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## Children's spontaneous counterfactuals: The roles of valence, expectancy, and cognitive flexibility



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### ABSTRACT

The current set of studies examined whether 8- to 11-year-olds generate counterfactuals spontaneously and whether outcome valence and outcome expectancy affect counterfactual reasoning within this age group. The role of cognitive flexibility in such reasoning also was explored. In Study 1, relatively few children spontaneously generated counterfactuals, yet both outcome expectancy and outcome valence influenced counterfactual reasoning. In Study 2, the majority of children generated counterfactuals without an explicit prompt and outcome valence influenced reasoning. Cognitive flexibility accounted for unique variance in counterfactual reasoning. The findings suggest that in middle childhood children spontaneously engage in counterfactual reasoning and that some of the same factors influence counterfactual reasoning in childhood as in adulthood.

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### Introduction

Humans commonly evaluate events and actions in everyday life to make sense of the world around them (Kanazawa, 1992). One frequently used method of evaluation is the act of comparing reality with an imagined outcome, known as counterfactual reasoning (e.g., Kahneman & Miller, 1986; Kahneman & Tversky, 1982; Roese, 1994). Previous research has indicated that adults commonly engage in counterfactual reasoning, and children as young as 3 years are able to do so when prompted explicitly (e.g., Beck, Riggs, & Gorniak, 2009; German & Nichols, 2003; Guajardo & Turley-Ames, 2004; Harris,

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German, & Mills, 1996). The primary purpose of the current set of studies was to examine children's spontaneous generation of counterfactuals. In particular, we examined the effects of outcome valence and expectancy violation on counterfactual reasoning. In the second study, we also explored cognitive flexibility as a partial explanation for individual differences in counterfactual reasoning.

Counterfactual thinking refers to the action of conceiving alternate versions of an actual event, and it involves asking "what if" or "if only" questions to imagine how an event could have occurred differently (Roese, 1994; Sanna & Turley, 1996). Counterfactual thinking is an important aspect of social-cognitive functioning. For example, such thinking has been found to be related to theory of mind understanding in early childhood (e.g., Drayton, Turley-Ames, & Guajardo, 2011; German & Nichols, 2003; Guajardo, Parker, & Turley-Ames, 2009; Guajardo & Turley-Ames, 2004; Müller, Miller, Michalczyk, & Karapinka, 2007; Perner, Sprung, & Steinkogler, 2004; Riggs, Peterson, Robinson, & Mitchell, 1998) and meaningfulness of events in adulthood (Kray et al., 2010). Adults who considered how pivotal events could have turned out differently rated those events as more meaningful than those who did not consider alternatives (Kray et al., 2010).

Epstude and Roese (2008) proposed a functional theory of counterfactual reasoning, which proposes that counterfactual thinking is important for behavior regulation and performance improvement. For example, counterfactual thinking influences our intentions to act differently in the future (Epstude & Roese, 2011) and our motivation to actually change our behavior (Markman, Gavanski, Sherman, & McMullen, 1993), particularly to prevent aversive outcomes from recurring (German, 1999; Mandel & Lehman, 1996; Sanna & Turley-Ames, 2000). Counterfactuals also can serve an affective function. When we consider how an event could have been worse, we can make ourselves feel better about the current situation (Roese, 1994). Thus, counterfactual thinking serves important social-cognitive and behavioral functions. Understanding when spontaneous counterfactual thinking emerges will aid in our knowledge of the development and functioning of such thinking across the lifespan (Beck & Riggs, 2014).

Research on pretend play suggests that children can engage in counterfactual thinking (thinking that is counter to reality) within their second year of life (Amsel & Smalley, 2000; Richards & Sanderson, 1999). Within experimental settings, children as young as 3 years can answer counterfactual questions when prompted directly (e.g., Beck et al., 2009; German & Nichols, 2003; Guajardo & Turley-Ames, 2004; Harris et al., 1996), although counterfactual abilities improve across childhood. Children as young as 3 years are able to identify alternative antecedents that would change an outcome (e.g., take off their shoes, wipe their shoes on the mat; Guajardo & Turley-Ames, 2004) as well as alternative outcomes when given an antecedent (e.g., Harris et al., 1996; Riggs et al., 1998). By 5 years of age, children demonstrate an understanding of *almost* (Beck & Guthrie, 2011), and they understand regret, including anticipating feeling regret (a counterfactual emotion), between 6 and 9 years of age (see Beck & Riggs, 2014; Burns, Riggs, & Beck, 2012; Guttentag & Ferrell, 2008; McCormack & Feeney, 2015; Rafetseder & Perner, 2012), although developmental changes in the experience of regret and relief continue across adolescence (Habib et al., 2012). Others have argued that children do not truly think counterfactually until later in childhood (Rafetseder, Cristi-Vargas, & Perner, 2010), perhaps as late as 12 years of age (Rafetseder, Schwitalla, & Perner, 2013). Rafetseder and colleagues have suggested that young children are capable of basic conditional reasoning (thinking about what could change an outcome), yet it is not until 9 to 12 years of age that they are able to think within the constraints set by actual events. Given the evidence that counterfactual thinking improves across middle childhood, we explored spontaneous counterfactual reasoning with children between 8 and 11 years of age. Although preschool-aged children can engage in counterfactual thinking when prompted, we hypothesized that it would not be until middle childhood that they did so spontaneously.

Previous work exploring antecedents of counterfactual thought has indicated that both outcome valence (favorability of an outcome) and outcome expectancy affect the likelihood of someone generating counterfactual statements. Both adults (e.g., Gavanski & Wells, 1989; Gleicher et al., 1990; Landman, 1987; Landman & Manis, 1992; Roese & Hur, 1997; Sanna & Turley, 1996) and children (German, 1999) generate counterfactuals more often following unfavorable outcomes as opposed to favorable ones. For example, Landman and Manis (1992) found that when adults reflected on their lives, they generated a high number of counterfactuals when they felt that they should have achieved

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