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Individual and developmental differences in preschoolers' categorization biases and vocabulary across tasks



Elizabeth A. Ware

Department of Psychology, Viterbo University, La Crosse, WI 54601, USA

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ABSTRACT

This study bridges prior research on young children's use of taxonomic versus thematic relations to categorize objects with prior research on their use of shared shape versus shared function to categorize artifacts. Specifically, this research examined associations in children's categorization tendencies across these two dichotomies, including assessments of individual differences, developmental trends, and vocabulary level. Preschoolers (3- to 5-year-olds) completed a receptive vocabulary assessment and two match-to-sample tasks: one pitting (superordinate) taxonomic and thematic relations against each other and one pitting shape and function similarity against each other. The results revealed individual and developmental variation in children's cross-task categorization biases, with a predominant tendency to focus on both thematic and function relations that became increasingly stronger with age. In 3- and 5-year-olds, function-based categorization was also positively associated with verb vocabulary. These findings demonstrate an emerging tendency to focus on relational information during the preschool years that, among other learning effects, may benefit verb acquisition. The results are discussed in terms of the real-time processing and developmental factors that might contribute to the development of strategies for learning about objects and categories during early childhood.

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E-mail address: eaware@viterbo.edu

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Introduction

Categorization is a fundamental aspect of cognition and a critical task of child development that helps children to organize experience and understand relations between entities. However, it is complicated by the fact that there are numerous ways to group entities, for example, based on taxonomic category membership (i.e., belonging to the same kind), thematic relatedness (i.e., interacting causally, functionally, spatially, or temporally), and shared properties (i.e., having common features such as shape or color). Thus, to better understand conceptual development, researchers have sought to determine how the importance of various criteria changes across development. This is often assessed by examining children's and adults' preferences for certain criteria over others in categorization tasks such as sorting and match-to-sample tasks. Two issues that have received particular attention in developmental research are children's use of taxonomic versus thematic relations to categorize (e.g., dog–cat vs. dog–bone) and their use of similarities in artifact shape versus function. There are similar motivations for studying these two dichotomies; namely, both provide insight into how children's concepts are shaped by perceptually available properties (i.e., taxonomic and shape similarity) and less apparent relational properties (i.e., thematic and function similarity). Nevertheless, to date these two dichotomies have been studied in separate bodies of research.

The current study, in contrast, explored the taxonomic/thematic and shape/function dichotomies within a single study and tested for associations in how children categorize across them. This research also tested for individual and developmental differences in children's cross-task categorization biases and associations between categorization biases and language development because these questions have been studied separately within the research on each dichotomy. Whereas the work on individual tasks provides insight into children's prioritization of certain criteria within specific contexts, the goal of the current work was to explore whether children develop broad categorization strategies that extend across multiple task contexts. Uncovering such broad strategies can help to elucidate the real-time processing that children engage in across contexts when learning about interconnections among objects, categories, and language. For example, if children focus more on perceptual information across multiple categorization task contexts, it suggests that they generally approach categorization by comparing or aligning perceptual similarities and differences. In contrast, if they focus more on relational information across contexts, it suggests that they generally approach categorization by associating objects according to a theme or context. Moreover, exploring individual and developmental differences in cross-task categorization tendencies will help to pinpoint the broader influence of experiential and developmental factors in these processes. Together, these findings can inform best practices for teaching children about categories or language such as understanding what guidance different children need to help them focus on particular properties or relations over others.

The comparison of the taxonomic/thematic and shape/function dichotomies is especially fitting for exploring questions about the development of broad categorization tendencies because, in addition to their comparable contrast of perceptual versus relational information, there are several parallels in the findings across these two research areas. Early research on both dichotomies suggested that there are developmental shifts in the relative significance of these criteria during the preschool years (Blanchet, Dunham, & Dunham, 2001; Gelman, Coley, Rosengren, Hartman, & Pappas, 1998; Lucariello, Kyratzis, & Nelson, 1992; Lucariello & Nelson, 1985; Smiley & Brown, 1979; Smith, Jones, & Landau, 1996); however, subsequent research in both areas indicates that children's categorizations vary across contexts and individuals, not age per se. First, children and adults both access a range of criteria and exhibit flexibility in their categorizations. For example, preschoolers cross-classify items into both taxonomic and thematic categories such as grouping “bus” with both “firetruck” (vehicles) and “backpack” (school theme) (Nguyen, 2007; Nguyen & Murphy, 2003). Flexibility has been demonstrated as early as 14 months in non-verbal categorization tasks (i.e., sequential touching) (Horst et al., 2009) and by 4 years in verbal match-to-sample tasks (Blaye & Bonthoux, 2001; Deák, Ray, & Pick, 2002, 2004). Thus, children exhibit flexibility in implicit tasks quite early, which ultimately develops into a more explicit understanding that can be applied with relative ease (e.g., Blaye, Chevalier, & Paour, 2007; Ross & Murphy, 1999).

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