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Journal of Experimental Child Psychology

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

Brief Report

Selective directed forgetting in children

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ARTICLE INFO

Article history:

Available online xxxx

Keywords:

Episodic memory
 Forgetting
 Directed forgetting
 Inhibition
 Memory development
 Selectivity

ABSTRACT

When, after study of an item list, adults are cued to forget some of the list items and encode new information instead, such cuing often induces selective forgetting of the to-be-forgotten material without impairing recall of the other items. This study examined developmental trends in such selective directed forgetting by having second graders, sixth graders, and young adults study three successive lists of items and, after study of List 2, cuing them either to remember both List 1 and List 2 or to forget List 2 but remember List 1. Consistent with prior work, second graders exhibited no forgetting at all in response to the forget cue, whereas young adults selectively forgot List 2. Sixth graders showed still another pattern with forgetting of both List 1 and List 2, suggesting that the ability to selectively forget is still absent at this age level. Directed forgetting has often been attributed to the action of inhibitory control processes. On the basis of this view, the current finding that children during middle childhood do not yet show selective forgetting indicates that the control processes underlying selective directed forgetting mature into adolescence and early adulthood.

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Introduction

A critical prerequisite for the everyday functioning of our memory is an efficient updating of the memory system. Such updating renders irrelevant out-of-date information, such as one's former home address, less accessible but enhances the accessibility of more relevant information, such as one's current address. Lab-based studies have repeatedly shown that young adults can forget irrelevant

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information when cued to do so, an ability often attributed to inhibitory processes (e.g., Geiselman, Bjork, & Fishman, 1983). Developmental work has shown that reliable memory updating typically arises at the end of the elementary school years, which is consistent with the view that, at earlier age levels, inhibitory processes are not yet sufficiently developed (e.g., Harnishfeger & Pope, 1996). More recent work now indicates that young adults not only can deal with updating tasks, in which participants are cued to forget all precue information, but also can deal with selective tasks, in which both relevant information and irrelevant information have been encoded and participants are cued to selectively forget the irrelevant precue information (e.g., Delaney, Nghiem, & Waldum, 2009). The current study sought to (a) determine whether such selective memory updating follows a similar developmental trend as does nonselective memory updating and (b) examine, on the basis of the findings, what type of process underlies selective memory updating.

A classic method of examining (nonselective) memory updating is the so-called list method directed forgetting (LMDF) task. In this task, participants successively study two item lists and, between lists, receive a cue either to remember the first list for a later memory test or to forget the list, pretending that it was presented for practice only. At test, participants are asked to recall both lists of items regardless of cue. Typically, relative to remember-cued participants, forget-cued participants show impaired recall of List 1 and improved recall of List 2, referred to as forgetting of the precue information and enhancement of the postcue information (e.g., Bjork, 1989). To date, a number of studies have examined LMDF in school-aged children, and the findings from this research generally indicate that younger, but not older, elementary school children show difficulties with the task (e.g., Aslan, Staudigl, Samenieh, & Bäuml, 2010; Harnishfeger & Pope, 1996; Zellner & Bäuml, 2004). For instance, Harnishfeger and Pope (1996) found that whereas fifth graders showed intact (adult-like) LMDF effects, the effects were completely absent in first graders and still reduced in third graders. Similarly, Zellner and Bäuml (2004) demonstrated reliable LMDF effects in fourth graders but not in second graders.

Arguably, the classic LMDF task does not represent a particularly demanding updating task because, in the forget condition, all of the List 1 information is designated as unimportant and, therefore, participants are asked to forget all precue items. In contrast, more recent research examined how participants deal with more challenging updating tasks, in which both relevant precue information and irrelevant precue information are provided and participants are asked to forget the irrelevant information but keep in mind the relevant precue information. For instance, Kliegl, Pastötter, and Bäuml (2013) had young adults study three successive lists of items. After presentation of List 2, participants were cued either to forget List 2 but keep in mind List 1 (RFR condition) or to keep both lists in mind (RRR condition). Thereafter, a third list consisting of relevant items only was presented. Across three experiments, the results consistently showed evidence for selectivity in LMDF; relative to the RRR condition, forgetting of List 2, but not of List 1, arose in the RFR condition, indicating that young adults are capable of selectively forgetting irrelevant precue information (for related results, see Aguirre, Gómez-Ariza, Andrés, Mazzoni, & Bajo, 2017; Aguirre, Gómez-Ariza, Bajo, Andrés, & Mazzoni, 2014; Delaney et al., 2009; but see Sahakyan, 2004).¹ To date, however, no study has yet examined developmental trends in selective LMDF.

The effects of both nonselective and selective cues to forget precue information have often been explained by retrieval inhibition. In the context of the classic (nonselective) LMDF task, this account assumes that forget-cued participants engage in active inhibitory processes that reduce access to List 1 items and, due to the resulting decrease in these items' interference potential, improve recall of List 2 (Geiselman et al., 1983). Regarding selective LMDF, the additional proposal is that inhibitory processes can flexibly target and suppress irrelevant precue information without affecting the relevant precue information (Aguirre et al., 2017; Kliegl et al., 2013). Indeed, recent work relating performance in the LMDF task to executive control mechanisms and the involvement of prefrontal cortical regions (Conway & Fthenaki, 2003; Hanslmayr et al., 2012) suggests that retrieval inhibition reflects the action

¹ Like many studies on nonselective LMDF, studies on selective LMDF typically did not find recall enhancement of the postcue items. This result may have been expected because, as in nonselective LMDF, in selective LMDF precue items are often tested prior to the postcue items. As shown in Pastötter, Kliegl, and Bäuml (2012), when the precue items are tested first and the postcue items are tested last, the postcue enhancement effect is often reduced or even absent.

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