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Journal of Experimental Child Psychology

journal homepage: www.elsevier.com/locate/jecp



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The role of perceptual similarity of the task environments in children's perseverative responding

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ARTICLE INFO

Article history:

Received 15 November 2012

Revised 9 July 2013

Available online 31 August 2013

Keywords:

Perseveration

Perceptual similarity

Task environments

Representations

Inhibitory control

Symbolic comprehension

ABSTRACT

Perseverative responding is often seen in children's performance in a variety of contexts. One such context is symbolic comprehension in which 2- and 2½-year-olds demonstrate difficulty in appreciating the association of symbols (pictures and scale models) and their referents and show a high proportion of perseverative responding. Representational-level explanations of perseveration were explored in the current studies via examination of the impact of perceptual similarity of visual environments across trials. Across two experiments, children saw either a picture (Experiment 1) or a scale model (Experiment 2) of a hiding location of a room and were then encouraged to recover the toy from an identical room. Manipulating the perceptual similarity of the environments across successive trials affected performance and perseverative responding. These results highlight the critical role played by perceptual information not only in symbolic tasks but also in many other tasks and have important implications for theories of perseveration.

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Introduction

Perseverative responding, defined as a tendency to repeat a previous response, has been demonstrated in children's performance in a variety of contexts, including symbolic comprehension (DeLoache, 1995a; DeLoache, Pierroutsakos, Uttal, Rosengren, & Gottlieb, 1998), A-not-B tasks (Bjork & Cummings, 1984; Cummings & Bjork, 1981; Diamond, 1985; Piaget, 1936/1954), spatial recognition (Bremner, 1978; Bremner & Bryant, 1977), and cognitive inflexibility (Zelazo & Frye, 1997; Zelazo,

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Frye, & Rapus, 1996; Zelazo, Reznik, & Pinon, 1995). In most cases, results indicate that despite knowing the correct response, children tend to repeat a previous response or apply previous rules to the contexts in which they no longer apply. One such context of primary interest for the current article is symbolic comprehension, investigating children's ability to associate a symbol (picture or scale model) to its referent. According to DeLoache (1995a), "A symbol is something that someone intends to stand for something other than itself" (p. 70). Symbolic artifacts have been used for thousands of years for a variety of purposes such as their role in communicating information, as expressed by the well-known adage, "a picture is worth a thousand words." However, the use of symbols is limited by the viewer's understanding. In this respect, symbolic knowledge entails what DeLoache (1995a) referred to as the three Rs: *representation*, *referent*, and the *relation* between the two. Accordingly, a symbol is both an object on its own while at the same time serving as a representation of another object—its referent (DeLoache, Pierroutsakos, & Troseth, 1996)—with a complete understanding of a symbol accomplished only when this "dual representation" (understanding the role of symbols as a representation of another entity) is achieved. Although adults show little difficulty in understanding symbols, this dual representation—or as Gregory (1970) called it "double reality"—of symbols (pictures) poses a great challenge to young children.

Research on children's abilities to understand symbolic representations has taken a variety of forms. One area of focus has examined the development of picture perception and infants' abilities to recognize the association of a picture and its referent. Not only has this ability been found in children by 2 years of age (Dahler, Perlmutter, & Myers, 1976) even without any previous experience or training with pictures (Hochberg & Brooks, 1962), but also it is evident in very young infants (DeLoache, Strauss, & Maynard, 1979; Dirks & Gibson, 1977; Jowkar-Baniani & Schmuckler, 2011).

Unfortunately, simple recognition of pictures is not necessarily indicative of infants' understanding of symbol–referent relations (DeLoache & Burns, 1994). Children often act in a manner suggesting that they confuse pictures with the objects they represent (DeLoache et al., 1998). For instance, DeLoache and colleagues (1998) found that 9-month-olds responded manually to a book containing colored photographs by frequently rubbing, patting, or hitting the images and sometimes even trying to pluck the pictures off the page. Comparable results have been demonstrated in other studies, with 3-year-olds believing that a picture of a rose would smell sweet or that a picture of ice cream would be cold (Beilin & Pearlman, 1991).

Such findings can be explained by using a model of symbolic comprehension and symbol use in which children's difficulties are due to a failure to achieve "representational insight" (DeLoache & Burns, 1994) stemming from a problem in considering two simultaneous representations of the same entity, leading to difficulty in understanding that a picture is both a representation of another object while being an object in its own right (DeLoache, 1995a, 1995b; Zelazo & Frye, 1997). In support of this idea, DeLoache (1995a) demonstrated that the saliency of a symbol influenced children's ability to effectively use that object as a symbol. In these tasks, children are shown the hiding location of a toy either in a picture of a room or in a scale model of a room and are asked to retrieve the toy from the actual room. She demonstrated that although 3-year-olds searched correctly for the toy in both the picture and model tasks, 2½-year-olds performed better in the picture task than in the model task. According to DeLoache (1995a, 1995b), this picture superiority effect arose because pictures are perceived as less salient objects compared with scale models. Accordingly, the highly salient and attractive nature of the model interfered with children's understanding of its symbolic status, leading children to treat the model as an object rather than a symbol, whereas the less salient picture was more easily recognized as a symbol by the younger children. These findings have been both replicated (DeLoache, 1987, 1991) and extended to the use of video images (Troseth & DeLoache, 1998).

Investigations of children's performance often demonstrate a large number of response perseverations or perseverative searches in these tasks (Sharon & DeLoache, 2003). In fact, this type of incorrect response, defined as searching in the location that had been correct on the previous trial, typically accounts for up to 50% of the errors made in symbolic retrieval tasks (DeLoache, 1991; O'Sullivan, Mitchell, & Dahler, 2001). In addition, in many studies, comparing children's search accuracy on the first trial of a symbolic retrieval task relative to later trials has revealed a "first trial superiority" effect, indicating better performance on the first trial compared with any subsequent trials (Schmitt & Anderson,

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