competence and inversely to various indexes of internalizing behavior (Denham 1998; Schultz et al. 2001). Indeed, EK in preschool children at risk predicts their social and academic competence in third grade (Izard et al. 2001). By age 11 years, children low in EK see themselves as anxious, depressed, and socially isolated (Fine et al. 2003). Furthermore, given certain environmental conditions, and probably a genetic proneness to negative emotionality, a child can come to see others or their intentions as interesting and friendly, or as hostile or frightening. A strong and persistent association exists between proneness to anger and aggression, on the one hand, and a hostile attribution or anger perception bias, on the other (Crick & Dodge 1994; Dodge & Coie 1987; Fine et al., in press; Schultz et al., in press). Thus, emotion perception or attribution biases help determine the content of mind, as well as the direction of emotion-motivated action. These mental biases indicate that things went awry in the development of emotion-cognition relations and the construction of mind.

The association between proneness to anger and anger perception bias illustrates an important emotion-cognition connection. Some research suggests an equally significant connection between emotion, emotion perception bias, and action (e.g., aggression), particularly in peer-rejected children (Hubbard 2001). Their emotion perception bias and related proneness to anger and aggression undoubtedly affect the processes involved in the construction of mind and in understanding the mind of others. Anger- and aggression-prone children show a strong tendency to see anger signals and hostile intentions where none exists (Crick & Dodge 1994; Fine et al., submitted; Shultz et al., in press).

Emotion action is conceived of as overt behavior determined or significantly influenced by emotion feelings. The effectiveness or adaptiveness of emotion action probably depends in large measure on one's success in modulating emotion arousal, particularly intense emotion arousal in stressful social situations (Izard 2002). Strong and persistent expression of negative emotions apparently constitutes mind stuff that may contribute to the development of traits of personality. Negative emotion expression in the more stressful episodes of the Strange Situation (Ainsworth et al. 1978) at age 1.5 years predicted the personality trait of neuroticism at age 3.5, whereas modulated positive emotion expression predicted conscientiousness and agreeableness (Abe & Izard 1999). One might expect such traits and their expressions in social interactions and other behavior to figure prominently in the construction and understanding of mind.

The space in between: The development of joint thinking and planning

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Abstract: We argue that theory-of-mind understanding has developed to facilitate joint thinking and planning, defined as the creation of new mental objects that could not have been created by one mind. Three components of this ability are proposed: the mental architecture indexed by false belief understanding, domain-specific knowledge, and the prioritization of the joint mind over the individual mind.

Introduction. Carpendale & Lewis (C&L) are exactly right when they argue for a middle position between individual and enculturation accounts of theory-of-mind understanding. Yet, for the social domain to be seriously considered in this realm where purely cognitive considerations have dominated, one must know which components of theory-of-mind understanding are influenced by individual processes. We suggest that the best way of identifying the components is to argue back from the likely function that theory-of-mind understanding serves in human life.

Our proposal is that theory-of-mind understanding functions to enable the uniquely human activity of joint thinking, which is the creation of new mental objects that could not have been created by one mind, and joint planning, which is the arrangement of plans that could not be accomplished alone. Such joint mental processes are generative. One person's thought or suggested subgoal is conveyed to someone else. The second person takes in the mental object and transforms it. Transformations, slight enough so that new objects can be assimilated by their recipients, provide the creative elements on which culture is based. For Winnicott (1971) they occur in the "space in between" people, a space of possibilities and generativity in which, as a person offers a thought to another person and the thought comes back transformed, something new happens. The building of scientific theory provides an adult example. One scientist offers a theory and another, having assimilated details of that theory, offers a revision. Reading a novel is another example. As the reader engages with the thoughts of the writer, the reader's mind is transformed. In both examples, thoughts are generated that are the product of two minds (Oatley 2003).

False belief should be understood not as a stand-in for theory-of-mind understanding but as one of its components. We suggest that three components enable joint thinking and joint planning, as shown in Figure 1: mental architecture (structure), domain-specific knowledge base (content), and the prioritization of joint goals over individual goals (the motivation). Taking the dimension of individual/enculturation proposed by C&L, evidence suggests that these three aspects have different developmental influences.

Mental architecture. To identify discrepancies between one's own thoughts and those of another, we need simultaneously to represent and compare two potentially conflicting mental objects. This has been assessed by measures of false belief. In contrast to C&L, we suggest that existing data imply that development of false belief is most strongly influenced by individual factors. First, the meta-analysis of Wellman et al. (2001) demonstrated that the age effect in false belief is substantial, unmoderated by other factors, and universal. Hence, biological maturation goes a long way to achieving it. Second, in a sample unrestricted by age (e.g., zero to ten years old) effects of cognitive maturation on false belief would be large and those of social factors, small. Social influences have been shown to speed up acquisition (Cutting & Dunn 1999; Jenkins & Astington 1996), but such influences are always demonstrated within a very narrow age range, serving to enhance their relative effect. Third, children without unusual cognitive impairment such as autism, or unusual linguistic experiences such as being deaf with hearing parents, almost all acquire false belief understanding. Except for the unusual cases, by about eight years old there are no individual differences in this skill. Variation in family

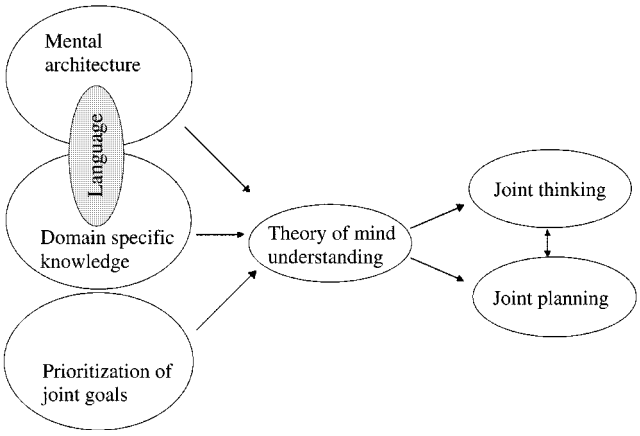


Figure 1 (Jenkins & Oatley). The components of theory of mind understanding and their role in joint thinking and planning

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and cultural experiences becomes irrelevant: The false belief switch gets turned on anyway.

Language provides some of the architecture necessary for false belief understanding (Astington & Jenkins 1999; Jenkins & Astington 1996), and insofar as social factors do speed up the acquisition of false belief understanding, this probably occurs through the effect of social influences on language development. Recent evidence suggests that this may occur through the linguistic structure of complementation (de Villiers & Pyers 2002). Language also contributes to our next proposed component: the content of domain-specific knowledge.

Domain-specific knowledge. Successful generative thinking and planning between minds requires content knowledge of the domain under discussion. We distinguish two aspects. One is the subject of the discourse: cars, dance, engineering, genetics, and so on. Hutchins (1987) investigated distributed cognition on a navy ship, and reported that successful performance in a seven-person navigation team required that team members had experience of the different roles in the team. This gave them content knowledge to understand ambiguous utterances and to solve problems in a way that was close to the perspective of others. A second aspect is talk about mental processes. If two people misunderstand each other, they may introduce process talk to clarify meaning, intention, and so on. Mental state talk is essential in such clarification: "Do you remember?" "What did you think?" "Are you angry?" The social process suggested by C&L is clearly central to the development of such content knowledge (Jenkins et al. 2003; Ruffman et al. 2002).

Prioritization of joint goals. Only if one cares enough about the internal experiences of others can the joint goal achieve prominence over one's own goals. Oatley and Larocque (1995) have shown that a whole class of errors in joint planning derives from one person being committed to goals of the self rather than joint goals. Bowlby (1971) described what he called goal-corrected partnerships, in which toddlers represent and act upon the goals of others through having experienced the same thing in their parents' treatment of them. In support of this, Herrera and Dunn (1997) found that those children who had had their own goals recognized by parents and siblings earlier were more likely to play cooperatively with peers two years later. This aspect of theory-of-mind understanding is thus strongly influenced by the social processes outlined by C&L.

Conclusion. Our delineation of components of theory-of-mind understanding allows for increased conceptual clarity of social antecedents in development. False belief understanding occupies a pivotal role in theory-of-mind development because it enables a type of interaction between minds not otherwise possible (Jenkins & Astington 2000). False belief and theory of mind are not synonymous. Once false belief has been acquired, other components of theory of mind become more important in explaining why individuals differ in their capacity to enter into the minds of others.

Reconstructing children's understanding of mind: Reflections from the study of atypical development

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Abstract: Carpendale & Lewis's (C&L's) theoretical reconstruction of the "theory of mind" problem offers new hope but still has far to go. The study of atypical development may provide some useful insights for dealing with the work ahead. In particular I discuss three issues – the boundary problem, the question of end states, and the issue of the centrality of triadic interaction.

Carpendale & Lewis (C&L) proclaim the end of theories of "theories of mind" as we know them. Hoorah! Social interaction wins the vote. Out goes individualism, in comes relationalism. Old-fashioned accounts of understanding mind – theory formation, introspectionism, enculturation, and modularity – are all dead. Long live constructivism! This view is good news for anyone who has ever questioned the primacy of a cognitive account to explain social reasoning. It is also good news for anyone who has ever questioned the lack of developmental emphasis in the study of children's understanding of mind. So C&L's theoretical reconstruction brings new hope to the theory-of-mind weary.

Now, the next question is how to pull it off. There is much work that still needs to be done. Below I take up three issues – the boundary problem, the question of end states, and the issue of a central role for triadic interaction. For each I suggest ways in which research on atypical populations might give some cautionary insights on how to proceed with the work ahead.

The first issue is the boundary problem – a common theme in the field. C&L aim to explain how children acquire "social understanding." This broad term refers to all manner of social knowledge, including knowledge of the mind. When it comes to detailing how knowledge is actually constructed within social interaction, wouldn't it help to be specific about the boundaries of that knowledge? Understanding the mind as a representational device may be a very different kind of knowledge than understanding of social rules, or the ability to talk about inner states and the role of social interaction may differ for each of type of knowledge. C&L seem to agree that different types of social interaction experience may relate differently to particular types of social knowledge when they refer to Peskin and Ardino's (2003) study. But if we want to try to understand better how social interactions actually work in helping to construct different types of knowledge, it may help to study an atypical group with impaired social interaction – children with autism. For example, if children with autism lack basic social relatedness, is it possible that they are ever able to fully grasp the representing function of a symbol or representation, even when such symbols or representations are removed from a social context?

A second problem is how to avoid the notion of "end states." In section 4, C&L make developmental links between children's early social interaction experiences and later social understanding. This makes social understanding look like an end state or developmental outcome. I do not think this is the intention. On the contrary, what C&L want to emphasise is "progressivity in development," the idea of a movement away from an initial starting point rather than a directionality towards a predetermined endpoint (Chapman 1988a). But given the way the account is currently formulated, it is difficult to get a sense of the nature of this progressivity. The process of development, as they point out, is a problem. Ideas about development being embedded in activity, regularity, social practice, or conversations and involving transactions between self and others have a long way to go. And we probably need to start at the beginning and look forward rather than trying to explain social understanding backwards.

The study of atypical development may offer some insights here. The way that development is modelled in neuroconstructivist accounts of atypical development (Thomas & Karmiloff-Smith 2002) is to examine how precursor states may be related to particular outcomes given different sets of constraints or circumstances. Although the idea of predetermined end-states might not appeal, connectionist dynamic systems and transactional accounts all argue that development is emergent, that influences are bidirectional rather than unidirectional, and that development involves a series of changes in a self-organising system. Capacities may disappear and then reappear later, may peak and then decline with time, and may start as general and become more specific. Organismic and systems theories also propose changes that include integration of earlier accomplishments as experiences and abilities are integrated into the subsequent reorganisation of the system.

A fuller account is still needed of the way in which developmental change proceeds over time from the starting state of social interaction. However, the idea that development involves an integration or reorganisation of earlier accomplishments is high-

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