Chapter 13
Children's Metacognition and Theory of Mind: Bridging the Gap

Plousia Misailidi

1 Introduction

Metacognition and theory of mind (ToM) have evolved over the past 20 years as two distinct and unconnected research fields. Nevertheless, as Flavell (2002) maintains, the two fields share the same overall objective, namely "to investigate the development of children's knowledge and cognition about mental phenomena" (p. 106). Whereas metacognition researchers are interested in children's developing capacity for thinking about – i.e., monitoring (or controlling) their own thoughts – ToM investigators address the ability to think about or make inferences about the thoughts and feelings of another person (Kuhn, 2000a, 2000b; Lockl & Schneider, 2006). Thus, the gap between the two research traditions may be more apparent than real.

The aim of the present chapter is to review some recent initiatives to bridge the gap between the metacognition and ToM research fields. The chapter is organized into three sections. The first section briefly introduces the metacognition and ToM constructs, and reports on some findings with regard to the age the two abilities begin to develop. The second asks why the gap between the metacognition and ToM research fields really exists. The suggestion that this gap is more apparent than real is discussed in the third section of this chapter, firstly by outlining two theoretical models attempting to incorporate ToM ability within a larger metacognition framework, and secondly by presenting some recent research that aimed to explore the relationship between children's ToM and metamemory as well studies investigating the relationship between children's ToM and metacognitive language.

P. Misailidi (✉)
Department of Primary Education, University of Ioannina, 451 10 Ioannina, Greece
e-mail: pmisaili@uoi.gr

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2 Metacognition and ToM defined

Metacognition has been broadly defined as awareness and management of one's own cognitive processes and products, or more simply as "thinking about thinking" (Flavell & Ross, 1981; Kuhn & Dean, 2004). Metacognition is generally considered to be a multidimensional construct (Schraw, 1998). A popular model (Flavell, Miller, & Miller, 2002) describes two related but conceptually distinct dimensions of metacognition: metacognitive knowledge and metacognitive processes. Metacognitive knowledge refers to a person's awareness and deeper understanding of cognitive processes and products (Vanderswalmen, Vrijders, & Desoete, this volume). Metacognitive processes, on the other hand, refer to an individual's ability to monitor and/or self-regulate her/his cognitive activities during problem solving (Flavell et al., 2002). Besides these two dimensions, Flavell's (1979) theoretical model also features metacognitive experiences (that is, "conscious or affective experiences that accompany and pertain to any intellectual enterprise", p. 906) as a prominent aspect of metacognition. Accordingly, a recent conceptualization of metacognition (Efklides, 2001, 2006, 2008) emphasizes metacognitive experiences as distinct from metacognitive processes, because the former are a manifestation of monitoring whereas the latter of control.

For many years it was believed that the various manifestations of metacognitive ability emerge around the age of 8–10 years (Veenman, Van Hout-Wolters, & Afflerbach, 2006). However, this view has been challenged recently on both theoretical and methodological grounds (see, e.g., Whitebread et al., 2009; Whitebread et al., this volume). From a theoretical standpoint, recently advanced models put forward that metacognition emerges from a very young age (Balcomb & Gerken, 2008; Koriat, 1993, 1994; Nelson & Narens, 1990, 1994). For example, Koriat's (1993, 1994) "trace accessibility" model suggests that metacognition may be available as a cognitive tool for learning in the form of implicit access to knowledge states that can drive behaviour, long before it is well differentiated and verbalizable. From a methodological standpoint, researchers have recently begun to recognise that past studies, using experimental paradigms that made heavy demands on young children's verbal and working memory abilities, underestimated young children's performance on metacognitive tasks (Van Hout-Wolters, 2000; Whitebread et al., 2005). Aiming to overcome this methodological drawback, Whitebread and his associates (Demetriou & Whitebread, 2008; Whitebread et al., 2005) observed preschool children in naturalistic settings (their kindergarten) and found evidence of source memory and other forms of metacognitive knowledge even in these young children. Similarly, Balcomb and Gerken (2008), using a non-verbal task, originally developed for work with non-human animals, demonstrated memory-monitoring skills in toddlers.

A related area of cognitive development is ToM, which has been broadly defined as knowledge about the existence of the mind and its contents (e.g., beliefs, desires and intentions) as well as the ability to use this knowledge for the prediction and explanation of human action (Premack & Woodruff, 1978). Based on this definition,

ToM is considered as a valuable social tool; assumptions about other people's mental states guide children's actions in their social environment and frame their inferences and interpretations of other people's behaviour. The effects of ToM are also spread across cognitive, communication, and emotional development (Hughes & Leekam, 2004; Lalonde & Chandler, 1995).

Children begin to develop a ToM from a very early age, but this ability undergoes major shifts during the course of development. One such shift occurs around the age of 4 years, when children develop the capacity to recognize that other people's as well as their own beliefs can be false. For example, whereas 3-year-olds do not understand that another person could hold a false belief most 4-year-olds understand that beliefs are representations of reality that can be mistaken (Gopnik & Wellman, 1994; Perner, 1991). Once the false-belief concept is fully developed, children are claimed to be mind-readers. In other words, the acquisition of an awareness of other people's false beliefs is considered to be the benchmark accomplishment signaling the emergence of a ToM[1] (Dennett, 1978).

The study of the development of metacognitive and ToM abilities in young children has made rapid progress in recent years. Nevertheless, the two research fields have curiously remained isolated from one another. Very few attempts have been made to investigate developmental interrelationships between these two abilities.

3 Why Is There a Gap Between Metacognition and ToM Research?

Flavell (1997, 2000) and Kuhn (1999, 2000a, 2000b) have speculated reasons as to why the metacognition and ToM research fields have been kept separate for so many years. Three reasons have been put forward:

1. Investigations in the two research fields target different age groups. ToM research has been largely confined to children aged up to 6 years. On the other hand, metacognitive development research has focused – at least until very recently, as explained earlier – on developments that occur during the elementary-school and the adolescent years.
2. Metacognition research investigates task-related mental activities, including strategies for improving performance on tasks or attempts to monitor these improvements. In contrast, ToM research is interested in children's knowledge about the contents of the mind. For example, do young children appreciate that

[1]False belief understanding is just one of the multiple facets of the ToM construct. ToM encompasses a range of reasoning abilities besides the ability to comprehend false beliefs. Other manifestations of ToM include the ability to distinguish appearance from reality, the ability to comprehend the distinction between desire and intention, and the ability to understand knowledge. Studies have shown that all these abilities are mastered before the age of 6 years (e.g., Flavell, Flavell, & Green, 1983; Pillow, 1999; Schult, 2002).

false beliefs typically cause mistaken actions or can they distinguish between the concepts of desire and intention?
3. Metacognition research is concerned more with what children know about their own mental processes (Flavell, 2000). In contrast, ToM research is mainly interested in children's ability to think about or make inferences about the contents of other people's minds. For example, the classical false belief task assesses young children's understanding of other people's false beliefs.
4. An additional, fourth, reason that may explain the discontinuity between the metacognition and ToM research approaches is related to their domains of application. Applications of ToM research have predominantly been located in the social arena, examining mostly the implications of children's emerging ToM skills on their social interactions[2]. Metacognition research, on the other hand, has been predominantly located in the academic (educational) arena focusing mainly on the impact of metacognitive abilities on educational outcomes.

In short, the gap between the metacognitive and ToM development research traditions exists because their foci and applications are different. Nevertheless, despite these divergences, the conceptual connection between these two bodies of research is self-evident: Both imply activities involving thinking about thinking or the formation of cognitions about cognition (Flavell, 1997). Moreover, as it was indicated earlier, there is evidence that both capacities emerge during the same period of development, the preschool years. So, the gap between these two literatures may be more a matter of emphasis rather than a genuine divide.

4 Attempting to Bridge the Gap Between Metacognition and ToM Research

In the last few years a number of theoretical and empirical initiatives have been made to bridge the gap between the metacognition and ToM research fields.

4.1 Theoretical Models Attempting to Link Metacognition and ToM

Two recent theoretical models have proposed links between metacognitive and ToM competencies. Both these models describe ToM as one of the multiple dimensions of the construct of metacognition. The first model (Kuhn, 1999, 2000a, 2000b)

[2]It is worth noting that in recent years, several researchers have abandoned the term "theory of mind" in favour of the term "social understanding" (e.g., Nelson, Plesa, & Henseler, 1998), in an attempt to emphasize the central role that children's inferences about the mind hold for social interaction.

locates ToM within a broader 'meta-knowing' framework, whereas the second model (Alexander & Schwanenflugel, 1996; see also Efklides, 2008) describes ToM as metacognitive knowledge about mental activity concepts. More specifically the two models are described below.

Kuhn's (2000a) model describes metacognition or "meta-knowing" as "any cognition that has cognition…as its object" (p. 302). Meta-knowing consists of three components: (a) metacognitive knowing, (b) metastrategic knowing, and (c) epistemological knowing. The distinction between metacognitive and metastrategic knowing is based on the widely employed dichotomy in cognitive psychology between the concepts of declarative and procedural knowledge. Metacognitive knowing refers to one's base of declarative knowledge; that is, knowledge a person may have about cognition (knowing that). Metastrategic knowing, on the other hand, involves procedural knowledge; that is, a person's knowledge about her/his own cognitive processes and of their impact on performance (*knowing how*). Epistemological knowing is the more abstract component of meta-knowing and it has to do with an individual's broader understanding of what knowledge and knowing are in general (how does anyone come to know).

How does the concept of ToM fit into Kuhn's (1999, 2000a, 2000b) theory of meta-knowing? According to Kuhn, ToM corresponds to the metacognitive knowing component of meta-knowing and includes children's knowledge about the mind (i.e., knowledge that mental states exist). This declarative knowledge about the contents of the mind can be according to Kuhn both personal and impersonal. Personal metacognitive knowing is knowledge about one's own mental states, whereas impersonal metacognitive knowing is knowledge about others' mental states. In this respect, young children's ToM refers to their ability to view themselves as well as other people as cognizers – both abilities are clearly metacognitive processes.

One of the core claims in Kuhn's (1999, 2000a, 2000b) theoretical model is that ToM serves as the foundation for the development of both metastrategic and epistemological knowing. This means that children need to acquire a ToM first, before they begin to develop the other two dimensions of meta-knowing. Kuhn's claim is conceptual rather than empirical: She assumes that having concepts of mental states, such as beliefs, is prerequisite to thinking about the strategies available in one's repertory and appreciating the nature of epistemological beliefs. In other words, Kuhn considers the acquisition of mental state concepts as a necessary initial step before the development of the other components of metacognition.

Similarly to Kuhn's (2000a, 2000b), Alexander and Schwanenflugel's (1996) model distinguishes three components of metacognition: (a) declarative metacognitive knowledge, (b) cognitive monitoring, and (c) regulation of strategies. The former component corresponds to the individual's knowledge about the contents of the mind (i.e., her/his ToM). The two latter metacognitive components respectively refer to the individual's ability to read one's own mental states and to predict how these states will affect present and future performance on a mental activity task as well as the ability to use metacognitive knowledge strategically to achieve goals (Alexander, Fabricius, Fleming, Zwahr & Brown, 2001).

According to Alexander and Schwanenflugel (1996), declarative metacognitive knowledge comprises three bodies of knowledge: (a) knowledge about mental activity concepts; (b) declarative metacognitive knowledge about these concepts; and (c) strategy-specific metacognitive attributions. Knowledge of mental activity concepts in this model refers to the comprehension of the language (or terms) that one uses to describe the mind or mental activities as well as to the organization (the intentional relations) of mental activity concepts. Declarative metacognitive knowledge entails knowledge of the task and situational variables that may influence an individual's performance in different cognitive tasks. Finally, strategy-specific metacognitive attributions refer to children's understanding of the operation of specific strategies (i.e., why specific strategies operate the way they do).

In sum, Kuhn's (1999, 2000a, 2000b) and Alexander and Schwanenflugel's (1996) models conceptualize ToM as one of the several dimensions of the broader construct of metacognition. In Kuhn's model, ToM is a particular kind of meta-knowing, whereas in Alexander and Schwaneflugel's model ToM constitutes declarative knowledge of one's cognitive content. Kuhn maintains that the early ToM achievements (e.g., false belief understanding) serve as the foundation for the metacognitive (metastrategic and epistemological) competencies that appear later in development. In contrast to Kuhn's, Alexander and Schwanenflugel's theoretical model does not make any specific predictions with regard to the developmental trajectory of ToM in relation to the other dimensions of metacognition.

4.2 Empirical Studies Relating Metacognition and ToM

There are at least two points of contact between research on metacognitive and ToM development: (a) One is research investigating developmental interrelationships between children's metamemory and ToM competencies. (b) The other is studies investigating associations between ToM and understanding of metacognitive language.

4.2.1 Metamemory and ToM

Whereas metacognition refers to a broad range of activities and processes (knowledge, strategies, regulation), metamemory refers specifically to "one's knowledge of memory, how it works in general and what one's own memory is like in particular" (Uhlfelder, 1985, p. 6). Two recent studies (Demetriou, 2009; Lockl & Schneider, 2007) investigated whether there is a developmental relationship between metamemory and ToM. The research hypothesis that guided both these studies was that ToM skills constitute a precondition for the development of metamemory competencies. Children in the first study (Lockl & Schneider, 2007) were tested longitudinally, that is, at three different time points separated by a testing interval of approximately 1 year. At each time of testing, children completed a set of false belief tasks. At Time 3

(when the children were 5 years old), children's metamemory was also assessed in an interview which contained examples from everyday memory tasks as well as from laboratory-like situations. In an attempt to test whether the relationship between false belief and later metamemory competencies was mediated by differences in children's verbal mental age or nonverbal mental abilities, the authors also included tests of verbal and nonverbal mental age.

The results of Lockl and Schneider's (2007) study demonstrated that false belief comprehension and metamemory were strongly related. Importantly, the correlation between false belief performance and metamemory remained significant even when the contributions of verbal and non-verbal mental age scores were partialled out. A series of hierarchical regression analyses revealed that false belief performance at Time 1 (when the children were 3 years old) and at Time 2 (when the children were 4 years old) made independent contributions to performance on the metamemory tasks at Time 3. Overall, then, Lockl and Schneider's (2007) study presented evidence supporting that early development of ToM competencies facilitates the development of metamemory.

Metamemory, broadly defined, encompasses a number of judgments, including source monitoring (see Johnson, Hashtroudi, & Lindsay, 1993). Within the metamemory framework, source monitoring refers to the ability of individuals to determine the origins of their memories. The study by Demetriou (2009, see also Whitebread et al., this volume) utilized a longitudinal approach to examine developmental interrelationships between children's memory source monitoring and ToM. Children in Demetriou's (2009) study were assessed longitudinally on three time points, separated by a 6-month time interval (children had a mean age of 4 years at the beginning of the study). At each time point, children were tested on two false belief tasks as well as on a range of measures assessing the development of both cognitive (verbal and non-verbal mental age, working memory, inhibitory control, language skills and so forth) and memory source monitoring competencies. The results revealed significant correlations among children's false belief task performance, verbal mental age and other cognitive abilities. However, the strongest relationship was that between false belief performance and source memory competencies, and this relationship became stronger with the advancement of age. Further and more importantly, the results showed that the relationship between false belief performance and source memory monitoring remained unchanged even after the effects of verbal mental age and other cognitive abilities (e.g., inhibition control and working memory) were partialled out. Nevertheless, the expected direction of the relationship was not proved. Contrary to her predictions, the results of Demetriou's (2009) longitudinal study showed that earlier source memory monitoring significantly predicted later false belief task performance and vice versa (see Whitebread et al., this volume). This could be interpreted as evidence that ToM does not solely predict metamemory competencies; the reverse can also be true. ToM and source memory monitoring are bidirectionally related.

In sum, taken together the findings of the two above longitudinal studies suggest that the development of ToM is strongly interrelated with that of metamemory. Nonetheless, the data are contradictory with respect to whether ToM competencies

constitute an early precursor of subsequent metamemory development or, conversely, whether earlier metamemory predicts later developments in ToM skills. Lockl and Schneider's (2007) results support that ToM is an earlier developmental achievement that predicts later metacognitive abilities, whereas Demetriou's (2009) findings provided evidence that the relationship between ToM and source memory competencies may be bidirectional. This means that the view advanced by Kuhn's (2000a, 2000b) model, representing ToM as an earlier socio-cognitive achievement and metacognition as a later competency may have been an overstatement which needs further investigation. More empirical evidence (ideally longitudinal or even training studies) is necessary to construct and evaluate more detailed and comprehensive accounts of the relationship between ToM and metacognition.

4.2.2 Metacognitive Language and ToM

Another attempt to interrelate the development of metacognition with ToM has been made by researchers whose interest is the relationship between metacognitive language and mental state understanding. Metacognitive language is language that describes the mind's contents and cognitive processes in general (see Olson & Astington, 1993). In Scholnick and Hall's (1991) terms, "it is language [*or terminology*] by which we signal to ourselves and others that we are engaged in some form of internal processing of events, and it's the language by which we identify that others are engaging in internal processing" (p. 402, italics added). Metacognitive language is considered as a crucial part of metacognition for two reasons. First, language about cognitive states and processes allows individuals "to gain access to our internal states [*and processes*], to monitor and transform them" (Scholnick & Hall, 1991, p. 402, italics added). Second, such terminology about cognition is subject to reflection that allows individuals "to understand and inter-relate aspects of mental functioning to one another" (Scholnick & Hall, 1991, p. 402).

Research has documented an increasing capacity to understand metacognitive language during the preschool years (Lyon & Flavell, 1994; Moore, Bryant, & Furrow, 1989). More specifically, research has shown that between the ages of 4 and 5 years children begin to comprehend the meaning of metacognitive terms, such as "know" and "guess". For example, if children are uncertain about the place where an object is hidden and a doll tells them that "she *guesses that* the object is hidden in place A", whereas a second doll tells them that "she *knows that* the object is in place B", children select place B as the place where they should search for the object (Moore et al., 1989). Around the same age, children also begin to comprehend the semantic differences between specific metacognitive terms, including the terms "learn", "remember" and "forget". More specifically, 4-year-olds, but not younger children, comprehend that the terms "remember" and "forget" do not simply refer to the knowledge or the ignorance of an individual but moreover imply the existence of previous knowledge (Lyon & Flavell, 1994) and, yet, that these terms differ from the term "guess" which implies absence of knowledge (Astington, 2000).

To what extent do the changes that take place in children's understanding of metacognitive terms during the preschool period are related with changes in the development of ToM competencies? So far only a handful of studies have investigated the relationship between the development of ToM and children's understanding of metacognitive terms (Astington & Pelletier, 1998a; Charman & Shmueli-Goetz, 1998; Moore, Pure, & Furrow, 1990). In one of these studies, Moore et al. (1990) examined 4- to 6-year-old children's abilities to: (a) distinguish between the verbs *believe* and *guess* with the verb *know*, and (b) to attribute false beliefs to others. The results showed that the two abilities were significantly related. That is, children who were successful in the false belief task were those who also correctly answered questions about the semantic differences between the verbs believe/know and guess/know.

In another study by Astington and Pelletier (1998a) the developmental relationship of ToM with metacognitive language was examined with two groups of children aged 4 and 5 years respectively. For the investigation of children's ability to understand mental states, these researchers used four false belief tasks, whereas for the investigation of children's ability to understand metacognitive terms the "Metacognitive Vocabulary Test" (Astington & Pelletier, 1998b) was employed. This test examines children's ability to understand the semantic differences between the metacognitive terms "know", "guess", "remember", "forget", "wonder", "figure out", "explain", "understand", "learn", "teach", "predict", and "deny". The results showed that children with higher scores on the false belief tasks were also more successful on the Metacognitive Vocabulary Test, whereas children who had low scores on the ToM tasks also scored lower on the Metacognitive Vocabulary Test.

Taken together, the findings of the above studies suggest important links between children's ability to attribute false beliefs (i.e., their ToM) and their acquisition of the ability to comprehend metacognitive terms. The cross-sectional nature of these findings, however, limits their interpretability, because it does not allow causal inferences to be drawn. A more recent longitudinal study by Lockl and Schneider (2006) provides some insight into the causal pathway of this relationship. Its results showed that early performance on ToM tasks significantly predicted later metacognitive vocabulary, even when individual differences in children's non-verbal mental age and general vocabulary were taken into consideration. These longitudinal data suggest that developmental changes in children's ToM predict changes in metacognitive language, a finding which lends evidence in support of Kuhn's (2000a, 2000b) claim that early ToM competencies precede advancements in metacognition.

5 Conclusions

In this chapter, we have identified some reasons why the metacognition and ToM research fields have been kept separate from one another for so many years. We have emphasized that this separation has probably been more a matter of emphasis than a genuine divide. The two theoretical models that we outlined in this chapter represent

some first sketchy attempts to bring closer together these two research approaches. Importantly, the view that ToM constitutes one of the first manifestations of the construct of metacognition (Kuhn, 2000a, 2000b) has provided the impetus to investigate developmental interrelationships between these two abilities.

Further attempts to bridge the gap between the metacognition and ToM research should be considered imperative for a number of reasons: First, current theoretical models of the relationship between metacognition and ToM (Kuhn, 1999, 2000a, 2000b) favour ToM as an earlier developmental milestone. However, the available findings (Demetriou, 2009; Lockl & Schneider, 2006, 2007) are contradictory with respect to which of these two abilities precedes the other. While some evidence supports that ToM is an earlier achievement that predicts later metacognitive competencies, other data indicate that the two abilities are intercorrelated in a reciprocal manner. Further research is, clearly, needed to identify the direction of the relationship between metacognition and ToM. If, in accordance to Kuhn's (2000a, 2000b) claims, it is proved that ToM precedes metacognition, a further critical question to be considered is whether there is anything special about metacognition that requires ToM and, conversely, whether there is anything special about ToM that allows metacognition to develop.

Second, besides the question concerning the causal direction of the association between metacognition and ToM, further research is necessary to determine the relationship of different dimensions of ToM with specific components of the metacognition construct. Both ToM and metacognition are broad, multidimensional constructs: false belief is just one aspect of the capacity to reason about mental states; metamemory and metacognitive language are, similarly, just two of the multiple components of the metacognition construct. In essence, what this means is that, there exists a possibility of different relations among different dimensions or components of metacognition and ToM, and also the possibility of change in these relations over developmental time, as well as of individual differences in these relations. To understand the developmental links between metacognitive and ToM competencies more fully, researchers need to investigate the growth of different aspects of children's ToM in relation to the development of different aspects of metacognition.

Third, further research on the association of metacognition with ToM is warranted to shed light on the nature and course of each of these two aspects of cognitive development separately. The majority of studies that have been conducted on the development of ToM have so far focused on the competencies of children up to 6 years of age. ToM developments beyond the preschool period have been rarely investigated (e.g., Carpendale & Chandler, 1996; Fabricius & Schwanenflugel, 1994). More research into the relationship between metacognition and ToM is expected to provide more detailed information about the older child's concepts of thinking processes and about the development of their understanding of particular mental states, which will aid to adequately describe the developmental course of ToM beyond the preschool years (see Flavell, Green, & Flavell, 1995; Schwanenflugel, Fabricius, & Alexander, 1994).

Likewise, as it was explained in the first section of this chapter, research conducted on the metacognitive development of preschoolers is relatively scarce

(Whitebread et al., 2009). Further research on the relationship between metacognitive and ToM competencies will make possible a more accurate description and measurement of metacognitive development in young children. This research is clearly important and advantageous, both in relation to revising the existing models of metacognitive development as well as for charting the effects of the early (preschool) metacognitive achievements on later developments in metacognition (as well as in ToM). Evidently, it is necessary to know more about the components of metacognition that develop first and of the conditions under which this development occurs (Veenman et al., 2006). Moreover, it is important to investigate how earlier metacognitive competencies prepare the way for the development of the later ones.

To conclude, metacognition and ToM have been viewed, until recently, as two separate domains of cognitive development. Yet, the theoretical and empirical work reported in the previous sections suggests that these two abilities are developmentally inter-related. Further research on the association between metacognition and ToM must be done, before we can draw any conclusions about the causal nature of this relationship.

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