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How do thoughts, emotions, and decisions align? A new way to examine theory of mind during middle childhood and beyond

Kristin Hansen Lagattuta^{*}, Noel M. Elrod¹, Hannah J. Kramer¹

Department of Psychology and Center for Mind and Brain, University of California, Davis, Davis, CA 95616, USA

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ABSTRACT

The current study examined 4- to 10-year-olds' and adults' ($N = 280$) tendency to connect people's thoughts, emotions, and decisions into *valence-matched mental state triads* (thought valence = emotion valence = decision valence; e.g., anticipate something bad + feel worried + avoid) and *valence-matched mental state dyads* (thought–emotion, thought–decision, and emotion–decision). Participants heard vignettes about focal characters who re-encountered individuals who had previously harmed them twice, helped them twice, or both harmed and helped them. Baseline trials involved no past experience. Children and adults predicted the focal characters' thoughts (anticipate something good or bad), emotions (feel happy or worried), and decisions (go near or stay away). Results showed significant increases between 4 and 10 years of age in the formation of valence-matched mental state triads and dyads, with thoughts and emotions most often aligned by valence. We also documented age-related improvement in awareness that uncertain situations elicit less valence-consistent mental states than more certain situations, with females expecting weaker coherence among characters' thoughts, emotions, and decisions than males. Controlling for age and sex, individuals with stronger executive function (working memory and inhibitory control) predicted more valence-aligned mental states. These findings add to the emerging literature on development and individual differences in children's reasoning about mental states and emotions during middle childhood and beyond.

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^{*} Corresponding author.

E-mail address: khlaga@ucdavis.edu (K.H. Lagattuta).

¹ NME and HJK contributed equally to this work.

Introduction

Children's understanding of mental states and emotions, theory of mind (ToM), has been a core topic in cognitive development research for the past 30 years. Despite a rich foundation of studies on infants' and preschoolers' concepts about desires, emotions, and beliefs (see [Wellman, 2014](#)), less attention has been directed toward ToM improvements after 6 years of age, including sources of variability during middle childhood and beyond ([Hughes & Devine, 2015](#); [Lagattuta et al., 2015](#); [Miller, 2012](#); [Pillow, 2012](#)). As reviewed in [Lagattuta \(2014\)](#), one such advance involves more complex reasoning about causal connections between mental states (e.g., how thoughts influence emotions). The current research expands this inquiry to consider development and individual differences in 4- to 10-year-olds' and adults' beliefs about *triadic* interrelations among thoughts, emotions, and decisions—for example, how thoughts elicit emotions as well as shape decisions. We focus on the thought–emotion–decision triad because it figures prominently in scientific theories of emotion, decision making, and clinical disorders, with interventions often aimed at helping individuals to recognize and change maladaptive relations among how they think, feel, and act ([Baumeister, Vohs, DeWall, & Zhang, 2007](#); [Borkovec, Ray, & Stober, 1998](#); [Coricelli et al., 2005](#); [Dolan, 2002](#); [Ehlers & Clark, 2000](#); [Ellis, 1991](#); [Fredrickson, 2001](#); [Lazarus, 1982](#); [Wood, Quinn, & Kashy, 2002](#)). Thus, this study informs basic research on ToM development during middle childhood and has implications for clinical practice.

Although children's reasoning about triadic coherence among thoughts, emotions, and decisions has not been systematically investigated, researchers have done substantial work examining children's understanding of each dyadic component: thought–emotion, emotion–decision, and thought–decision. Considering first thought–emotion relations, [Lagattuta and colleagues \(Lagattuta, 2007, 2014; Lagattuta & Wellman, 2001; Lagattuta, Wellman, & Flavell, 1997\)](#) found that between 3 and 6 years of age children exhibit greater awareness that thinking or being reminded about the past or the future can change current emotions. In addition, although 5- and 6-year-olds recognize that two people in the same situation will feel differently depending on the focus of their thoughts, older children better appreciate the power of positive thinking to improve emotions during negative events ([Bamford & Lagattuta, 2012](#)). Moreover, although children pass false belief tasks at around 4 or 5 years of age, they continue to struggle with understanding emotions caused by false beliefs until 6 or 7 years (see [Harris, de Rosnay, & Ronfard, 2014](#)). More generally, studies have documented improvement between 3 and 10 years of age in children's understanding that thoughts shape emotional well-being as well as how emotional states affect how a person thinks ([Altshuler & Ruble, 1989](#); [Amsterlaw, Lagattuta, & Meltzoff, 2009](#); [Bender, Pons, Harris, & de Rosnay, 2011](#); [Flavell, Flavell, & Green, 2001](#); [Harris, Johnson, Hutton, Andrews, & Cooke, 1989](#); [Sayfan & Lagattuta, 2008, 2009](#)).

Researchers have examined children's understanding of emotion–decision relations in the context of morality, coping, and post-decision regret. For example, [Lagattuta \(2005\)](#) found that children aged 7 years and older better understand than younger children that willpower decisions (inhibiting desires to abide by rules) can be emotionally satisfying and that fulfilling desires by breaking rules can cause negative feelings (see also [Arsenio, Gold, & Adams, 2006](#); [Lagattuta, Nucci, & Bosacki, 2010](#); [Lagattuta & Weller, 2014](#)). There are also significant improvements between 5 and 7 years of age in recognizing that deciding to forgo personal desires to help others can have emotional benefits ([Weller & Lagattuta, 2013, 2014](#)). Relevant to how emotions affect coping decisions, [Sayfan and Lagattuta \(2009\)](#) demonstrated that children as young as 4 years understand that behavior choices, such as fight or flight, can be effective in reducing fear, with advances between 4 and 7 years in understanding more complex causal links between emotion and behavior (see also [Bamford & Lagattuta, 2010](#); [Harris, 1989](#)). Children begin to report feeling regret at around 6 to 9 years of age ([Beck & Riggs, 2014](#); [O'Connor, McCormack, & Feeney, 2012](#); [Rafetseder & Perner, 2012](#)), and this emotion aids them in making more adaptive future decisions ([O'Connor, McCormack, Beck, & Feeney, 2015](#); [O'Connor, McCormack, & Feeney, 2014](#)). Still, children exhibit more difficulty in reasoning about another's regret than in reporting their own experience of it ([Weisberg & Beck, 2010](#)), further indicating that knowledge about emotion–decision connections continues to develop through middle childhood.

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