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Constructing an understanding of mind: The development of children's social understanding within social interaction

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Abstract: Theories of children's developing understanding of mind tend to emphasize either individualistic processes of theory formation, maturation, or introspection, or the process of enculturation. However, such theories must be able to account for the accumulating evidence of the role of social interaction in the development of social understanding. We propose an alternative account, according to which the development of children's social understanding occurs within triadic interaction involving the child's experience of the world as well as communicative interaction with others about their experience and beliefs (Chapman 1991; 1999). It is through such triadic interaction that children gradually construct knowledge of the world as well as knowledge of other people. We contend that the extent and nature of the social interaction children experience will influence the development of children's social understanding. Increased opportunity to engage in cooperative social interaction and exposure to talk about mental states should facilitate the development of social understanding. We review evidence suggesting that children's understanding of mind develops gradually in the context of social interaction. Therefore we need a theory of development in this area that accords a fundamental role to social interaction, yet does not assume that children simply adopt socially available knowledge but rather that children construct an understanding of mind within social interaction.

Keywords: language; Piaget; social interaction; theories of mind; Vygotsky; Wittgenstein

1. Introduction

Debate concerning how children come to understand the social and psychological world, now often known as children's "theories of mind," has become increasingly concerned with the influence of social interaction. Recent studies have found that individual differences in preschoolers' competence on measures of false belief understanding are correlated with aspects of children's socialization history. By suggesting that social interaction may influence the development of children's mentalistic understanding, this research has reopened issues that have long been discussed in the debate over how children come to understand the mind.

As an example of this research, Perner et al. (1994) reported that preschoolers with siblings demonstrate false belief understanding at an earlier age than children without siblings. This "sibling effect" was replicated by Jenkins and Astington (1996), although they found that it to be less pronounced for children with more advanced linguistic abilities. Lewis et al. (1996) also found in one study an association between number of siblings and performance on false belief tests, but overall they found a more consistent effect of older siblings and kin on the development of false belief understanding. In a series of experiments with a large number of participants, beneficial effects were found for older but not younger siblings (Ruffman et al. 1998). The sibling effect was not replicated, however, in two more recent studies involving working-class families (Cole & Mitchell 2000; Cutting & Dunn 1999). This research suggests the possibility that rather then just the number of people in the household it is the nature of the relationships children experience that influences development (Hughes et al. 1999). There is further evidence of correlations between social cognitive development and parenting style (Hughes et al. 1999; Ruffman et al. 1999; Vinden 2001), aspects of parent-child conversation (Sabbagh & Callanan 1998), attachment (Fonagy et al. 1997; Meins 1997; Meins et al. 1998; Symons & Clark 2000), mothers' education (Cutting & Dunn 1999), and socioeconomic circumstances (Holmes et al. 1996).

Furthermore, a number of studies have found correlations between language and social understanding (e.g., Cutting & Dunn 1999; de Villers 2000; Happé 1995; Jenkins & Astington 1996). In longitudinal studies, forms of family talk about mental states have been found to be related to later success on false belief tests (e.g., Brown et al. 1996; Dunn et al. 1991; Moore et al. 1994; Ruffman et al. 2002). In addition, mothers who think of their children in mentalistic terms ("mindmindedness"), and therefore presumably talk to their children about the psychological world, have children who are more advanced in understanding beliefs than are other children (Meins & Fernyhough 1999; Meins et al. 1998). Similar correlations between family interaction and the development of children's understanding of emotions have also been reported (e.g., Dunn et al. 1991; Hooven et al. 1995; Kuebli et al. 1995; Steele et al. 1999). In a longitudinal study, Astington and Jenkins (1999) found that earlier language abilities predict later

false belief performance but earlier false belief competence does not predict later language abilities, supporting the conclusion that language is important in social cognitive development.

Another source of evidence that social interaction is important for the development of a mentalistic understanding comes from research with deaf children. A number of studies have shown that deaf children with hearing parents are delayed in the development of false belief understanding, whereas deaf children with deaf parents are not delayed (Peterson & Siegal 2000; Woolfe et al. 2002). This seems to be because deaf parents are native users of sign language and thus their children are exposed to normal conversation, but hearing parents are less fluent in sign language and therefore their children are not exposed to complex conversation about everyday events involving people's actions, beliefs, and emotions. Conversation about the mental world may well be essential for the development of social understanding.

This accumulating evidence that aspects of social interaction are correlated with social understanding must be explained by a complete account of social cognitive development. The contemporary body of research in this area derives from one of the dominant theories according to which children come to understand their own and others' minds by formulating an implicit "theory" of the mind (Astington et al. 1988). In this article we will, in general, use the broader phrase, *social understanding* (Dunn 1988) as we present an alternative position. All theories of the development of social understanding have had to recognize the research of social interaction on social understanding, but they do so in very different ways and most accounts still begin from an individualistic perspective. It has seemed that the only possible alternative is to contrast individualistic accounts with unspecified statements about the "enculturation" of the child. In this article we argue for an alternative account of the development of mental state understanding that integrates the social and individual dimensions of development. We contend that the child does not merely adopt socially available knowledge but, rather, *within* social interactions an understanding of mental states develops and is constituted. Our approach is based on Chapman's (1991; 1999) reformulation of Piagetian theory, drawing on Vygotsky and Wittgenstein, and it is also consistent in some ways with other contemporary approaches (Hobson 1993; 2002; Montgomery 1997).

To introduce our alternative theory we set it in the context of continuing debates and competing theories within the "theory of mind" tradition (sect. 2). We first discuss the more general issue concerning the relative contributions of social versus individual processes in development (sect. 2.1), and then turn to attempts by competing theories to explain the role of social interaction in the development of children's social understanding (sect. 2.2). In the third section we introduce our alternative constructivist approach in which we argue that social interaction is essential in the development of cognitive, social, and moral knowledge. We briefly discuss the development of infants' ability to engage in triadic interaction involving the self, others, and the physical world (sect. 3.1). This basic yet essential level of social understanding allows children to engage actively in social interaction and to acquire language, and thereby gradually to develop a more sophisticated mentalistic understanding by learning the criteria for the use of words

referring to the mental world (sect. 3.2). In the fourth section we address two important issues that distinguish our account from those we criticize. We explore what has been taken as the crucial evidence for the dominant theoretical approach and suggest that the explanatory framework presented here explains the data more completely (sect. 4.1). Not only does the constructivist perspective better account for the range of experimental evidence, it can also explain the role of relationships in social development, like the sibling effect and the influence of attachment patterns (sect. 4.2). We conclude (sect. 5) by making some suggestions for future directions in research that follows from our theoretical perspective.

2. The problem with the "theory of mind" tradition

The problem with the "theory of mind" literature is that the majority of approaches to the issue are individualistic. This is usually contrasted with a straw person, referred to as *enculturation*. In the two parts of this section we first describe a solution to the individual-social dichotomy before articulating how the problem of individualism manifests itself in contemporary theories.

2.1. Theory construction versus social construction: Individualism, collectivism, and relationalism

At the broadest level, debate regarding the development of children's social understanding concerns the relative contributions of social and individual processes. This is the issue of whether theories start with the individual or focus on the influence of the social group on development. We first illustrate how this issue has emerged in research on the development of children's social understanding, and then set this debate in the context of the more general issue in order to derive an approach to resolve this problem.

In the context of social cognitive development, the developmental question, according to Raver and Leadbeater (1993), is "whether the true starting point is to be located in the single, isolated, free mind of the individual or in a social, communal world of shared experience or language" (p. 355). Raver and Leadbeater contrasted the "theory of mind" and social development research programs and suggested that

> Theory-of-mind research focuses on the single mind of the individual child as a rational empiricist, processing incoming perceptual data and reporting the results of those observations. In contrast, social developmentalists focus on the interaction of at least dyads, and the development of social minds of children communicating in a peopled world. (Raver & Leadbeater 1993, p. 355)

This tension has also been articulated by Astington and Olson (1995) as occurring between theory construction and social construction. They suggested that an alternative to theory construction in which "children construct a theory about human talk and action" (p. 185) is a process of enculturation in which "children internalize the folk psychology of their particular culture" (p. 184), and, therefore, an understanding of mind acquired in

such a fashion is "a set of cultural norms" (p. 185). In this view, social construction is equivalent to enculturation and the ability to "participate in a kind of interpretive discourse…. In the one case the child is seen as constructing concepts, in the other as internalizing social understanding" (p. 185). Internalization, in this socialization approach, involves making external social norms internal. This enculturation approach, which has been attributed to Wittgenstein, was clearly stated by Astington and Gopnik (1991, pp. 19–20): "On this view folk psychology is … what Wittgenstein would call a 'form of life', a set of social and cultural practices and conventions. The mechanism for development, on this view, would be socialization or enculturation – children would learn how to psychologize appropriately in the way that they learn to dress properly or eat politely" or learn that "forks go on the left" (Gopnik 1993, p. 3). Astington and Gopnik (1991, p. 20) further specified the difference between the view they attributed to Wittgenstein and the "theory formation" view by stating that "theories always develop with reference to the outside world; put very simply, a theory former wants to get closer to the truth. Cultural practices, on the other hand, are, at least largely, self-constitutive: they make themselves the case. Theories are true or false, cultural practices are right or wrong."[1]

The implication of this interpretation of Wittgenstein is that social cognition is relativistic and therefore forms of social understanding are culture-specific and free to vary across cultures, just as ways to dress properly or eat politely vary. We, however, argue in section 3.2 for a different interpretation of Wittgenstein. Briefly, although we acknowledge cultural variation (Lillard 1998; Vinden 1996; 1999), the basic forms of understanding of self and others that we are concerned with in this target article are built onto forms of shared practice, or everyday activities, that are necessarily part of human interaction, such as adults caring for infants, andthat therefore are likely to be common across cultures (Canfield 1993).

Astington and Olson (1995), as well as Raver and Leadbeater (1993), suggested the need for an integration of the two perspectives – that is, the isolated individual formulating a theory of social behavior versus the child passively adopting concepts available from the culture. The conflict between these two contrasting positions, often referred to as individualism and collectivism, is a general issue concerning the role of social interaction in the development of knowledge that arises in many areas of development (Carpendale & Müller, in press). Given that he is often mislabeled as the archetypal "individualist" developmental theoretician, it might seem surprising that it was this "perennial problem" that Piaget (1977/1995, p. 184) grappled with in a series of essays published as the *Sociological Studies* (Chapman 1986; Kitchener 1986; Smith 1995). The question for Piaget was "Do the operations by means of which we attain what rational consciousness calls truth depend on society and, if so, in what sense?" (p. 184). He criticized individualism for neglecting the role of social life in transforming the individual's cognitive structures; in Piaget's words, "human knowledge is essentially collective, and social life constitutes an essential factor in the creation and growth of knowledge, both pre-scientific and scientific" (Piaget, 1977/1995, p. 30).

On the other hand, collectivism is also problematic for a number of reasons. One difficulty is that if knowledge is simply passed on from the collective to the individual, how is it that individuals can question and criticize collective beliefs? "If truth is something social, how can one distinguish legitimate common representations from collective beliefs not based on reason?" (Piaget 1977/1995, p. 197). Piaget also criticized collectivism for not considering the influence of different types of social relationships on development (Carpendale & Müller, in press; Duveen 1997).

As an alternative to individualism or collectivism, Piaget argued for a third possibility, according to which it is relations between individuals that are primary (Kitchener 1986, chap. 4; Smith 1995; see also Bunge 2000; Elias 1978): "The primary fact, from this point of view, is neither the individual not the set of individuals but the relationships among individuals, a relationship constantly modifying individual consciousnesses themselves" (Piaget 1977/1995, p. 136). This position leads to a consideration of different types of relationships and their influence on development: "One will no longer be content to say that 'society' is the basis of logic but will ask exactly what social relationships are involved" (p. 136). The two types of relationships that Piaget (1932/1965) described, forming the extremes of a continuum, were constraint and cooperation. Constraint involves inequality and views being imposed by authority, whereas cooperation involves interaction among equals.

Our approach to the development of children's social understanding focuses on the *relations* between people. From a relational, action-based perspective the developing child is embedded in social interaction, and an involvement in social activity itself is an integral part of constructing knowledge of this activity. This activity simultaneously involves operative interaction with the world as well as communicative interaction with other people (Chapman 1991; 1999). It is the mutuality of operative and communicative interaction that forms the basis of the constructivist position proposed here.

Although we have focused on Piaget, a relational, embodied, constructivist approach to development could also be based on other theorists (Bunge 2000; Elias 1978; Overton 1998). A number of approaches recognize the importance of social interaction in development (e.g., Cole 1992; Rogoff 1997; 1998), but this is not the place to exhaustively review and critique them.[2] The perspective we take is on the psychological development of infants and children with the assumption that such development occurs within the infant's or child's activity – an activity matrix made up of biological, social/cultural, and psychological dimensions (Overton 1994). From this perspective, development begins from a point of relative lack of differentiation, and the child's distinctions between self, other, and the world of objects emerge through activity in such a matrix.[3]

An issue that arises in regard to constructivism is that such approaches may appear to imply relativism. That is, if knowledge is constructed within social interaction then, because social interaction may vary across cultures, it would appear that such knowledge would be specific to particular cultural groups. Moreover, there would be no way to evaluate different forms of knowledge; all forms would be equally valid. That is, there

are just different forms of knowledge and there is no way to be able to say one is better than another. This "constructionist" position (Gergen 1994), therefore, collapses the distinction between development and mere change and amounts to relativism (for further discussion see Chandler 1997). However, although the constructivist position we endorse accepts that knowledge is constructed within interaction, there is still development in the sense that one form of knowledge is better, more complete, or more adequate than other forms of knowledge (Chapman 1988b).

As a way to resolve this difficulty with relativism, Chapman (1988b) distinguished progressivity in development from directionality toward a predetermined end point. According to Chapman's (1988b) reading of Piaget's equilibration theory, this theory was meant to address the question of "how one form of thinking or knowing might be judged more or less 'advanced' than another" (p. 97). After the necessary first step of describing forms or stages of thinking, the next step for Piaget was to explain the process of development from one form of knowledge to another. Development from this approach is progressive in the sense that partial and incomplete perspectives are coordinated, resulting in more coherent and complete forms of knowledge. The process of equilibration is assumed to be universal and progressive, but this does not imply a particular predetermined end-state. Rather, development involves movement away from an initial starting point of lack of knowledge (Chapman 1988b).

In the next subsection we discuss attempts to account for the influence of social interaction on the development of children's social understanding at the level of particular theories of children's social cognitive development.

2.2. Accounting for the influence of interaction on children's social understanding

The issue of how to address the social dimension in development is of importance within debates over which is the best theoretical account of children's understanding of mind because each of the competing accounts must explain the recent evidence suggesting that social interaction influences such development. Until recently, the discussion concerning theories of children's "theories of mind" primarily consisted of debate among three dominant theories: theory-theory, modularity theory, and simulation theory. The pace and excitement of debate among these factions over the past decade has been frantic (for reviews see, e.g., Hala & Carpendale 1997; Flavell & Miller 1998; Lewis & Carpendale 2002). However, because recent analyses have witnessed much cross-fertilization between perspectives (see Carruthers & Smith 1996) the aim of this section is to highlight common stress points within these positions. This section briefly describes how the dominant theoretical perspectives are still highly controversial. There are sufficient critiques of each perspective for us not to dwell on individual theories. Instead the focus will be on a fundamental flaw shared by all, thereby justifying the need for the alternative put forward in section 3.

The phrase "theories of mind" signals the fact that the dominant theoretical position in research on mental state understanding has been that children construct theories of mental states which are similar to theories or paradigms in science. Change occurs either because

children acquire a more sophisticated capability to represent mental state phenomena (Perner 1991) or because they modify their theories in light of evidence that is not compatible with their current framework of understanding (Gopnik 1993; Gopnik & Wellman 1992; 1994; Wellman 1990). Theory-theorists claim that the child's understanding of mental states is theorylike because this knowledge is coherent and domain-specific, it shows a complex relation with the available evidence, postulates unobservable entities, and, most important, undergoes "paradigm shifts" when the child abandons one set of principles for another in the face of sufficient disconfirming evidence.

Stich and Nichols (1992) characterized a theory as a "body of rules or principles or propositions … which serve to guide the execution of the capacity to be explained" (p. 35). Similarly, Gopnik and Wellman (1992; 1994) stated that a theory is a system of interrelated laws or rules that can be used to derive or infer predictions or explanations. In other words, understanding a particular action requires applying the theory's laws and deriving a solution. The editors of the special issue of *Mind and Language* (1992) in which two of these articles appeared suggested that such an approach is the most common strategy in cognitive science for explaining the ability to negotiate a particular psychological domain. For example, this is the dominant approach in the area of language, but even here it has been severely criticized (e.g., Baker & Hacker 1984; Tomasello 1995b).

Critics have long argued about whether the child's understanding can be equated with theoretical postulates within scientific movements (e.g., Feldman 1992; German & Leslie 2000; Harris 1994; Hobson 1991; Scholl & Leslie 2001; Nelson et al. 1998). Russell (1992) argued that describing children's understanding of mind in terms of a series of theories does not provide an account of development. Gellatly (1997) claimed that drawing an analogy between cognitive development and historical change in theories conflates different levels of discourse and neglects the social dimension to child development and theory change in science. Campbell and Bickhard (1993, p. 33) suggested that if the term "theory" is used loosely it is general enough to include any form of human knowledge.

The view that children's understanding of mind is best explained in terms of one or more innate modules resulting in a "hard-wired" theory draws on arguments that the development of such social understanding is simply too important to be left to chance and that this understanding is acquired by children very early and without apparent effort or explicit teaching (e.g., Baron-Cohen 1995; German & Leslie 2000). The position that an innately given module or set of modules is triggered at some point in development would seem to be the least consistent with developmental changes in children's understanding of mind (Gopnik & Wellman 1994). It lives uneasily with the accumulating evidence, such as the sibling effect described above, showing that the nature of the social interaction children experience is closely related to the development of their social understanding. A further example is that secure attachment is associated with early false belief understanding (Fonagy et al. 1997; Meins 1997; Symons & Clark 2000). This might be accounted for from the innate perspective by assuming that attachment depends on innate

temperament, but this explanation is ruled out because the same infant can form different attachments with different adults (Meins et al. 1998). In addition, Tomasello (1999b) has argued that there has not been enough evolutionary time for the series of four mechanisms proposed by Baron-Cohen to have evolved. Further, Moore (1996) has pointed out difficulties with each of the sources of evidence (i.e., animal lesion studies, a study of neuroimaging, and studies of patients with brain damage) advanced by Baron-Cohen (1995) for the existence of modules or mechanisms. As in the debate over language development, we assume that there is agreement that children must be biologically prepared to develop an understanding of mind. The debate concerns whether the solution to this problem of understanding the mind is innately given or whether it is the capacity to develop such a solution that has evolved.

According to simulation theory, children develop an understanding of mental states through introspection, and use their imagination to reason about psychological matters (Harris 1991; 2000). We agree that imagination must play an important role in children's reasoning about the mind, but the introspective aspect of this approach is problematic for a number of reasons. Simulation theory faces the problem of how we can ever be confident that we can generalize our introspection to others (see Russell, 1996, for a discussion). A more important difficulty for simulation theory is that the assumption that children learn the meanings of mental state terms through introspection is vulnerable to Wittgenstein's (1968) private language argument (Chapman 1987a; Montgomery 1997; Russell 1996). Wittgenstein's argument—actually an *anti*–private language argument or arguments (Russell 1996) – seems to establish that children cannot learn the meanings of mental state terms just by introspecting on their own inner experience.

In reviewing Wittgenstein's arguments we now move from the problems of the individual theories to a critique of a fundamental assumption shared by all theories discussed so far. The assumption in these theories is that the problem the child must overcome, through inference or introspection, is to figure out what is going on in the private and hidden realms of other minds. German and Leslie (2000, p. 230) set up the "'fundamental problem of theory of mind as follows: given that beliefs, desires and pretends can be neither seen, heard nor felt, how does the young brain succeed in learning about them?" It is just this causal psychological view of the mind that Wittgenstein rejected. Wittgenstein (1968) argued that our language "bewitches" people into thinking of psychological matters as inner objects and his aim was to dispel misconceptions that our language leads one into. People assume that language refers to things, and in the case of beliefs, desires, and intentions we assume inner objects, or representations, that are causally related to behavior. We contend that this assumption is common to most theories of children's "theories of mind" and, that Wittgenstein's philosophy can be applied as a general critique of many current theories of social cognitive development (Racine, in press). Wittgenstein's goal, especially his private language argument, was therapeutic because his intent was to clear the ground of misconceptions, and we aim to use his remedy to propose a constructivist cure for the currently ailing approaches to mental state understanding.

Although there is general agreement about the importance of Wittgenstein's private language argument, there is considerable controversy regarding the meaning and implications, and even the location of the argument or arguments, in Wittgenstein's (1968) *Philosophical Investigations* (ter Hark, 1990).[4] By a private language Wittgenstein did not mean a new language that has not yet been taught to anyone else, or a dying language only spoken by one last speaker. Rather, a private language is radically private in the sense that it is not possible to teach it to others because it is based on private ostensive definition. Wittgenstein's rejection of the idea that one could define words privately is part of his critique of what he referred to as Augustine's view of language, according to which ostensive definition is the foundation for language because "it correlates words with things" (Hacker 1990, p. 99). Among the problems with this view of language, Wittgenstein (1968) showed, is that "an ostensive definition can be variously interpreted in *every* case" (para. 28; emphasis in the original). An Augustinian might argue that the word-thing connection in language can be saved by the fact that one can "mentally point" – that is, when it comes to inner sensations we simply direct our attention. Thus, privately or mentally pointing would be unambiguous. However, this too would not work because it would require a person to "individuate a particular mental activity – sensation or impression – concentrate his attention on it, and label it" (Williams 1999, p. 19). Hacker (1996, p. 132) argued that there is nothing like mental pointing that could be similar to public pointing. One cannot concentrate one's attention inwardly and label a sensation. Thus, with regard to internal private states, nothing "could logically count as remembering correctly or incorrectly" (Hacker 1990, p. 108). This is just one aspect of Wittgenstein's general rejection of the whole view of beliefs, desires, and intentions as inner objects that one could introspect on and label.

Perhaps a more fundamental reason that words cannot be defined privately is that meaning is not attached to words, utterances, or representations in a mechanistic or dyadic manner (Goldberg 1991). Instead, meaning is based on use, on shared practices with others. Wittgenstein (1968, para. 580) argued that "an 'inner process' stands in need of outward criteria."

> According to Wittgenstein, the way to find out the meaning of psychological expressions is not to look inside the self, but to look at the function that the respective words and concepts play in our language. This is because the meaning of such expressions is determined by the ways in which they are typically used, not by the particular subjective impressions that we happen to have in these situations. (Chapman 1987a, p. 107)

It is important to emphasize that the Wittgensteinian view of beliefs is very different from that assumed by most work in the "theory of mind" tradition. In Racine's words (personal communication, November 2002), "when people in the field speak of beliefs as mental contents, they reify belief into a new form of mental content that is independent of activity but yet causes activity. There are no such contents. Belief exists and is created in action, not in the head. We should not take the development of an ability to re-present activities off line to be the development of an ability to experience inner states of belief"

(see also Racine, in press). It is this Wittgensteinian view of beliefs and intentions that we assume in the alternative theory we propose in this target article.

We should be clear that Wittgenstein was arguing against the idea that introspection could be the way one learns the meaning of psychological terms. But he did not rule out introspection in some cases once someone has learned to talk about the psychological world, such as in the following example: "Does it make sense to ask: 'Do I really love her, or am I only pretending to myself?' and the process of introspection is the calling up of memories; of imagined possible situations, and of the feelings that one would have if …" (Wittgenstein 1968, para. 587; see also Hacker 1996, p. 133). We should also emphasize that Wittgenstein was not denying that one experiences sensations privately. This was not the target of his private language argument. Rather he rejected the idea that it would be possible to learn the meaning of psychological words through introspection.

We have pointed out some difficulties with the dominant theoretical accounts of children's mentalistic understanding (for further criticism see, e.g., Gellatly 1997; Hobson 1991; Nelson et al. 1998; Russell 1996). There are, however, different versions of these positions and we lack the space to do justice to the complexity of these theoretical approaches. We also recognize that criticisms may be countered with auxiliary hypotheses. These theoretical positions converge on some points. That is, most theorists would agree that infants must be innately prepared to learn about the social world, that their own inner experience must play some role in the development of this understanding, that such knowledge is interconnected and changes with development, and that imagination is important in the process of social reasoning. Within such general agreement, however, there is still much controversy, and there is an urgent need for an alternative theoretical account that is more consistent with the accumulating evidence of the important role of social interaction in the development of children's social understanding.

To summarize our argument thus far, a common problem with the dominant perspectives in the field is that each focuses on the cognitive architecture of mental state reasoning, without reflecting on the social landscape in which such reasoning is constructed (Astington 1996; Lewis et al. 1996). It is not by coincidence that recent discussion has begun to consider this social dimension as more central to development (Astington & Baird, in press). Astington's (1996) Vygotskian approach more explicitly includes such a social dimension. However, as we discussed in section 2.1, we must carefully distinguish social constructionist approaches that are equivalent to passive enculturation from social constructivist positions that also recognize the social dimension as essential but claim that passive adoption of cultural norms cannot account for all development. So far, Astington (1996) has not been explicit on this issue, and the resulting ambiguity tends to lead to the enculturation interpretation. Although Vygotsky's approach could be read as an enculturation theory, more complex readings are possible and more plausible (e.g., Fernyhough 1996). In section 3 we construct an account that is in keeping with such a reading.

3. A solution: Constructing an understanding of mind

In the preceding sections we contrasted approaches based on the assumption that the development of an understanding of mind is an individual process of introspection, maturation, or the formation of a theory, with the contrasting position that children acquire culture-specific concepts regarding the mind that are passed on from the social group. Instead of choosing between these two contrasting positions we begin from a different starting point and endorse an alternative perspective emphasizing the relations between people (Piaget 1977/1995). Concepts about the mind are not just passed on from the social group, nor are they completely formed by individual child-theorists. Instead, children gradually construct social understanding through the regularities they experience in interacting with others.

Our approach to the development of children's social understanding is based on Chapman's (1991; 1999) reformulation of Piagetian theory emphasizing the social dimension in development. Piaget is now known for his emphasis on subject-object interaction, even though in his early work (e.g., Piaget 1924/1928), and continuing throughout his career (Piaget 1977/1995) he was also concerned with the social dimension of development (Chapman 1988a; Lourenço & Machado 1996). Vygotsky (1978; 1934/1986), on the other hand, is known for his concern with the role of social interaction in the development of higher mental functions. An integration of subject-object interaction and social interaction results in a triangle "consisting of an active subject, the object of knowledge, and a (real or implicit) interlocutor, together with their mutual relations," which Chapman (1991, p. 211) termed the "epistemic triangle." Chapman argued that "although Piaget recognized the importance of both operative and communicative forms of interaction in various phases of his work, he never integrated those components in a single model" (p. 212). This epistemic, or "knowing," triangle preserves the insights of Piaget and Vygotsky and facilitates thinking about how social interaction and subject-object experience can be reconciled in development. The epistemic triangle has much in common with Hobson's (1994; 2002) notion of a "relatedness triangle," except that the latter focuses almost exclusively on affective engagement, particularly in infancy.

Chapman employed the notion of the epistemic triangle to describe the role of social interaction in the development of knowledge in the area of children's reasoning on concrete operational tasks (Carpendale 1999a; Carpendale et al. 1996; Chapman & Lindenberger 1992). We take it to be the lowest common denominator for understanding development in general and it is equally applicable to children's reasoning regarding social matters. The fundamental point is that social interaction is essential in the development of cognitive, social, and moral knowledge. Children "construct a new conception of reality by coordinating their object-oriented *operative interactions* with those of other people, by means of their *communicative interactions* with the individuals in question" (Chapman 1999, p. 34; emphasis in the original). At the same time that children are constructing knowledge of the physical world they are also constructing knowledge of other people. It is through communicative interaction that children discover that others sometimes have different beliefs about the world. We take it that children

assume a stable external world that remains the same for themselves and other people. In order to maintain this assumption when they encounter others who may have different beliefs about aspects of the world, such as the location or identity of objects, children change their expectations or their understanding of mind and of how beliefs are formed. At some point children realize that access to information, for example through seeing, is essential in the formation of beliefs. That is, children construct an understanding of how they and other people acquire knowledge of the world and they may achieve comparable levels of development at similar ages because of commonalities in their experience.

From this perspective, knowledge is gradually constructed within social interaction. Children's social knowledge is based on action; it is not theoretical in the sense of a set of laws formed on the basis of observation to explain the doings of other people. Understanding others is at first practical. It is gradually constructed through regularities in interaction with others. At first the interaction between infant and other (e.g., the caregiver or sibling) is dyadic and not yet referential, but by the latter part of the first year this interaction becomes triadic, between the infant, the caregiver, and objects.[5] That is, aspects of the world become increasingly included in the interaction between infant and caregiver. The infant is embedded in this triadic interaction but only gradually differentiates the self, other people, and the world of objects. In keeping with this gradual view of development, we expect to see children exhibit early forms of knowledge about the mind first in interaction; only later will children become able to reflect on such knowledge.

In the following subsections we flesh out this view of development in more detail, first briefly in development during infancy and next when children begin to learn words.

3.1. The development of the epistemic triangle: Social understanding in infancy

Triadic interaction between the child, another person, and the world is essential in the development of knowledge in general, and here we focus on social knowledge. This leads to the question of how and when the capacity for triadic interaction develops from an infant's dyadic interaction with either a parent or the world of objects. There is much debate and discussion concerning how and when infants achieve the capacity for triadic interaction – or move from "primary intersubjectivity" to "secondary intersubjectivity" (Trevarthen 1979; Trevarthen & Hubley 1978).[6] Examples of behavior involving triadic interaction begin toward the end of the first year of life and include social referencing, gaze following, and different forms of pointing. One of the early manifestations of triadic interaction between the infant, an adult, and objects during infancy occurs at about 12 months of age when infants start to point to objects (Schaffer 1977). Bates et al. (1976) distinguished between infants' use of pointing gestures in order to make requests ("proto-imperatives") and pointing to direct adults' attention to objects ("proto-declaratives"). At this age, infants appear to be actively directing an adult's attention. These are two forms of behavior that at least appear to involve joint visual attention. This capacity for joint attention plays an essential role in word learning during the second year (e.g., Baldwin 1995; Lock 1980). The triangle between the infant, the parent, and the world in action can be observed even earlier, at about 9 months of age, in the phenomenon of social

referencing, in which an infant apparently refers to a parent's facial expression to determine their evaluation of an ambiguous situation (e.g., Walden & Ogan 1988).

Any claim about the age at which joint attention behaviors such as pointing, gaze following, and social referencing develop will be controversial. This is because there are different forms of these behaviors that develop at different ages and because there is much debate about what these behaviors may reveal concerning infants' social understanding; both rich and lean interpretations of this apparent evidence of early social understanding in infancy are possible (Baldwin & Moses 1996; Moore & Corkum 1994). Richly interpreted, those behaviors involving joint visual attention seem to be evidence of infants' understanding that other people have intentions and attention that can be directed to various aspects of the world (Carpenter et al. 1998; Tomasello 1995a). The behaviors mentioned above have been interpreted as evidence that infants at this age already have an "implicit" "theory of mind" (Bretherton 1991; Bretherton et al. 1981). From the perspective of this rich interpretation, infants require a mentalistic understanding of attention in order to engage in joint attention with adults and, therefore, this behavior reveals such an insight.

Theorists taking a rich view of joint attention can be seen as falling within an individualist framework. According to that framework, social development begins with the first person perspective and the individual's own self-knowledge which then must be extended to others; that is, "knowledge of other minds is parasitic on our knowledge of our own mind" (Jopling 1993, p. 291). With this starting point for self-knowledge, the route to an explanation of understanding other minds is usually through the analogical argument. This argument has an extensive history. A current use of it by Meltzoff et al. (1999) is the following: "(a) When I perform that bodily act I have such and such a phenomenal experience, (b) I recognize that others perform the same type of bodily act as me, (c) the other is sharing my behavioral state; ergo, perhaps the other is having the same phenomenal experience" (p. 35). Tomasello (1999b, pp. 70–76; 1999a, p. 68) also relied on the analogical argument in his theorizing about infancy (although his theorizing concerning language is consistent with ours).

The analogical argument relied on by the individualist framework is problematic for a number of reasons (e.g.., ter Hark 1990). For example, it seems to attribute too much to the infant in counterfactual reasoning and the ability to take an external perspective on their own experience (Soffer 1999). Analogical reasoning is possible once children have the concept of self and other, but the argument already presupposes this distinction and on that ground cannot logically be its source (Scheler 1954, pp. 240–241). (For further criticism of the analogical argument see Müller & Carpendale, in press.)

More recent accounts of joint attention support a leaner interpretation. For example, Baldwin and Moses (1996) explored development in triadic interaction in the context of social referencing and found that infants look at their mothers under conditions of stress but not to gather information. This suggests that triadic interaction may be important in further development of infants' social understanding, but at 9–12 months of age it is only

very rudimentary and is more likely to be a manifestation of the attachment system than social understanding.

The most well-known lean account is that of Moore and Corkum (1994; Corkum & Moore 1995; 1998), who showed that infants engage in joint visual attention, or end up in situations in which their attention is coordinated with adults, through processes such as conditioning without having yet developed an understanding of attention (for a similar argument, see Kaye 1982). Rather than joint attention necessarily revealing infants' understanding of other people's attention, Moore and Corkum (1994) suggested that there are developmental changes in infants' understanding of joint visual attention. They provided evidence that around the end of the first year infants rely primarily on observing the adult's head turn without apparently understanding the importance of eye direction. This appears to call into question the commonsense view that infants of this age understand that the other person is paying attention to the object. Later, during the first half of the second year, infants begin to use eye direction information as well as the head turn to achieve joint visual attention. This suggests that experience in which infants' attention is coordinated with adults' attention occurs before infants understand much about attention (Moore 1999). The infant becomes embedded in interaction with some success and only through the experience of that interaction later develops a more complete understanding:

> Once the infant is reliably engaging in joint attention, the experiences offered by this new triadic interactive form of behavior will afford progress in the infant's conceptualization of attention and set the child on the road to the discovery of all forms of social life that rest on sharing attention with others. (Corkum & Moore 1995, pp. 81–82)

This position is also supported by research on infants' pointing (following Murphy & Messer 1977). Desrochers et al. (1995) reported that in a longitudinal study the majority of infants began to use noncommunicative pointing (i.e., pointing without looking at their mother) at 12 months of age. However, only beginning at 15 months did these same infants begin to use pointing that seemed communicative in intent – for example, by simultaneously looking at their mothers to ensure they were successfully communicating. Desrochers et al. documented the development of increasingly sophisticated forms of pointing between the ages of 12 months and 18 months. Here again the evidence suggests that infants engage in action such as pointing, which may result in achieving joint visual attention or the coordination of attention with an adult, because the parent may attend to the object to which the infant is pointing. However, these young infants do not as yet appear to understand what they are doing because they do not look at the parent's face. In further exploring the development of pointing, Moore and D'Entremont (2001) found that infants at age 1 year are more likely to point when their parent is looking at them, whereas at age 2 years they tend to point when their parent had not seen an interesting sight. This suggests that young infants point to enhance interaction, but older infants understand pointing as directing others' attention.

Another reason for caution concerning the acceptance of overly rich interpretations of the meaning of early joint attention comes from research with nonhuman primates. Chimpanzees can follow gaze, and on the surface their behavior looks surprisingly similar to that of infants, but Povinelli (1999) showed through a series of experiments that chimpanzees do not appear to understand the psychological significance of gaze direction. For example, chimpanzees trained to beg with a hand-out gesture and given the opportunity to beg for food from one of two experimenters sitting side-by-side are initially just as likely to beg from someone with her eyes closed, with her head turned away, or even with her head covered by a bucket as they are to beg from someone with her eyes open. It takes many trials for the chimpanzee to learn to beg from the person who can actually see their begging gesture (Povinelli 1999).

Proponents of the lean interpretation of joint attention have much in common with our position on infant social understanding. In particular, Moore (1999) set the origins of infant social understanding within triadic interaction (equivalent to subject, interlocutor, and object): "One might say that the 12-month-old recognizes intentional relations but only to the extent that she can share such a relation with an interactive partner. For the 1-year-old, intentional relations exist in the interaction and are not a property of, or descriptive of, individuals" (p. 48). However, Barresi and Moore's (1996) more detailed account starts from an individualistic perspective in which infants have different information about self and other and the integration of these two sources of information leads to the development of an understanding of self-other equivalence: "An individual organism's information about intentional relations is available from two different sources. An organism has direct first person information about its own intentional relations and direct third person information about the intentional relations of other agents" (p. 108). This implies that a self-other distinction is already in place, whereas from our perspective it is this distinction that requires an explanation.

An alternative approach that avoids these problems within an individualist framework is the relational framework (Jopling 1993), according to which the development of social understanding begins from relations between people rather than from individual self-knowledge. The starting point in development is a position of relative nondifferentiation between self, other, and the world (Baldwin 1906; Hobson 1993; Merleau-Ponty 1964; Piaget 1936/1963, 1937/1971; Vygotsky 1998; Werner & Kaplan 1963). From an observer's point of view one sees the infant interacting with others and the world, but at first the infant has not constructed these distinctions. The differentiations between inner and outer, subject and object, and self and other occur gradually within interaction (Müller & Runions 2003). The process by which the infant shifts from participating in triadic interactions to an understanding of the distinction between her own and others' intentions remains a holy grail within this area of theorization. However, only the constructivist perspective starts from a point where this problem is not already "solved" – as stated above, accounts within the "theory of mind" tradition assume self-other differentiation from the outset.

A central assumption from a constructivist perspective is that knowledge originates in activity. Infants interact dyadically with the world of objects as well as with people, and

through this activity they develop sensorimotor action schemes. Such schemes embody knowledge because they are modified as a function of the differences between what is anticipated and what the infant actually experiences (Chapman 1999). With further development, two or more action schemes may be combined, resulting in more objectivity or separateness from the infant's own action. The infant develops expectations about what can be done with objects as well as expectations about their interactions and routines with people. And infants begin to regard people as independent "centers of causality" (Piaget 1937/1971); that is, people do not always do what the infant expects or wants (Baldwin 1906). Different patterns of activity are possible with people as compared to with objects. There has been a great deal of research attention devoted to the study of face-to-face dyadic interaction between infant and parent. In such interaction infant and parent respond to each other and this could be described as a form of communication but it does not yet refer to anything outside of this dyadic interaction (Chapman 1991). Objects may begin to be included in this interaction in routines such as giving and taking. From this perspective, infants first experience triadic interaction that is supported by the parent or through processes such as infants learning to associate head turns with interesting sights (Corkum & Moore 1998). At this point infants still do not have a clear understanding of others' attention; but over time they will construct such an understanding through interaction (Müller & Runions 2003). Development involves a process of gradually constructing action schemes and combining them. Infants slowly differentiate and coordinate their attentional directedness toward objects with others' directedness toward objects (Müller & Carpendale, in press).

Hobson's (2002) relatedness triangle is a similar approach that emphasizes the importance of the infant's emotional engagement. To this important insight, we add that the infant's understanding of causality and spatial relations is also critical in the infant's ability to engage in joint attention. This point is reflected in the various forms of gaze-following that are observable from about age 3 months to age 18 months. More complex forms of this social behavior, such as following an adult's gaze to an object behind the infant, require the infant to have an understanding of herself as an object within a world of other objects (Müller & Carpendale, in press).

When infants have developed the capacity to coordinate attention with others they can refer to aspects of the world by directing others' attention, and they can understand other people's referential intent. Reference involves more than just forming an association between a sign, usually verbal, and an action, as is the case in the few triadic chimpanzee gestures (Tomasello & Camaioni 1997). Instead, signs can be used flexibly to convey different meaning in different contexts, and this requires the ability to infer others' referential intent.[7] Recent "theory of mind" research on infancy has worked with inventive experimental procedures, but neglects an older tradition (e.g., Lock 1978; Schaffer 1984) that attempted to chart the development of such signs within the richness of the infant's daily interaction rituals and experiences. Our position is in keeping with this tradition and the more recent view of Reddy (1991) that the rituals preverbal children engage in during "teasing" and "mucking about" show the beginnings of the process by which children come to share attention and to construct a practical or lived form of social understanding or knowledge of other people.

The ability to achieve joint attention and to understand other people's referential intent is the foundational insight on which language is based (e.g., Baldwin 1995; Sinha 1999). Tomasello (1999b; Tomasello et al. 1993) argued that it is this uniquely human ability that allows people to make use of culture to a far greater extent than can other animals. This ability is based on an initial level of social understanding that gives infants the capacity to engage in triadic interaction, and such interaction then provides a context for further social cognitive development. Infants now start to use actions and words to refer to other things. Their communication at this point becomes referential; that is, infants indicate what they want the adult to attend to and also are able to determine adults' referential intent. At this point, "words begin to mediate children's sensorimotor acquaintance with reality. Children no longer know reality solely in terms of what they could *do* with it, but also in terms of what they could potentially say (or hear) *about it*" (Chapman 1999, p. 34; emphasis in the original). All of the components of the epistemic triangle are now in place. In the next section we discuss how this new level of knowing provides a context for further development in children's understanding of the social world.

3.2. Outer criteria for inner processes: Talking about the psychological world

As infants develop the capacity to coordinate attention with others, they begin to learn language. Children's word use is built onto the shared practices they have already developed, such as following or directing another's attention, making requests, and conveying their intentions or goals. Learning to talk is grafted onto prior ways of acting and interacting with others. This is a view of language as activity, not just as information exchange. In this section we are concerned with the development of children's ability to talk about the psychological world. This raises the issue of the relations between language and thinking. A common assumption is that concepts are acquired first and then the words for such concepts. In contrast, from a Wittgensteinian perspective, language and thinking are much more tightly intertwined. Wittgenstein (1981, para. 324) asked, "Does a child learn only to talk, or also to think? Does it learn the sense of multiplication before or after it learns multiplication?" We assume that the child learns about the concepts and the words at the same time. That is, learning the meaning of words to do with multiplication involves learning the operations that are criterial for those words.

The research on children's language and their social understanding initially used language as a window on children's understanding and tended to focus on words that seem most obviously to be mental state terms such as "think" and "know." Other words, however, that are not obviously mental state terms at all (e.g., "hide") involve some understanding of how people know things and of how people can be prevented from knowing things (Turnbull & Carpendale 1999a; for similar discussion see Russell, 1992). In fact, it would be difficult to draw a clear line between words that do or do not turn on some understanding of the psychological world. Hacker (1991) pointed out that saying a robot or an automatic door opener "sees" something is parasitic on the primary use of such a verb. With reference to human agents, simple words such as "look" and "see" seem to refer to perception, but their correct use is tied to an understanding of the

perceiver's psychological attributes when they attend to something. Learning the use of such words is rooted in children's everyday experiences of coordinating attention with others. Children can be asked the false belief test question by referring only to where Maxi would look (the "look question") without use of the word "think." In fact, in some research young 3-year-olds seem to pass this form of the test question before the "think" version of the question (Chandler & Hala 1994; Hala & Chandler 1996). Similarly, 3-year-olds pass a false belief question phrased with "say" before a similar question phrased with "think" (Nelson et al. 2003). The general point is that a great deal of talk that is based on an understanding of knowledge acquisition and the mental world may not, in fact, involve what we would usually consider to be mental state terms (Turnbull & Carpendale 1999a).

In describing how children learn to talk about the psychological world it is necessary to draw on Wittgenstein's notion of criteria. According to Chapman's operational semantic theory (1999; Carpendale et al. 1996), children learn about the meaning of relational words such as "longer" through learning the operations that are criterial for the use of such words. Children may come to understand that the meaning of "longer" in the case of length involves the operation of checking to see which of two sticks protrudes farther. Only through elaboration do children learn the additional criterion of first lining up the ends of the sticks. Terms like "longer" are also involved in other language games referring to time. In the present case of learning how to talk about the psychological world the criteria for the use of such words are embedded within social interaction. As discussed above, Wittgenstein's (1968) private language argument stressed that it is not possible to learn through introspection the meanings of words referring to inner processes (Chapman 1987a; Montgomery 1997; Russell 1996). It follows from this that children learn about inner processes (their own and other people's) through public criteria, not only through their subjective experience; that is, they learn the appropriate contexts for the use of various words referring to the psychological world. Children learn the pattern of interaction for which it is appropriate to use a particular term, either mental, emotional, or dealing with pain, and so forth. Wittgenstein's (1968) view of how children learn the meaning of sensation terms is that

> words are connected with the primitive, the natural, expressions of the sensation and used in their place. A child has hurt himself and he cries; and then adults talk to him and teach him exclamations and, later, sentences. They teach the child new pain-behavior. (para, 244)

Wittgenstein's argument regarding sensation words also applies to psychological words (Chapman 1987a). Children learn to talk about the psychological world in a variety of ways including discussions about themselves and other people. That children appear to develop the ability to understand another's belief at the same time as their own (Gopnik 1993) would suggest that they learn the criteria for each at about the same time. Criteria for talk about the mental world are behavioral evidence for inner experiences such as sensations, emotions, thinking, remembering, imagining, and so forth: "Criteria are those publicly observable circumstances which might be used in teaching the correct use of the expression to a child or someone else learning our language" (Chapman 1987a, p. 105).

From a Wittgensteinian perspective, the use of psychological terms becomes part of earlier, or more "primitive," prelinguistic behavior (Hacker 1997). Words such as “see” and “look” may be grafted onto earlier joint attention behaviors. These words can then be used as new ways to direct and follow attention. Similarly, emotion words may be grafted onto the child’s prior reactions or behaviors. The circumstances surrounding the use of psychological words become the criteria for their use. Talk about the mental world is built onto prior activities as a refinement (Canfield 1993; 1999; Malcolm 1991; Turnbull & Carpendale 2001).

It might seem that if we endorse the Wittgensteinian idea that children learn about the mental world through learning how to express in language their feelings, plans, goals, and so forth and through learning the criteria for the third person use of various psychological terms, then we must endorse an enculturation position in which mentalistic concepts are imported from the social world to the individual. As mentioned in section 2.1, this is one interpretation of Wittgenstein and it implies a cultural relativism by which children would just learn the mental concepts used in their particular culture. However, we do not endorse this interpretation for two reasons. First, at the basic level of social understanding (e.g., seeing, looking, intentions, desires, and beliefs), children’s understanding is built onto shared practices that we expect would be common across cultures because these are common aspects of human experience (for a parallel argument within the theory view, see Wellman 1998). This does not rule out that there may be cross-cultural variability, such as in complex emotions (Lillard 1998).

Second, and central to our argument, children’s development is constructive. This involves combining the epistemic triangle approach to development with Wittgenstein’s concept of criteria. That is, children do not acquire an understanding of talk about the psychological world in an all-or-nothing fashion. Concepts are not passed on, ready-made, through language. Criteria are multiple and children may initially acquire a subset, which enables them to use words apparently correctly in supportive contexts. It is only through communicative interaction with others about beliefs (sometimes differing, sometimes concordant) about the world that children gradually construct an understanding of belief. In other words, although young children often use and seem to understand words based on an understanding of the process of knowledge acquisition (e.g., “see,” “remember,” and “guess”), their understanding is as yet incomplete and is based on a partial set of the criteria for the correct use of such words (Montgomery 1997). For example, Lillard (1993b) showed that when young children first begin to use the word “pretend” they focus on the more obvious criterion of the action being performed rather than on the individual’s knowledge or intentions. This view is consistent with the generally protracted nature of language development (e.g., Nelson 1997).

We now turn to a consideration of other accounts of the relation between language and social understanding. The finding that various aspects of children’s linguistic ability are associated with false belief performance has already been mentioned (e.g., Cutting & Dunn 1999; de Villiers 2000; de Villiers & de Villiers 2000; Happé 1995; Jenkins &

Astington 1996). One approach is that language can be used as a window to reveal the child's social understanding. Bartsch and Wellman's (1995; see also Sabbagh & Callanan 1998) work exemplifies the usefulness of such research in that it shows that children produce terms referring to desires before they refer to beliefs. However, one should be careful of the assumption that mental terms refer to mental states. Even the simple word "want," which would be coded as a desire term, can be used in many ways, such as to make requests or to make offers. Budwig (2002) found that mothers and their children used the word "want" in different ways. Regarding syntax, the de Villiers (e.g., de Villiers & de Villiers 2000) showed that the child's grasp of the syntax of complementation (the fact that mental state verbs necessarily take complementary clauses when they refer to mental states, like other non–mental state verbs; e.g., He thinks that he had eggs for breakfast; He said that he had eggs for breakfast) is correlated with false belief test performance. Such analyses suggest important connections between mental state understanding and the ability to parse statements about mental states. Longitudinal evidence indicates that language competence, as measured in standardized tests, appears to predate the development of false belief understanding (Astington & Jenkins 1999).

Each piece of research shows how children's understanding of mental states is likely to be related to their general proficiency in understanding and producing words and sentences. However, such correlations raise the issue of causal direction, third factors, and the nature of any influence. Indeed they are somewhat antithetical to our approach because language and social understanding are so intertwined that it is somewhat artificial to separate human activity into parts and call one part language and the other social understanding. This position follows, in part, from viewing language as activity (Turnbull 2003; Turnbull & Carpendale 1999a). However, if we do talk in terms of language and social understanding, then, from the perspective of the epistemic triangle, language is important for two reasons. Astington (2001, p. 686) has described these two roles, and the need for a resolution, as "a means for representing false belief in contradistinction to the evidence given in reality and it is also the means by which children become aware of beliefs, both content and attitude…. What is needed is a new conceptualization that reconciles and combines insights from both views." Although we may differ from Astington in what we mean by representation – from our perspective language mediates children's knowledge of reality – children learn the criteria for words to talk about human activity and then can reflect on the psychological world. Language, or communicative interaction, is the means through which children learn about other people's experience and so develop a more complete set of criteria.

Parallel arguments have been made within more traditional accounts. Harris (1996), in particular, had the insight that conversation is important. Rather then mere exposure to mental state terms, Harris argued that conversation is important because it is a constant reminder that other people have different perspectives. We agree that this is one role conversation plays, but we contend that this is not sufficient. Communicative interaction helps children realize when they only have a partial set of the criteria for using words such as "'look," "see," "think," and "know" correctly, and when their understanding of the patterns of interaction in which these words are used is incomplete. Conversation has a pivotal role within the epistemic triangle, but as part of an integrated system not as an

independent factor. To maintain the assumption that one lives in a common, stable, external world that is the same for the self and others – one of the basic presuppositions required in any attempt at communication – children must develop an increasingly sophisticated understanding of the nature of the mind. Maintaining the assumption of an independent external world in the face of evidence of other people's differing experience of the world requires that children modify their understanding of the relations between their own and others' beliefs about the world to include the notion that one's beliefs about the world depend on the information to which one is exposed.

Once children can talk about the social, emotional, and psychological world they can begin to reflect on or think about people's activity in psychological terms (Chapman 1991; Piaget 1945/1962; Vygotsky 1934/1986). This raises the issue of how we view the process of reasoning. In the theories we reviewed earlier in this target article the process of reasoning involves simulation or the application of rules that are either innate or formulated by the child on the basis of observation. In contrast, we suggest that children understand talk about the psychological world in terms of the patterns of activity that are criterial for the use of such mental state terms – that is, the pattern of interaction for which we use these words. Reasoning, then, involves the coordination of these activities. Thus, as well as understanding questions in terms of human interaction, children also require the ability to imagine and coordinate activities that may not be immediately present. From this perspective, reasoning is not based on the application of rules, but particular instances of rules would be manifest in the process of reasoning (Carpendale et al. 1996).

4. Using the epistemic triangle to explain the "core findings" in "theory of mind" and the influence of relationships

In this section we address the "so what?" questions that necessarily follow in response to the proposed position in section 3. In section 4.1 we take the paradigm that appears to show most clearly that a clear conceptual shift takes place, the false belief test, and compare a traditional theory-theory account with the one offered here. In section 4.2 we explore whether the theory presented here can go further than previous ones in accounting for the correlations between a range of social relationships, like the sibling effect, and mental state understanding. We suggest that it can do so more convincingly than any other account.

4.1. The gradual acquisition of criteria within conversation

We are not the first to criticize the dominant accounts of "theory of mind" development by suggesting that such skills are acquired gradually. Such gradualism has been explained within a framework of other arguments, like the protracted development of language (Nelson 1997), and from within a philosophical critique of the theory-theory approach (Woodfield 1996; see also Russell 1996). It is therefore important to outline how gradualism follows from our theoretical perspective. Theory-theorists might depict a series of theories, "rudimentary prototheories" (Ruffman 2000, p. 263) like "preliefs" (Perner et al. 1994), or processing demands in different procedures. This account can

only go so far. However, an argument based on gradualism cannot be an excuse for fuzzy thinking. It needs a theoretical foundation and it needs to provide an explanation of the data.

The notion of gradualism underlies the type of developmental approach taken by Piaget, and also Vygotsky. For example, as Chandler (2001) has pointed out, in Piaget and Inhelder's (1948/1967) research on the development of children's understanding of visual perspective taking they described a sequence of different forms of understanding. This developmental approach has often been lost in the subsequent role-taking literature and the current "theory of mind" research . The strong tendency has been to collapse this protracted development into a single transition point (Chandler 2001; Chandler & Carpendale 1998).

The view that an understanding of mind unfolds gradually may appear to be a nonstarter when the collected data on the false belief test are examined. The recent meta-analysis conducted by Wellman et al. (2001) attempted to identify the factors that reliably facilitate performance in the false belief test. In an analysis of 178 experiments with 591 conditions, Wellman and colleagues found that factors like the type of task used, or whether the target question focused on the protagonist's thoughts or his or her actions, were stable across studies. There seemed to be a clear conceptual shift in children's performance at around age 4, and this is consistent with the theory-theory account of developmental change. However, consistent patterns of performance on one procedure do not necessarily inform us about the nature of change – from our theoretical perspective they may simply show that four-year-old children across the many studies engage in sufficient interaction with others about the veracity of beliefs to pass this test. As Scholl and Leslie (2001) noted, the meta-analysis might only show the sorts of improvement with age seen on most developmental tasks.

Indeed proponents of the theory-theory perspective have long warned us about the problem of "neurotic task fixation" (Gopnik et al. 1994, p. 157), and there are dangers in relying on only one task, particularly those versions of that task which do not test the variations in performance. In Wellman et al.'s (2001) meta-analysis some types of studies were not considered. Moses (2001) pointed out that among the types of studies not included are studies involving explanations of false beliefs, deceptive behavior, and eye movements rather than verbal responses. Even within the homogeneity of tests that were likely to lead to homogenous results, there was still considerable variation among samples, and the authors found that "several task manipulations do increase young children's performance: framing the task in terms of explicit deception or trickery, involving the child in actively making the key transformations, and high-lighting the salience of the protagonist's mental state or reducing the salience of the contrasting real-world state of affairs, all help young children to perform better" (Wellman et al. 2001, p. 672). Two issues emerge from Wellman et al.'s interpretation of the collected false belief data, which are typical of the 'theory-theory' approach to the literature: the extent of task variation and its implications.

In contrast to the theory-theory, the constructivist view actually predicts that there will be variations in the child's acquisition of knowledge within a domain. For example, when exploring the development of children's social understanding, Selman et al. (1983) found different levels of perspective taking when the child was involved in an activity than when the child was reflecting on it. The same analysis can be applied to the types of data reported by Wellman et al. (2001) and the findings, listed above, which they chose to omit from their analysis. For example, Wellman et al. found that if the protagonist's motive is made explicit or if the child actively participates in the procedure (e.g., Chandler & Hala 1994; Hala & Chandler 1996) then preschoolers pass the test in greater numbers. Similar results are found when child participants act out the answer by demonstrating with a doll (Freeman et al. 1991). We propose that children do better on false belief tasks when they are actively involved because their understanding of the events is supported by the social interaction. Not only is their attention directed by the experimenter (within the epistemic triangle, the subject-interlocutor interaction), but also their involvement in important aspects of the events commits them to acting on the object of knowledge (the subject-object of knowledge part of the triangle). Thus children's thinking is supported by their practical activity within a dynamic triadic process. With further development in their ability to hold different aspects of events in mind and coordinate them, children will be able to deal with false belief situations at a more abstract level. This type of research provides a snapshot of mental state understanding in the making. It reveals a microcosm of relationships, which current studies are showing to be vital and which explain patterns of findings to be revisited in section 4.2.

A constructivist perspective would predict that the performance of children who are within the process of developing these insights would be influenced by many aspects of social interaction. Such gradualism is highlighted by recent research showing that there are other influences of the context of the assessment procedure. For example, there is inconsistency between laboratory-based assessment procedures – standard false belief tests – and naturalistic observation of young children. Children typically pass standard false belief tests only by the age of approximately 4 years, whereas in the home parents report observing their 2½ or young 3-year-olds apparently demonstrating an understanding of false belief (Astington 2000; Newton et al. 2000). In a diary study Newton et al. (2000) found that parents reported many incidents in which their young children were involved in deception even though these children were known to have failed false belief tasks. In agreement with our position, Newton et al. suggested that rather than early deception-reflecting insight, young children engage in deceptive acts with only partial understanding and such experience is the context for learning about deception.

Wellman et al. (2001) claimed that although factors such as the child's active involvement improved performance on false belief tasks this evidence "failed to fit an early competence model" (p. 674) because those factors "do not raise the youngest children's performance to systematically above-chance performance" (p. 674) and there were no interactions between these task manipulations and age. Wellman et al. derived "the essential claim that such task factors mask early competence" (p. 672). The difficulty with this interpretation is that Wellman et al. appear to have interpreted arguments for

gradualism within their own way of thinking about competence, resulting in the straw person they term the "early competence model." Wellman et al's inference is based on a prediction that the child either has or does not have false belief understanding, which may be hidden by performance factors. This is based on the assumption that competence is a hidden underlying factor that causes performance (Chandler 1991). However, there are sufficient data showing how children are able to understand false beliefs at different times to support the claim presented here that we need to explore the process of change in greater detail. The general problem is that if an individual has developed a particular competence why does he demonstrate it in some situations but not in others? Is this variability measurement error or evidence of gradual development?[8]

Variability in performance across different tests is usually explained in terms of performance factors masking the child's competence. But, as Chapman (1987a) pointed out, it is not always possible to separate performance factors clearly from the underlying competence. The assumption that there is one competence that is presumed to arrive all in one piece, like a theory or a set of rules, is what Chapman (1987a) referred to as the "measurement model." As an alternative approach he proposed the "membership model," according to which there are varying degrees of understanding that are assessed with different procedures. Here we could say that degrees of membership, or competence with mental state concepts, are related to children's increasing grasp of the multiple criteria for words referring to the mental world and their ability to understand events outside of supported social contexts in their immediate practical activity.

The perspective we apply draws on Vygotskian (1978; 1934/1986) ideas according to which children's initial, fragile social understanding, or "understanding-in-action" (Dunn 1996), is at first evident when supported by social interaction. Instead of naturalistic observation of early competence (e.g., Newton et al. 2000) being the application of a theory, this type of experience is necessary to gradually construct social understanding. This claim that children begin talking about the mental world with only a partial understanding is consistent with work on language learning in general (Nelson 1997). This is not, however, a simple adoption of culturally available concepts concerning the mental world; rather, children must come to understand these concepts through becoming competent in using such words in their practical activity. Children's correct use of psychological words is tied to their understanding of social situations and human activity. This understanding is facilitated by relationships that help the child understand other points of view. With experience in such social interaction concerning the mental world, children's understanding becomes progressively consolidated. That is, children are able to think about situations abstracted from their practical context of interaction and are able to anticipate and reason about situations such as the false belief task. The ability to talk about the mental world gives children a resource with which to reflect on and understand others as well as themselves.

The fixation on false belief understanding has prevented us from examining the longer view of development. As Chandler (1988) pointed out long ago, this initial understanding of the nature of beliefs and mind is not yet equivalent to a mature adult understanding of the mind. An understanding of the possibility of false beliefs will not allow children to

make sense of situations in which people with access to exactly the same information still arrive at different, but equally legitimate, interpretations of the same information. A child with only an understanding of false beliefs would assume that only one interpretation could possibly be right, and others must therefore be wrong. To accommodate the experience of interpretive diversity given the same information, while maintaining the assumption of a stable, independently existing external world, children slowly modify their understanding of the process of knowledge acquisition to achieve an understanding of the interpretive nature of knowledge. So when children encounter situations in which different beliefs are apparently based on the very same information, they must revise their earlier understanding that beliefs depend on the information one is exposed to (i.e., false belief understanding) and develop an interpretive understanding of the mind (Carpendale & Chandler 1996; Chandler & Lalonde 1996; Lalonde & Chandler 2002). This early insight into the interpretive nature of knowledge is a step toward a more mature understanding of mind, but there is still further development in understanding how knowledge is acquired during adolescence and adulthood (Carpendale & Chandler 1996; Chandler et al. 2001). Proponents of the dominant theories have been notably quiet about what happens in development after the child's fifth birthday. However, research that explores whether 5-year-olds can use simple false belief knowledge to make inferences about their own and others' perspectives finds that they singularly fail to do so (Varouxaki et al. 1999).

In addition to the content of talk about the mental world, the approach we are proposing also implies that the nature of the parent-child relationship should be important in the development of children's social understanding through facilitating children's understanding of the events and human activities being talked about. We turn to this implication of our approach in the next subsection.

4.2. The role of relationships in the construction of social understanding

In this section we return to the issues illustrated by the sibling effect discussed earlier in this target article (see sect. 1 and sect. 2.2). Any account of how the child comes to understand the psychological world must be able to explain a range of other sources of evidence showing that mental state understanding is significantly correlated with factors in the child's social environment, such as attachments, parenting styles, and parent-child communication. In this section we argue that the importance of communication in either facilitating or hindering the understanding of other perspectives directs our attention to the nature of communication within different relationships. The sibling effect is important because it is a marker of the types of process hypothesized here, but it is only one such marker. Dunn (1996) has repeatedly reminded us of the important role of relationships in social cognitive development. What is needed is a theoretical explanation of how relationships operate as a vehicle for the child's construction of the mind. The idea of the epistemic triangle is useful in explaining this development because it is through becoming aware of other people's beliefs and coordinating these often differing perspectives with their own beliefs that children develop an understanding of mind. Through such interaction and by confronting others' often differing beliefs about the world, children gradually construct a more complete understanding that increasingly

coordinates their own experience with that of other people. It is partially the resistance or refractoriness of social interaction that stimulates the development of knowledge. Thus, we would expect that differences in the amount and nature of the social interaction experienced would be related to individual differences in infants' early social understanding and to young children's further developing mentalistic understanding. We will discuss two ways of describing parent-child relationships: attachment and cooperation.

4.2.1 Affective engagement and mental state understanding. A body of research in which social relationships are shown to correlate with social understanding has been influenced by attachment and psychodynamic theories (Fonagy & Target 1997; Hobson 1993; 2002; Meins 1997; 1999). Fonagy et al. (1997) found that securely attached children, as measured with the Separation Anxiety Test, a projective measure of attachment security, were more competent on theory of mind tasks than insecurely attached children. This positive relation between attachment security and false belief understanding has also been found with a Q-sort measure of attachment (Symons & Clark 2000). In a longitudinal study, Meins (1997) found that children who were classified as securely attached at age 11 to 13 months were more likely than insecurely attached children to pass a false belief task at age 4 years, and more complex mentalizing tasks at age 5 years (Meins et al. 1998). A relation between attachment and early social understanding in infancy was also reported by Bretherton et al. (1979). These researchers found that children who were securely attached at age 12 months had used more protodeclarative pointing at age 11 months than other infants.

There have been a number of potentially compatible explanations proposed for this positive relation between secure attachment and social understanding. Meins (1999; Meins et al. 2001) suggested that security of attachment and social cognitive development are positively associated because parents of children who develop secure attachments respond sensitively and appropriately. To do this they need to think of their children as persons with thoughts and feelings and treat them in this way. That is, parents whose children develop secure attachments are "mindminded"; they tend to "treat their infants as individuals with minds, rather than merely entities with needs that must be met" (Meins 1999, p. 332). This way of interacting develops secure attachment, and it also exposes young children to talk about the psychological world. Meins' explanation for the connection between attachment security and social cognitive development is that the same parental characteristic that results in secure attachment also results in the "exposure of the infant to mental state language" (p. 337). She found that maternal child-centered (mindminded) language (but not mindminded language about other people) to 6-month-olds predicted children's false belief performance at age 4 (Meins et al. 2002). This evidence requires an explanation of how exposure to mental state language influences social development, which is what we have provided here.

At a level at which theories of affect and cognition are integrated, it is not too difficult to show how analyses of infant-caregiver affect are wholly compatible with data on parent-infant shared attention. Indeed Hobson (2002, p. 147) argued that security of attachment, which is based on the mother's way of relating to the infant, may influence the infant's

ability to engage with others, and it is this engagement that is essential in interaction in the "relatedness triangle" and in the development of thinking, especially thinking about the social world. From the vantage point of observations of interactions, Baldwin and Moses (1996) pointed out that internal working models consist of knowledge of other people and relationships. That is, infants develop expectations about other people based on primary relationships. Such views echo one another and fit into the framework of our general developmental theory, which extends beyond infancy. Perhaps we should not be surprised that such a way of viewing internal working models converges with Piagetian ideas about development being rooted in interaction because one likely source of Bowlby's ideas was Piaget's notion of schemes. Piaget (1945/1962, pp. 188–189, 206–207) wrote about the "affective schemes" or "personal schemes" that infants develop as "modes of feeling and reacting" to people in ways that sound like internal working models – the set of expectations infants build up about other people and how they will act. This is early sensorimotor, lived, practical knowledge about people based on expectations acquired through experience of how parents respond.

Research on the development of affective exchange in infancy has greatly illuminated key issues in infant development. The correlations between such exchanges and tests of later mental state understanding suggest a need for a broader explanatory framework. One possibility is that secure attachment is an indicator of a relatively cooperative parent-child relationship, and, as we will argue in the next section, this is the type of relationship that, according to constructivist theory, facilitates the development of knowledge.

4.2.2 Cooperation versus constraint. Exploration of the nature of parent-child relationships has led to interest in the influence of parenting style on social cognitive development (Astington 1996; Vinden 2001). Ruffmanet al.'s (1999) data show that parents who reported that they dealt with disciplinary situations by asking their child to "reflect on the victim's feelings" (p. 406) had children who were more advanced in false belief understanding. In addition, cooperative interaction is related to and may facilitate the development of children's social understanding. Dunn and colleagues (1991) found that cooperative sibling interaction was related to successful false belief explanations. Also, Brown et al. (1996) reported that cooperative interactions with friends and siblings were related to children's frequent use of mental state terms. Such evidence needs a theoretical explanation.

If, as Chapman (1991; 1999) argued, knowledge of the world develops through coordinating other people's perspectives with one's own within the epistemic triangle, then aspects of relationships and communication that facilitate our understanding of other people's perspectives should have a positive effect on development. An aspect of relationships that was important in Piaget's (1932/1965; 1977/1995) work on moral judgment is the degree of constraint versus cooperation present in relationships. This analysis is relevant for the our discussion because development, according to Piaget (1932/1965), is facilitated by relationships of cooperation and mutual respect and hindered by relationships of constraint and unilateral respect because cooperation facilitates understanding. Cooperative relationships have the potential of approaching Habermas' (1983/1990) conception of the ideal conditions of unrestrained

communication, allowing all participants to understand each other's positions fully and arrive at solutions to conflicts that everyone can agree with. In our terms if understanding is gradually constructed by the child within triadic interaction, then it follows that the extent and nature of cooperation between the child and others are important.

It follows from a constructivist perspective that cooperative relationships, allowing free communication between parents and children, should facilitate the development of an understanding of mind. Parents differ in how much they feel obliged to justify their positions and listen to their children's perspective and, thus, in how much cooperation they allow or encourage in their relationships with their children. Relationships among parents and children that are more cooperative than constraining should facilitate children's understanding of other people's points of view. This interpretation is consistent with research showing that parental styles (Baumrind 1991) differing in the extent to which parents reason with their children differentially affect child development. Cooperative relationships are the ideal context for the development of knowledge, but this alone is not sufficient. Talk about a substantive connection to the world is also required (Döbert in press) – in this case talk about people's activity in terms of their goals, beliefs, and desires. Various experiences such as cooperative peer interaction in the context of role enactment and shared pretense may contribute to the development of mental state understanding largely due to the stimulation of interaction and conversation.[9]

Of course, these correlations do not allow us to draw causal conclusions. The parent-child relationship is a system that is influenced by characteristics of both the child and the parents. It is important to acknowledge that relationships involve the child as well as the parent, and, although the influence of parents tends to be emphasized, characteristics of the child also influence the nature of the parent-child relationship (Bell 1968; Symons & Clark 2000). Parents' ability to engage with their child may be influenced by their beliefs about parenting (e.g., Baumrind 1991; Ruffman et al. 1999; Vinden 2001) and emotions (Hooven et al. 1995), as well as by the parents' level of stress, depression and psychiatric disorders, patience, social support, socioeconomic circumstances, and education.

On the other hand, the extent to which parents can be cooperative and can support the child's reasoning will partly depend on, and interact with, the child's abilities and characteristics. The child's developmental level may influence the nature of the relationship because children who are more advanced in language and social cognitive development may be easier to interact with in a cooperative manner.[10] Individual differences on the child's part may vary from extremes such as autism,[11] which severely restricts the child's ability to engage in triadic interaction as evidenced by the lack of protodeclaritives at 18 months of age (Hobson 1993), to differences in ability to focus and maintain attention (e.g., hyperactivity, impulsiveness, distractability). Blindness also makes joint attention more difficult to achieve and for that reason seems to hinder the development of social understanding (Minter et al. 1998; Peterson et al. 2000). We agree with Hobson (1993; 2002) that such factors on the child's part influence the ability to engage in interpersonal relatedness, as well as the nature of that interaction, and it is such interaction that is essential in social cognitive development. In this target article we have

restricted our analysis to the study of human development, but the same principles could be extended to nonhuman primates.[12]

5. Conclusion and future directions

What benefits can be gained by adopting a constructivist approach to the development of children's social understanding? For a start we have summarized examples of a voluminous literature that relates an understanding of mental states to a range of social experiences. Traditional accounts of "theory of mind" can only go so far in adding to the list of social influences on the child simulator/theoretician before coming to realize that a social dimension has to be incorporated into such theories. The theory presented here sets out to do two things. First, it attempts to establish from the start that social processes are a necessary part of any account of how children come to construct an understanding of their social world: from infant dyadic interaction through to complex social skills beyond simple false belief understanding. Second, it has revisited and reworked the constructivist account of development and used this to reassert its central focus on action and the potential for examining knowledge acquisition as a social process. For us, a constructivist approach to understanding the child's grasp of the social world is the only possible solution to the impasse between individual and social perspectives on social understanding and the problem this reveals in the assumption that the "theory of mind" metaphor makes about the development of knowledge and meaning: that the child has to learn about the workings of the mind through inference or introspection. For us, following Wittgenstein, "as a human activity 'meaning' is best thought of as a verb, not a noun" (Shotter 1978, p. 46).

By providing a framework that integrates social and cognitive processes, the analysis presented here calls for new directions in research based on the relations between particular forms of interaction and the development of social knowledge. Here we suggest some required shifts in the research agenda, as a means of illustrating how the implications of our position are very different from those offered by theorists within the "theory of mind" tradition. We refer to five areas of urgently needed research.

This research agenda begins in infancy with the study of the development of "shared meaning" (Chapman 1999, p. 34). This is one of the most difficult and important problems in developmental psychology. We have pointed out flaws in other approaches and provided a firm foundation and the tools with which to build an account of the development of infants' ability to grasp others' referential intent (see also Müller & Carpendale in press). But we acknowledge that the sketch we have provided is, as yet, partial. Researchers must begin by addressing the *process* by which the infant engages in interaction and joint attention. In doing so, we suggest that longitudinal naturalistic observation of infant-parent interaction and infants' joint attention would complement the current experimental research (e.g., Moore & D'Entremont 2001). Ironically, such naturalistic research was more common 25 years ago (e.g., Bates et al. 1976; Lock 1978; Schaffer 1977). What is needed is a detailed analysis of infants' interaction and the emergence of social referencing, gaze following, and pointing, as well as a study of the context of the ongoing sequence of interaction in which the act is embedded. Some

contemporary research of this sort does already exist (Reddy 1991) and we suggest that such work may help solve the riddle of how self-other differentiation and coordination emerge during infancy. According to the view adopted here, and in contrast to the position held in the "theory of mind" accounts of infancy, "the child's understanding is not just a matter of recognizing a correspondence between the mother's words and reality, but of grasping her *referential intent* in that situation – knowing what one is *meant* to attend to in response to her words and gestures" (Chapman 1999, p 34; emphasis in the original).

Second, we need to move from the intriguing findings relating individual differences in the social experiences of infants and their social understanding to research that explores the processes involved. For example, the findings of Meins et al. (2002) are intriguing, but how is it that mothers' tendency to talk about their infants in psychological terms is positively associated with their child's understanding of false beliefs almost four years later? What is it about the nature of these parents' interactions with their infants that correlates with the development of social understanding? Such research turns our attention to the nature of parent-child interaction and developing talk about the psychological world, and our theory provides a framework for this research. For example, such studies should examine how the criteria for the use of mental state terms are displayed (Turnbull & Carpendale 1999a; 2001). Differences between families in the ways in which criteria are made evident could also be studied. It is important to remember that researchers studying talk about the psychological world should be concerned not just with mental state terms but more broadly with talk about human activity (see sect. 4.1).

Third, and related to the points above, the gradual view of development implied in an activity-based theory such as ours means that researchers need to study forms of understanding even before children are able to explicitly explain false beliefs. One way to approach this issue is by manipulating the tasks to discover what factors facilitate young children's reasoning within the context of the assessment procedure. This type of research, and a considerable amount of such research has been conducted (e.g., Lewis & Mitchell 1994), should be used to think about the nature of development, not merely to search for "early competence." This would involve an extension of research using novel approaches to assess children's grasp of an actor's beliefs. For example, Call and Tomasello's (1999) nonverbal false belief procedure could well be used to tap early forms of understanding, just as it has been used to reveal a competence in deaf children (Figueras-Costa & Harris 2001; see also Carpenter et al. 2002). There is still scope to make a closer inspection of how children respond during traditional tests of false belief. For example, an interesting source of evidence of an early form of understanding comes from within the theory-theory and is referred to as "implicit knowledge" of false belief (Clements & Perner 1994; Clements et al. 2000; Garnham & Ruffman 2001). This work seems to demonstrate that young children, even slightly before their third birthday, respond to a prompt in a false belief test by looking in the direction of the correct container, even though these same children then go on to fail a more standard verbal question. Clements and Perner (1994) describe this knowledge as implicit because it cannot be verbalized. It has more recently been referred to as "nonverbal theory of mind"

(Ruffman 2000), but we point out that although the child's response is not verbalized it is in response to a verbal prompt. Not only might research on this effect illuminate potentially interesting processes by which children come to construct an understanding of the false belief task (e.g., the nature of the criteria they use), it would also free theory-theory from the contortions it has to make to incorporate such evidence into its developmental account.

Fourth, we need to explore more closely just what it means for a child to "have" an understanding of belief, in order to move beyond overly simple accounts of theoretical transitions at age 4 years. As well as expecting gradual development in different forms of understanding, we also predict and would investigate unevenness in development between different areas of children's experience. Some children may have more experience and therefore more understanding of particular aspects of social understanding. For example, in a recent study Peskin and Ardino (in press) found that children's performance on a false belief task in which an object is moved to a new location without the knowledge of the protagonist ("unexpected transfer task") is positively associated with success in a hide-and-seek game, whereas children's performance on a false belief task in which a container has unexpected contents ("unexpected contents task") is positively associated with success in keeping a secret from one of the experimenters about a birthday cake wrapped in a bag. Such data are clearly compatible with a constructivist account.

Fifth and finally, and as stated above, researchers need to move away from age/stage fixation to explore what happens to children after age 4 years. For a start, children cannot necessarily use the knowledge they demonstrate in the standard false belief test. A recent study by Maridaki-Kassotaki et al. (2003) found that in Greek, in which two terms are used synonymously to mean "to look for," a version of the false belief test with one verb appeared to facilitate 3-year-olds' performance, whereas its synonym hampered performance in 5-year-olds. Such data reveal that children's understanding of questions about beliefs are mediated by their understanding of verbs referring to mental states. Further work along these lines would reveal more about the process by which children come to acquire the subtleties of a mature understanding of mind – particularly knowledge and skills that make up the complexity of a culture's psychology (Lillard 1998). The approach put forward here stresses the need to explore the matrix of social relationships involving transactions between the child and others and in which the child constructs social understanding.

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NOTES

1. It is not clear that an enculturation approach is directly championed by any theorist within the "theories of mind" literature, but such an approach is discussed by many (e.g., Astington 1996; Astington & Olson 1995) and sometimes attributed to Wittgenstein or Bruner (1990).

2. Rogoff (1997, p. 266) criticized internalization approaches and argued instead for "development as a process of transformation of participation." Although there is much that we agree with in Rogoff's approach, her view of internalization involves either the transmission or acquisition of information (corresponding to collectivism or individualism, respectively) – both being examples of what Overton (1994; 1998) termed a "splitting" or "isolation" strategy. Rogoff (see also Matusov 1998) critiqued a particular view of the nature of internalization. We agree with the critique. However, there is a second view of internalization (Lawrence & Valsiner 1993), according to which internalization involves the child's reconstruction of knowledge rather than transmission. Interaction is internalized (or "interiorized," in Piaget's terminology) to the extent that the child can implicitly perform the act and does not actually have to enact the activity (Carpendale et al. 1996; Chapman 1991; 1999).

3. There are other positions such as Thelen and Smith's (1994; Thelen et al. 2001) dynamic systems approach that are consistent in many ways with the approach we take. Thelen and Smith's account is similar to Piaget's theory in emphasizing the practical and embodied nature of cognition. And Chapman (1992; see also Boom, in press) suggested that Piaget's theory was an early theory of self-organization. However, there may also be important differences. In Thelen and colleagues' (2001) explanation of the A not B error they appear to assume objectivity, whereas that is what Piaget tried to explain (Müller & Carpendale 2001). This suggests that they started from a different beginning point in development.

4. We cannot survey here the extensive literature on Wittgenstein's private language argument, but we do need to at least respond to Kripke's (1982) interpretation. Kripke began from Wittgenstein's claim that all rules are up for interpretation. This is the paradox that "no course of action could be determined by a rule, because every course of action can be made out to accord with the rule" (Wittgenstein 1968, para. 201). From this, Kripke derived the radically skeptical position that there can be no such thing as rule following, and this also applies to language since word use is rule following. This implies that the apparent meaningfulness of language must be an illusion and language must be meaningless. Kripke ended up in this radically skeptical position because he refused to give up the idea that rules are interpreted. But Wittgenstein was, in fact, arguing against this external explanation that there is a middle step of interpretation in applying a rule. Ironically, Wittgenstein was setting up the paradox that the range of interpretation is infinite to show that rule following cannot consist of interpretation – that "interpretations by themselves do not determine meaning" (para. 198). In the same section that Kripke focused on, Wittgenstein went on to write, "It can be seen that there is a misunderstanding here. … What this shews is that there is a way of grasping a rule that is

not an *interpretation*" (para. 201). Then, in paragraph 202, "And hence also 'obeying a rule' is a practice" (McDowell 1984; Russell 1987). Wittgenstein's position is internalist: that is, it is not possible to separate the rule and the application (ter Hark 1990, chap. 3).

5. Triadic interaction here refers to interaction involving self, other, and the world, not to interaction among three people.

6. However, Trevarthen took an innatist approach to explaining this development, whereas we do not.

7. We recognize that reference is a controversial issue (Putnam 1988). To be clear about our position, we do not consider reference to involve a dyadic relation between a sign and the thing referred to. This would seem to require a mechanistic view of meaning in which meaning is assumed to be attached to representations (Goldberg 1991). Instead, we consider reference to involve a triadic relation between the self, others, and an aspect of the world (Carpendale 1999b; Chapman 1991; 1999; Sinha 1999). Thus, meaning is not fixed to signs, but signs are used to direct others' attention and shared meaning is achieved through ongoing social interaction (Turnbull 2003; Turnbull & Carpendale 1999b).

8. Variability in children's performance on false belief tasks is reminiscent of similar debates in other areas of research. The most well-known example is criticism of Piaget's theory concerning "horizontal decalage." The standard interpretation of Piaget's theory was as a theory of mental logic, according to which reasoning involves the application of a logical rule. A prediction derived from this interpretation is that once a child has developed such a rule he or she should be able to solve all problems based on the same underlying logical rule. It is well known, of course, that there is considerable evidence of variability in children's performance on tasks that are all apparently based on the same logical principle. The research literature provides other examples of similar difficulties in explaining evidence of variability in performance on different tasks that apparently should all be assessing the same competence. For example, in research on Kohlberg's theory of moral development much more variability in the stage of moral reasoning employed was found than had been predicted by Kohlberg (e.g., Carpendale 2000). A particularly good example of the same sort of issue arose in the role-taking literature (e.g., Chandler 2001).

As argued elsewhere (Carpendale et al. 1996; Chapman 1987b), horizontal decalage is only problematic when it is assumed that Piaget's theory is a theory of mental logic. From the perspective of an interpretation of Piagetian theory emphasizing the origin of knowledge in action, horizontal decalage is not a problem (Chapman 1987b; 1988; Lourenço & Machado 1996). Instead, it should be expected. Similarly, variability in performance on different false belief tasks is only a problem because it clashes with a common and implicit assumption about the nature of reasoning – that is, the view of reasoning as being based on the development of rules or principles that are then applied to problems to generate solutions (in domains such as moral reasoning or reasoning about the physical world, and now the social world).

9. Pretend play has been considered as a possible facilitating context for the development of social understanding, that is, as a "zone of proximal development" (Lillard 1993a; Youngblade & Dunn 1995). The overall amount of pretend play has not been found to be associated with false belief understanding, but false belief understanding is associated with specific *types* of pretend play: when children make joint proposals in their pretend play and when they explicitly make role assignments to themselves and their partners in play (Astington & Jenkins 1995). Also, young children's tendency to role enact is associated with belief understanding seven months later (Youngblade & Dunn 1995). From our perspective, we would expect that increased social understanding would facilitate children's ability to engage in cooperative pretend play, and that this social interaction could also serve as one context, among others, for further social development. We would not expect that any facilitative effect would depend only on the fact that pretense is involved, but rather also on the fact that such situations would require cooperative interaction in which children must coordinate their activity toward shared goals. This would require talking about human activity and the need to reach mutual understanding because the children are enacting some event together.

10. In considering the role of the child's abilities we recognize that our approach needs to be integrated with domain general approaches to children's reasoning about the mind (e.g., Gordon & Olson 1998; Mitchell & Riggs 2000; Frye et al. 1995). The child must have an ability to pay attention to important aspects of social interaction and must be capable of achieving some distance between himself and the situation so he can reflect on it rather than act impulsively (Moses 2001). Furthermore, reasoning about situations that are not immediately present would require the ability hold in mind and to imagine aspects of situations (Harris 2000). Clearly, there is some distance to go in developing this aspect of our approach, but we suggest that a likely candidate for further study would be attentional capacity, which in Chapman's (1987b) approach has a role in understanding and reasoning.

11. Concerning autism, our position is consistent with Hobson's (1993; 2002) view of autism as due to a disruption in the child's ability to engage in affective interaction. In this article we have spelled out in further detail the nature of this interaction beyond infancy and the role of language in social cognitive development. However, we have not applied the issue of autism to our analytic framework because it is associated with so many other social and cognitive problems and differences from the typically developing population that no conclusive statement can be made here.

12. This focus on the role of relationships in development, as well as what the child brings to the relationship, allows us to think about both atypical development and research with nonhuman primates. Here our approach is consistent with Tomasello's (1999b) position that what is required in typical social cognitive development is both normal neurological development as well as the right social and cultural conditions. In children with autism we see biological abnormalities hindering the children's ability to engage with others in ways that are essential to normal social cognitive development, even though they have access to normal human social interaction (Hobson 1993).

"Enculturated" apes – that is, chimpanzees and bonobos raised in a human linguistic environment – do develop more social cognitive and language skills than wild chimpanzees, but they can only go so far – not much beyond the level of a 2-year-old human child (Savage-Rumbaugh et al. 1993).

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