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Age differences in the rejection of false memories: The effects of giving warning instructions and slowing the presentation rate

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ABSTRACT

Two experiments were conducted to examine whether children of different ages differ in their ability to reject associative false memories with the Deese–Roediger–McDermott (DRM) paradigm. Two different types of manipulations that are thought to facilitate false memory rejection in adults—slowing the presentation rate and issuing explicit warnings—were analyzed in younger and older children. The results showed that older children were more able than younger children to reject associative false memories through warnings and by slowing the presentation rate. We conclude that although older children are, in general, more prone to produce false memories with the DRM paradigm, they are also more able to reject them when certain conditions facilitate the editing process.

Introduction

Although extensive research has been conducted to analyze the developmental pattern of false memories, both implanted and spontaneous, only a few studies have been concerned with exploring age differences in false memory rejection. The current study examines the extent to which children of different ages are able to use rejection strategies to avoid false memory production.

Research carried out on false memories in children has flourished with studies on implanted suggestion conducted with the misinformation paradigm (e.g., Bruck & Ceci, 1999; Ceci, 1997; Ceci & Bruck, 1993; Ceci, Bruck, & Battin, 2000; Holliday, Reyna, & Hayes, 2002; Roebers & Schneider, 2000) and the imagination inflation paradigm (Ceci, Loftus, Leichtman, & Bruck, 1994; Pezdek &

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Hodge, 1999), and these studies have demonstrated that as children get older they become more immune to suggestions (Bruck & Ceci, 1999; Ceci & Bruck, 1993). One of the explanations for such a decline in suggestibility is given by the fact that there is an increase in source monitoring ability with age, referring to the ability to correctly remember the context in which a particular memory originated. A large amount of literature has shown that young children demonstrate a poor ability to monitor the sources of their memories (for reviews, see Lindsay (2002), and Roberts and Blades (2000)), a difficulty that is particularly apparent in situations involving reality monitoring (e.g., Foley & Johnson, 1985; Foley, Johnson, & Raye, 1983), discrimination between self-performed and other-performed actions (Foley, Ratner, & Passalacqua, 1993), or judgments about similar external sources (Lindsay, Johnson, & Kwon, 1991; Poole & Lindsay, 1995).

For a long time, implanted and misinformation studies led to the conclusion that young children are more prone to any kind of false memories than older children or adults because younger children have more difficulty in monitoring or rejecting false memories. However, research on spontaneous false memory using the Deese–Roediger–McDermott (DRM) paradigm (Deese, 1959; Roediger & McDermott, 1995) has since provided a different conclusion. This paradigm, first used with adults and then used with children, is based on a procedure in which lists of associates are presented to the participants, always omitting the converging word that is linked to all of the presented words of a list. For example, one list could be composed of several associates, such as *bed*, *rest*, *awake, tired, dream, wake, snooze, blanket,* etc., without the inclusion of its converging word *sleep*. The impressive result of this paradigm is that the converging words (critical items) may be equally or even better recalled and recognized than words presented in the lists (Roediger & McDermott, 1995).

Using this paradigm, recent studies have found an increase in false memory with age, from childhood to adulthood (e.g., Brainerd, Reyna, & Forrest, 2002; Brainerd, Reyna, Forrest, & Karibian, 2006; Carneiro, Albuquerque, Fernandez, & Esteves, 2007; Howe, 2006; Howe, Gagnon, & Thouas, 2008; Odegard, Holliday, Brainerd, & Reyna, 2008), which seems to contradict the developmental pattern usually found with implanted false memories. However, more recent studies have shown that the age increase in false memory is not a finding specific to DRM studies. When connected meaning tasks are used, implanted false memories can also increase with age, as the studies of Connoly and Price (2006), Fazio and Marsh (2008), and Ceci, Papierno, and Kulkofsky (2007) demonstrated. These findings have led some authors (e.g., Brainerd, Reyna, & Ceci, 2008) to argue that there is no dichotomy between implanted and spontaneous false memories in regard to developmental reversals. According to fuzzy trace theory, connected meaning paradigms could lead to increases with age because of two factors: children's limitations in forming semantic (gist) relations and older children's or adults' difficulty in using their superior true (verbatim) memories to suppress meaning-based errors in tasks requiring the processing of many meaning-sharing items (Brainerd & Reyna, 2005; Brainerd, Reyna et al., 2008).

Rooted on different conceptual grounds, an associative activation theory (Howe, 2006, 2008) has proposed that age-dependent increases in the number, strength, and automaticity of interitem associations can explain false memory developmental patterns. The role played by associative relations has been emphasized in some influential accounts of DRM effects (for an extensive presentation, see Gallo, 2006), and the approach continues to inspire the works of numerous researchers. However, it should be noted that the issue of whether there is a real dichotomy between semantic processing (as proposed by fuzzy trace theory) and associative processing (as proposed in the associative account) remains a subject of debate (e.g., Brainerd, Yang, Reyna, Howe, & Mills, 2008).

At the same time, there is some evidence from DRM studies with children indicating that false memory rejection increases with age. Using a mathematical model of recognition to compare the amounts of false memory rejection in children of different age levels, Brainerd, Holliday, and Reyna (2004) and Brainerd and Reyna (2002) found an increase in false memory rejection through development. Furthermore, an event-related functional magnetic resonance imaging study conducted with the DRM paradigm suggests that the right anterior prefrontal cortex, a region activated when conditions make higher monitoring demands, is more likely to be recruited with increasing age (Paz-Alonso, Ghetti, Donohue, Goodman, & Bunge, 2008). Moreover, Rybash and Hrubi-Bopp (2000) found that when a "generate" condition previous to recall was included, where participants were instructed to think of other words that were semantically related to the presented items, young adults were able to decrease false recall, whereas children and old adults increased it. This study seemed to indicate