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## The origins of children's metamemory: The role of theory of mind



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### ABSTRACT

The relation between preschoolers' theory of mind (ToM) and declarative metamemory (DM) was investigated in two studies. The first study focused on 4-year-old children's ( $N = 106$ ) cognitive and affective ToM and their DM. The data showed a significant association between cognitive (but not affective) ToM and DM, independent of verbal ability, non-verbal ability, and working memory. The second study involved 83 children tested at 4 years 6 months of age (and 6 months later) for cognitive ToM and DM. Here, results showed that early cognitive ToM, in particular false-belief understanding, predicts later DM independent of early verbal ability. These data support a view considering cognitive ToM as a precursor of children's DM.

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### Introduction

Declarative metamemory (DM) refers to individuals' knowledge and beliefs about the functioning of their own memory (Flavell & Wellman, 1977; Schneider, 1999). It is conscious explicit knowledge about factors that affect memory performance and includes not only knowing that a range of variables affect memory but also knowing why they affect memory. DM comprises knowledge about memory tasks, memory-relevant variables, and potential applicable memory strategies as well as beliefs about the capacities, functioning, and limitations of the memory system. It can be assessed using off-line tasks such as questionnaires.

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Overall, existing studies show substantial improvements in DM between kindergarten and early school years (e.g., [Cavanaugh & Borkowski, 1980](#); [Fritz, Howie, & Kleitman, 2010](#); [Sodian, Schneider, & Perlmutter, 1986](#)), with preschool children showing a basic understanding of metamemory-relevant variables ([Kreutzer, Leonard, & Flavell, 1975](#); [Lockl & Schneider, 2007](#); [Wellman, 1977](#)). Given the effects of metamemory on children's learning ([Schneider, 2008](#)), it is striking that very few studies have investigated the origins of children's knowledge about memory. An approach that seems fruitful in addressing this issue is one that links children's emerging DM to individual differences in theory of mind (ToM).

ToM is defined as the ability to attribute mental states such as beliefs, emotions, and intentions to self and others in order to predict, influence, and manipulate social behavior ([Wellman, Phillips, & Rodriguez, 2000](#)). After many years of research in this area, we now know that children acquire important milestones during preschool years ([Wellman, Cross, & Watson, 2001](#)), following a predictable developmental trajectory ([Pons & Harris, 2000](#); [Wellman & Liu, 2004](#)). Crucially, research has shown the existence of strong individual differences between children of the same age ([Cutting & Dunn, 1999](#)), with important consequences for children's social and cognitive development ([Hughes, 2011](#); [Lecce, Caputi, & Pagnin, 2014](#)).

In studying the connections between ToM and DM, great emphasis has been placed on the theoretical model developed by [Kuhn \(2000\)](#), which positions the acquisition of ToM understanding in the larger context of metacognitive development. According to this framework, ToM appears early and as a basic metaknowing of the content of the mind and the nature of mental states. Metacognition is considered a subsequent (and more mature) ability encompassing knowledge about cognitive processes and the links between these cognitive processes and cognitive performance. In addition, it involves procedural knowledge, that is, the application of metamemory during memory performance. Kuhn's model is extremely pertinent for the purpose of the current study because it claims that ToM serves as a base for the development of metacognition. Indeed, Kuhn posited that having a concept of mental states, such as beliefs, is a necessary initial step for thinking about the strategies to solve a cognitive task.

Despite [Kuhn's \(2000\)](#) model being an innovative approach, very few studies have empirically tested this model. To date, the most comprehensive research on the relation between ToM and DM was conducted by [Lockl and Schneider \(2007\)](#), who focused on children's false-belief understanding, that is, the understanding that beliefs are separate and distinct from reality ([Perner, 1991](#)). [Lockl and Schneider \(2007\)](#) followed a sample of German preschoolers longitudinally for 3 years: from 3, 4, and finally 5 years of age. Participants were tested for verbal ability and false-belief understanding at all ages and for DM at 5 years. Findings showed strong relations between false-belief understanding and DM, with false-belief understanding at 3 and 4 years of age significantly predicting DM (independent of verbal ability) at 5 years.

The results of [Lockl and Schneider's \(2007\)](#) study are original and have contributed considerably to increasing interest in this area of research. However, they leave a number of questions open. First, on the basis of Lockl and Schneider's work, we do not know whether the relation between ToM and DM is specific for cognitive ToM, such as false-belief understanding, or rather generalized to other domains of ToM, such as emotion understanding. Second, given that [Lockl and Schneider \(2007\)](#) measured DM only at 5 years of age, they were unable to test the relation between early DM and later ToM. Thus, the question of whether the relation between ToM and DM is unidirectional or bidirectional remains open for investigation. Answering these questions is relevant both theoretically and empirically (see the final Discussion for more comments on this issue).

In the current research, we conducted two separate studies to answer these questions. Both focused on 4- and 5-year-olds because during this developmental period individual differences in ToM are shown clearly ([Wellman et al., 2001](#)) and DM begins to emerge ([Wellman, 1977](#)). Study 1 was designed to examine the specificity of the relation between ToM and DM by comparing cognitive and affective ToM and by taking into consideration a number of control variables. Study 2 expanded on the findings of Study 1 by using a longitudinal design to examine the direction of the relation between ToM and DM.

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