Journal of Experimental Child Psychology 107 (2010) 325–336

Contents lists available at ScienceDirect

Journal of Experimental Child Psychology

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

Two types of perseveration in the Dimension Change Card Sort task

Rima Hanania

Department of Psychological and Brain Sciences, Indiana University Bloomington (IUB), Bloomington, IN 47405, USA

ARTICLE INFO

Article history:
Received 9 December 2009
Revised 8 May 2010
Available online 20 June 2010

Keywords:
Perseveration
Selective attention
Development
DCCS
Attention switching
Executive function

ABSTRACT

In the Dimension Change Card Sort (DCCS) task, 3-year-olds can sort cards well by one dimension but have difficulty in switching to sort the same cards by another dimension when asked; that is, they perseverate on the first relevant information. What is the information that children perseverate on? Using a new version of the DCCS, the experiments in this article reveal that there are two types of perseverators: those who perseverate at the level of dimensions and those who perseverate at the level of values (stimulus features). This novel finding has implications for theories of perseveration.

Introduction

One of the important developing skills in executive function is the ability to flexibly shift attention from one source of information to another as task demands change. Young children show marked improvement in this ability during the preschool years, as measured by such tasks as the Dimension Change Card Sort (DCCS) (Frye, Zelazo, & Palfai, 1995). In the DCCS, children are asked to sort a set of simple picture cards into boxes with target cards on them, as illustrated in Fig. 1. The sorting cards (e.g., red rabbits and blue boats) match each target card (e.g., a blue rabbit and a red boat) on exactly one dimension; in this example, the red rabbit matches the blue rabbit on shape and matches the red boat on color, similarly for the blue boat. On the first phase of the task, the preswitch phase, children are asked to sort the cards by one dimension (e.g., by color) and then on a second phase, the postswitch phase, they are asked to switch and sort the cards by the other dimension (e.g., by shape), thereby requiring that the cards be sorted into opposite boxes on the two phases. Although nearly all 3- and 4-year-olds sort the cards correctly by the first dimension, no matter which dimension is first, 3-year-olds tend to be unsuccessful on the postswitch phase, continuing to sort cards by the first

E-mail address: rhanania@indiana.edu

0022-0965/$ - see front matter © 2010 Elsevier Inc. All rights reserved.
doi:10.1016/j.jecp.2010.05.002

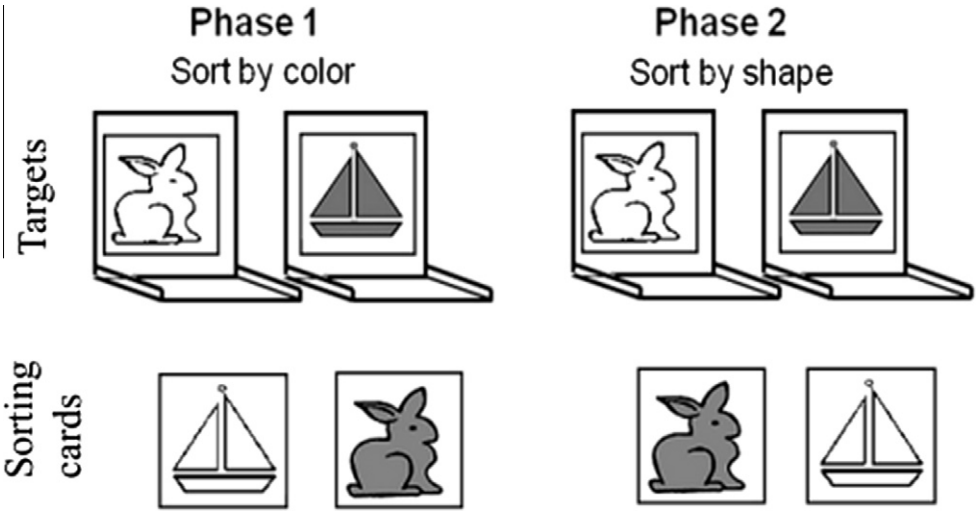

Fig. 1. Standard DCCS task with two phases using the same cards and switching sorting dimensions. White = blue; gray = red.

relevant dimension even though they are asked to switch and sort by the other dimension instead; that is, they perseverate. On the other hand, 4-year-olds are much more likely to sort the cards correctly postswitch, demonstrating an ability to follow the new instructions and to flexibly switch their responses appropriately (e.g., Kirkham, Cruess, & Diamond, 2003; Perner & Lang, 2002; Towse, Redbond, Houston-Price, & Cook, 2000; Zelazo, Frye, & Rapus, 1996; for reviews, see Garon, Bryson, & Smith, 2008, and Hanania & Smith, 2009).

Attention-based theories of perseveration (e.g., Kirkham et al., 2003; see also Garon et al., 2008) explain sorting success in terms of children's ability to selectively attend to the relevant information; that is, the ability to focus attention on just what is relevant, ignoring the misleading irrelevant information. Both 3- and 4-year-olds sort equally well by the first dimension; thus, both age groups appear to be able to selectively attend to the preswitch relevant information. To be successful on the second sorting phase, children must shift attention to the other dimension and selectively attend to the postswitch relevant information. Because perseverators sort incorrectly postswitch, sorting instead as they did on the first phase, they appear to be stuck selectively attending to the preswitch relevant information, unable to switch away from it (e.g., Kirkham et al., 2003) or toward information that was irrelevant on the first phase (e.g., Müller, Dick, Gela, Overton, & Zelazo, 2006; Zelazo, Müller, Frye, & Marcovitch, 2003). What is the relevant information that these perseverating children attend to and get stuck on? Do children perseverate on the first attended dimension (e.g., color) irrespective of the values on that dimension, or do they perseverate on the particular values (e.g., the stimulus features red and blue) such that perseveration is dependent on the presence of those same values on postswitch trials? Although some studies have attempted to answer this question (notably Zelazo et al., 2003), there remains some uncertainty about the source of perseveration. The experiments described in this article reexamined this issue by using a novel version of the DCCS. The results reveal new insights about perseveration and help to resolve ambiguous previous findings by showing that there are two types of perseverators.

Dimensions versus values

In the standard DCCS task, the sorting cards on pre- and postswitch phases are exactly the same (e.g., red rabbits and blue boats), making it unclear whether children perseverate because they continue attending to the first relevant values (e.g., the stimulus features red and blue) or because they continue attending to the first relevant dimension (e.g. color) regardless of the values on that dimen-