



Contents lists available at ScienceDirect

Journal of Experimental Child Psychology

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

Theory of mind in emerging reading comprehension: A longitudinal study of early indirect and direct effects

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ARTICLE INFO

Article history:

Received 28 October 2016

Revised 4 March 2017

Available online xxxx

Keywords:

Theory of mind

Reading comprehension

SVR

Metacognition

Longitudinal

ABSTRACT

The relation between children's theory of mind (ToM) and emerging reading comprehension was investigated in a longitudinal study over 2.5 years. A total of 80 children were tested for ToM, decoding, language skills, and executive function (EF) at Time 1 (mean age = 3;10 [years;months]). At Time 2 (mean age = 6;03), children's word reading efficiency, language skills, and reading comprehension were measured. Mediation analysis showed that ToM at Time 1, when children were around 4 years old, *indirectly* predicted Time 2 reading comprehension, when children were 6 years old, via language ability after controlling for age, nonverbal ability, decoding, EF, and earlier language ability. Importantly, ToM at 4 years also *directly* predicted reading comprehension 2.5 years later at 6 years. This is the first longitudinal study to show a direct contribution of ToM to reading comprehension in typical development. Findings are discussed in terms of the simple view of reading (SVR); ToM not only supports reading comprehension indirectly by facilitating language but also contributes to it directly over and above the SVR. The potential role of metacognition is considered when accounting for the direct contribution of early ToM to later reading comprehension.

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Introduction

The simple view of reading (SVR; Gough & Tunmer, 1986; Hoover & Gough, 1990) proposes that reading comprehension is the product of two key dimensions: word reading (decoding) skills and linguistic comprehension. Although empirical evidence has shown that decoding ability and linguistic comprehension skills account for a large percentage of variance in reading comprehension (e.g., Adlof, Catts, & Little, 2006; Johnston & Kirby, 2006; Kendeou, van den Broek, White, & Lynch, 2009; Vellutino, Tunmer, Jaccard, & Chen, 2007), researchers have argued that the SVR may be *too* simple (e.g., Conners, 2009; Johnston & Kirby, 2006; Pressley et al., 2009) and that an additional component needs to be added to the model to account for variance unexplained by decoding and linguistic comprehension (Kirby & Savage, 2008). Potential candidates for this have included speed of processing, naming speed, and executive function (EF) (e.g., Adlof et al., 2006; Johnson, Jenkins, & Jewell, 2005; Johnston & Kirby, 2006; Joshi & Aaron, 2000) as well as higher-order comprehension skills such as inference making and comprehension monitoring (e.g., Cain, Oakhill, & Bryant, 2004; Kim, 2015; Oakhill & Cain, 2012). However, although these studies have shown that these factors contribute to reading comprehension performance, it remains unclear whether their contribution is over and above the two dimensions of the SVR. The aim of the current study was to consider the role of theory of mind (ToM) as a potential further factor facilitating emerging reading comprehension.

Children's developing attentional control has also been considered as a potential third component of the SVR. Conners (2009) reported that attentional control (the ability to inhibit irrelevant responses and initiate alternative responses) accounts for variance in reading comprehension even after controlling for decoding, language comprehension, processing speed and verbal short-term memory. Conners argued that attentional control might contribute to reading comprehension through its role in the higher-order comprehension process of detecting and repairing comprehension failures. Importantly, however, other researchers have proposed that this type of strategy and locating information, finding main ideas, determining text structure, and using visual cues are essentially *metacognitive processes* (Kirby & Savage, 2008). Metacognitive processes require thinking about aspects of one's thinking, which may draw on EF abilities but go beyond them. Specifically, Kirby and Savage (2008) suggested that these strategies are especially relevant to reading comprehension due to the text remaining visible to the reader. They argued that the SVR does not address the role of these metacognitive strategies in reading comprehension.

Metacognition relates to higher-order thinking, involving not only dynamic control over active cognitive processes but also reflective insight about these processes (Kuhn, 2000). One well-researched measure of metacognition in young children is their ToM ability (Courtin & Melot, 2005; Flavell, Green, & Flavell, 2000). Theory of mind broadly involves the ability to impute mental states such as beliefs, desires, and intentions to oneself and others in order to explain and predict behavior (Premack & Woodruff, 1978; see Doherty, 2008, for an overview). A crucial milestone in this development occurs when children gain an understanding that someone can hold a mistaken (false) belief about the world. This ability occurs at around 4 years of age (Wellman, Cross, & Watson, 2001) and is shown by children's performance in explicit false belief tasks (Wimmer & Perner, 1983). A standard false belief task typically involves a character (e.g., Sally) leaving an object (e.g., a ball) in one location and, while Sally is away, another character (e.g., Anne) unexpectedly moving the object to a new location. When Sally returns, children are asked a direct question: "Where will Sally look for her ball first?" Children who have a mature ToM will understand that Sally will go to the location where she left the ball (because they understand this is where she thinks it is) rather than the second location (where they know the ball actually is). Passing these tasks clearly shows that children can now *think* (represent) how someone *thinks about* (represents) something and, therefore, can understand different perspectives (Perner, 1991; Perner, Stummer, Sprung, & Doherty, 2002). This ability is clearly metacognitive in nature because it involves being able to think about thinking (Flavell et al., 2000).

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