is there a relation between such abilities and early language development?

The Development of Categorization

Somewhere between 15 and 21 months of age there are striking changes in the ways that children sort objects into categories (Gopnik & Meltzoff, 1987a, 1987b; Langer, 1982; Nelson, 1973b; Ricciuti, 1965; Starkey, 1981; Sugarman, 1983). In these studies, children have been given mixed arrays of objects and their spontaneous sorting behavior has been observed. For example, a child might be presented with an array of four identical clay balls and four identical pillboxes. By about 1 year of age children can begin to group objects from a single category, for example, they may place all the balls in a single pile (Ricciuti, 1965; Starkey, 1981; Sugarman, 1983). By 15 months or so they may show what Mandler and Bauer (1988) call "exhaustive serial touching," that is, they touch all the objects in one category followed by all the objects in the other category (Gopnik & Meltzoff, 1987a; Nelson, 1973b; Ricciuti, 1965; Sugarman, 1983). Only at 18 months, however, do children begin to form multicategory groupings of all the objects in an array. It is only at this point that children will, for example, place all the boxes in one pile and all the balls in the other (Gopnik & Meltzoff, 1987a; Nelson, 1973b; Ricciuti, 1965; Sugarman, 1983). We

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might coin the term "exhaustive grouping" to describe these more sophisticated behaviors. In exhaustive grouping children displace the objects to form separate spatially defined groups, each composed of objects from a different category.

All these studies have presented children with objects that were identical within each category. In contrast, it has long been thought that children would not spontaneously sort objects with within-category variation until later in their development. In the classical "Vygotsky blocks" tasks (Vygotsky, 1962), for example, children were given objects that varied on several different dimensions, such as a set of blocks of different colors, sizes, and shapes. They tended to sort those objects "complexively" rather than sorting them according to properties. They might make a group of a red square block, followed by a red circular block, followed by a blue circular block rather than placing all the square blocks in one pile and the circular blocks in another pile. These tasks, however, require that the children pick out one particular property of objects, among many possible properties, and sort them according to that single property. They test the children's ability to understand the logical relations between objects and object properties.

Neither of these arrays—identical objects nor objects that simultaneously vary on many dimensions—capture the type of categorization that is involved in early naming and that many psychologists believe is cognitively primary. Rosch proposed that human beings naturally categorize objects into what she called "basic-level" categories. The members of such categories are not identical but they do share many similar within-category properties. These shared properties overlap rather little with the properties of the members of other basic-level categories (Rosch, Mervis, Gray, Johnson, & Boyes-Braem, 1976).[1]

There are a few studies of basic-level categorization in infancy using different paradigms. Roberts has shown that by 9 months of age children can recognize a single basic-level category in a habituation paradigm (Roberts, 1988; Roberts & Horowitz, 1986). Mandler and Bauer (1988) also suggest that, by 18 months, children may exhaustively serially touch objects from two basic-level categories. The first aim of this study was to investigate whether 18-month-old children would spontaneously sort objects into basic-level categories. Would they actually place objects of different types in different locations? In addition, we wanted to explore how this ability was related to the ability to sort identical objects and to other significant cognitive abilities of this period.

Categorization and Naming

Basic-level categorization is particularly interesting because of its possible relation to naming. One theoretical reason we might expect to find relations between these two areas of development, in particular, is that both basic-level categorization and naming involve similar conceptual domains. There have been few demonstrated relations between general aspects of language, such as the ability to use words or combine them, and general cognitive skills or abilities. There have, however, been a number of studies that demonstrated specific relations between the emergence of words that encode particular types of concepts and problem-solving abilities that require those concepts. For example, there appear to be relations between words like "gone" that encode disappearance and the development of object-permanence abilities. Similarly, there appear to be relations between the development of words for the success and failure of plans, like "there" and "uh-oh," and means-ends abilities (Gopnik & Meltzoff, 1986b). Since names encode basic-level categories, a relation between naming and basic-level sorting would be another instance of such a specific relation.

A second reason for predicting such a relation is that there are significant changes in naming at about the same time as the changes in sorting we have outlined. Between 15 and 21 months, children often develop a marked interest in naming objects. This interest may take the form of a "naming spurt"—a sudden sharp increase in naming (Bates et al., 1979; Bloom, 1973; Corrigan,

[1] We have used the term "basic-level" here to indicate simply categories that have prototype-based within-category variation and are similar to those encoded in early language. Some of these categories might be described as "superordinate" or "subordinate" in the adult system. There is evidence that the child's system may be structured somewhat differently from the adult's in this respect (see Mandler & Bauer, 1988, and Mervis, 1987, on "child-basic" categories). The important contrast here is to sets of identical objects on the one hand and objects that differ on many dimensions on the other.

1978; Goldfield & Reznick, 1990; Gopnik & Meltzoff, 1987a; Halliday, 1975; McShane, 1980; Nelson, 1973a). There is much evidence to suggest that early names, acquired both before and after the naming spurt, encode basic-level, prototype-based categories (Bowerman, 1978; Kuczaj, 1982; Mervis, 1987).

Some investigators have seen the development of early naming and the emergence of the naming spurt as essentially linguistic developments. For these theorists, the naming spurt occurs as a result of a "nominal insight" or a new "referential capacity" or even the activation of a linguistic constraint (Halliday, 1975; Markman, 1989; McShane, 1980). However, we might also think of the use of names as a kind of categorization behavior. A name places some of the objects in the world into a particular group. From this perspective, changes in naming may not be purely linguistic phenomena. Instead, they may also be related to nonlinguistic cognitive developments.

Very young infants, perhaps those as young as 9 months of age, can comprehend names, and so recognize that a name picks out a category of objects (Bates et al., 1979; Benedict, 1979). At least some infants can also spontaneously and actively use a few names to indicate objects in a category at a very early age, approximately 1 year, particularly if that category is salient or significant (Gopnik, 1988; Harris, Barrett, Jones, & Brookes, 1988; Huttenlocher & Smiley, 1987).

At around 18 months, however, many children begin to name many different objects, often, it seems, every object they see, not just salient or significant ones. A sharp increase in vocabulary results. This naming spurt can also be thought of as a kind of categorization behavior. However, it involves a rather different kind of categorization than the categorization involved in the very earliest uses of names. When children comprehend early names and when they produce a few names for salient objects, they seem to use the names to detect or mark single categories. During the naming spurt, children begin to comprehensively assign all the objects they see to different categories by giving them different names. The naming spurt is often described by saying that the child discovers that every object has a name. We might also see it as the discovery that every object belongs in some category.

The idea of a conceptual side to the naming spurt may be supported by the fact that, as described above, there are similar changes in children's nonlinguistic sorting abilities (Gopnik & Meltzoff, 1987a, 1987b; Nelson, 1973b; Ricciuti, 1965; Sugarman, 1983). These changes take place at about the same time that naming spurts are typically reported. These "exhaustive grouping" behaviors are similar in some respects to the behaviors of the naming spurt. In both cases, children seem intent on sorting collections of objects systematically into several categories, rather than on selecting out a single category. In both, the children spontaneously and actively divide the world into "natural kinds." A number of authors have suggested, on this basis, that there might be a particular relation between increases in naming at 18 months and the development of spontaneous sorting (Gopnik & Meltzoff, 1986a, 1987a, 1987b; Nelson & Lucariello, 1985).

However, there is also an interesting difference between the kind of categorization involved in the cognitive tasks used to date and in early naming. All the previous studies that have measured exhaustive sorting have used objects that were identical within each category, while early names encode categories with basic-level intracategory variation. What remains to be tested is the relation between the naming spurt and the ability to sort objects into basic-level categories.

A third reason for predicting that basic-level sorting might be related to naming is that there are already studies suggesting such relations between other types of sorting behaviors and naming. In a longitudinal study of 12 children, Gopnik and Meltzoff (Gopnik & Meltzoff, 1987a) found a specific empirical relation between the emergence of a naming spurt and the development of spontaneous exhaustive grouping of identical objects. In Gopnik and Meltzoff's study, children developed a naming spurt at the same time or shortly after they first displayed exhaustive grouping. In addition, there were strong correlations between the age at which children showed such behavior and the age at which they developed a naming spurt. Children who developed a spurt early also were likely to develop exhaustive grouping early. Similarly, though with different measures, Lifter and Bloom (1989) discovered a relation between spontaneous classificatory object play and the naming spurt.

Gopnik and Meltzoff's study, like the