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Getting Vygotskian about Theory of Mind:
Mediation, Dialogue, and the Development of Social Understanding

Charles Fernyhough

Durham University

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Correspondence concerning this article should be addressed to Charles Fernyhough, Department of Psychology, Durham University, South Road, Durham, DH1 3LE, UK.

Tel.: +44 (0) 191 334 3243

Fax.: +44 (0) 191 334 3241

c.p.fernough@durham.ac.uk

Abstract

The ideas of L. S. Vygotsky (e.g., 1934/1987) have been increasingly influential in accounting for social-environmental influences on the development of social understanding (SU). In the first part of this article, I examine how Vygotskian ideas have to date been recruited to explanations of the development of SU. Next, I present a model of SU development which draws on two implications of Vygotsky's ideas: the importance of semiotic mediation for mental functioning, and the dialogic nature of the higher mental functions. I then consider the value of the proposed model in accounting for evidence from three areas of enquiry: the typical development of SU in infancy and early childhood, relations between individual differences in SU and social-environmental variables, and atypical development. The model is suggested to be particularly helpful in understanding the transition from intentional-agent to mental-agent understanding, and the role of language in SU. Remaining challenges include a need to specify further the cognitive processes underlying internalization, and to gather more extensive evidence on the roles of typical and atypical social experience in SU development.

Keywords: dialogue, inner speech, mentalizing, private speech, semiotic mediation, social understanding, Vygotsky's theory

Getting Vygotskian about Theory of Mind: Mediation, Dialogue, and the Development of Social Understanding

Human beings attain levels of social understanding (SU) whose sophistication is unknown elsewhere in the animal kingdom (Tomasello, Carpenter, Call, Behne, & Moll, 2005). One thing we have learned from more than a quarter-century of theory-of-mind researchⁱ is that the cognitive processes underlying these forms of understanding are unlikely to be attributable to a unitary social-cognitive capacity (Nelson, 2004). Among the reasons for skepticism about this possibility has been the absence so far of any compelling evidence for a modular mentalizing capacity based on a unitary neuroanatomical substrate (Apperly, Samson, & Humphreys, 2005), despite claims that SU is best understood in these terms (Fodor, 1992; Leslie, 1991). Another reason comes from evidence that any genetic component to SU is considerably weaker than the social-environmental variables that have been proposed to influence this process (Hughes, Jaffee, Happé, Taylor, Caspi, & Moffitt, 2005). Indeed, the compelling evidence for social influences on SU development makes it clear that children's developing understanding of others is determined by their ability to draw on pre-existing and parallel-developing social-cognitive and general cognitive resources. The time is ripe, therefore, for an account of SU development that can pay full attention to how children's emerging social-cognitive capacities are shaped by developments in other areas of cognition.

A number of proposals have been made for psychological capacities and qualities that are likely to play a part in SU. Simulation theorists (e.g., Gordon, 1992; Harris, 1989) have suggested that SU depends upon individuals' ability to project themselves imaginatively into the perspectives of others and simulate their mental processes. This suggests that children's pre-existing imaginative capacities are likely to constrain their social-cognitive reasoning abilities. A second suggestion, based on evidence for the importance of the narrative context of laboratory

assessments of SU (Lewis, Freeman, Hagestadt, & Douglas, 1994), is that children's abilities in this respect will depend upon the capacity to represent and process narratives. A third proposal comes from Tomasello et al. (2005), who suggest that SU is predicated upon a species-specific motivation to share intentional states with others. These authors argue that experience of social interactions in which intentional relations to the world are shared is necessary for individuals to build the cognitive structures needed for more sophisticated reasoning about mental states and behavior.

One developmental achievement that is more likely than any other fundamentally to transform children's SU is the acquisition of language. A rich body of recent empirical research has shown how increasingly sophisticated linguistic abilities can mediate and structure children's conceptual understanding of other minds (see chapters in Astington & Baird, 2005a). This growth of interest in the involvement of language in SU development is reflected in a more general increase in interest in the constitutive role of language in cognition (e.g., Carruthers, 2002; Clark, 2006).

One theory that can be useful for understanding this involvement of language in SU is that of L. S. Vygotsky (e.g., 1931/1997, 1934/1987, 1930-1935/1978). The heyday of research into children's understanding of other minds has witnessed a parallel groundswell of interest in Vygotsky's ideas about how human mental functioning is rooted in the interpersonal contexts within which it develops, and how cognitive functions traditionally considered separately can transform each other in development (see Lloyd & Fernyhough, 1999). In exploring the possibility of a Vygotskian account of SU development, I shall be assuming that any such account should be able to answer to three main types of evidence. First, it must provide a description of normal ontogenesis which can be evaluated with respect to developmental observables. Secondly, it must be able to account for qualitative and quantitative differences

between individuals in development. Thirdly, it must be sufficient to explain situations where the normal course of development is perturbed.

This article is in five parts. In the first, I examine how some central Vygotskian ideas have been used in explaining SU development. In the second, I outline a theoretical framework which places emphasis on two important implications of Vygotsky's ideas: the role of semiotic mediation in mental functioning, and the dialogic nature of the higher mental functions. In the third section, I consider how this framework can be applied to explaining typical SU development, with a particular focus on the transition from intentional-agent to mental-agent understanding, and the role of language in SU. In the fourth part, I examine the model's predictions with regard to those social-environmental and cultural variables known to relate to individual differences in SU development. In the final section, I consider the model's application to cases of atypical development, with a particular focus on autism and sensory impairment.

Vygotsky and Social Understanding

Wertsch (1985) identified three main themes to Vygotsky's theory: (a) the reliance on a 'genetic method', whereby mental functions are investigated with respect to their developmental precursors and sequelae; (b) the claim that the higher mental functionsⁱⁱ have their origin in interpersonal activity; and (c) the assumption that mental activity is mediated by culturally derived sign systems. A foundational concept in Vygotsky's theory is the notion of *internalization*, the process whereby the individual, through interaction with others, actively reconstructs external, shared operations on the internal plane (Vygotsky, 1931/1997). For example, Wertsch and Stone (1985) showed how a child collaborating with her mother on a problem-solving task will internalize and abbreviate the dialogue which occurred between them and use it subsequently to regulate her own solo activity. The process of internalization, along with its conceptual relation, the zone of proximal development (see below), has been the subject

of extensive research and elaboration (e.g., Lawrence & Valsiner, 1993; van Geert, 1998; Wertsch, 1991).

A central assumption of Vygotsky's theory is thus that 'individual' mental functioning is irreducibly social in origin. Mental activity which is initially distributed or shared between individuals is later actively reconstructed on the internal plane. Such a theory has implications for the problem of how an epistemic subject can ever come to know about another epistemic subject, when the mental states of the other are not objectively observable (Austin, 1979). This epistemological problem flows from a Cartesian conception of mind as a mental *substance*, trapped within the body, with no access to external reality except through (possibly unreliable) perceptual systems (Ryle, 1949/1973). In contrast, followers of Vygotsky's approach conceive of mind primarily as *activity*, which can extend beyond the skin to interpenetrate with other minds in interpersonal exchanges. Vygotsky's theory thus offers the prospect of an account of SU development which avoids the 'Cartesian ghost' (Moore, 1996) by considering how the internalization of interpersonal activity fundamentally restructures the individual's cognition.

Vygotsky was not the only developmentalist of his era to argue for the social origins of some forms of thought (e.g., Piaget, 1977/1995; Mead, 1934). Where Vygotsky differs from his contemporary Piaget, however, is in his claim that higher forms of mental functioning are mediated by culturally derived artifacts, such as signs. Vygotsky stated that "the central fact about our psychology is the fact of mediation" (1933/1997, p. 138). In a large and diverse body of work, he explored the implications of typically developing children's use of signs for verbal planning (Levina, 1981), mediated memory (Leont'ev, 1932), and the self-regulation of behavior (Vygotsky, 1934/1997). In a series of hypotheses which have been the focus of renewed empirical attention in recent years (e.g., Winsler, Fernyhough, & Montero, in press), Vygotsky claimed that the development of verbal mediation is evidenced in children's use of self-directed

language (now commonly known as private speech) to accompany and regulate their behavior. Recent research has found support for his predictions of a U-shaped trajectory in private speech development (Winsler & Naglieri, 2003), relations with task difficulty and task performance (Fernyhough & Fradley, 2005), and the semantic and syntactic abbreviation hypothesized to accompany internalization (Winsler, de Leon, Wallace, Carlton, & Willson-Quayle, 2003).

Despite Piaget's (e.g., 1977/1995) acknowledgement of the importance of social exchanges for intellectual development, and the interest of neoPiagetian researchers in defining the conditions under which interpersonal interaction can lead to intellectual progress (e.g., Chapman, 1991), no equivalent to this idea of semiotic mediation exists in Piaget's work or in any contemporary neoPiagetian accounts. Indeed, Piaget's view of language was somewhat impoverished in comparison with modern accounts (Müller & Carpendale, 2000), and probably not rich enough to allow for the psychological functions that Vygotsky attributed to it, nor the semiotic transformations that he proposed to accompany its internalization. On the grounds that Vygotsky's writings neither address nor repudiate the idea of cognitive egocentrism, Piaget (2000) explicitly rejected the Vygotskian view of private speech and, by implication, his claims for the semiotic mediation of higher mental processes. Given this essential difference between their theories, it would seem important for any Vygotskian account of SU to examine fully the implications of this aspect of his theory, and determine how accounts that draw on different combinations of these two theorists' ideas lead to diverging empirical predictions.

Vygotsky never addressed the set of theoretical problems that are nowadays gathered under the umbrella of theory-of-mind research (see Note 1). Indeed, a lack of clarity in his theory about how young children's thought comes to be 'socialized', or capable of accommodating the differing perspectives of social partners, lay at the root of his disagreement with Piaget (2000) about the developmental significance of private speech (Fernyhough, 1999). Any attempt to draw

out the implications of Vygotsky's theory for SU development must therefore tread a line between sensible extrapolations from his writings to new bodies of data, and attributing ideas to Vygotsky that were never properly his. That said, Vygotsky's writings offer a rich source of ideas for making sense of social-environmental influences on SU development. His acknowledged influence as a theorist makes it important to determine what an account of SU development that is true to his theoretical ideas might look like, or, as is more likely, whether different neoVygotskian accounts might be possible based on different combinations of his key concepts.

Five Vygotskian Ideas

At least five Vygotskian ideas are relevant to explaining the emergence of SU (see also Fernyhough, 2004a). Although these ideas represent an integrated theoretical system, and thus resist attempts to consider them in isolation, evaluation of existing Vygotskian accounts is likely to benefit from clarity on the concepts from which they are founded. My aim in the remainder of this section is to itemise these ideas and outline how they have been used in current theorizing about SU development, before setting out a specific theoretical position in the sections that follow.

The first idea that can be useful for accounts of SU development is that of *internalization* (Vygotsky, 1931/1997). A view of SU development as involving the gradual and progressive internalization of interpersonal exchanges can help us to make sense of the growing evidence that children's understanding of others is developmentally rooted in their experience of social interaction. Vygotsky's ideas about internalization involve a concept that is richer than that of social learning (or the assimilation of information made available in social contexts). Among the challenges for contemporary theorizing about SU are firstly to pay attention to the syntactic and semantic abbreviation processes which transform the activity that is internalized, and secondly to consider how internalization is itself constrained by existing SU competences.

The second concept that can help us to understand SU development is that of the *zone of proximal development* (Vygotsky, 1934/1987, Ch. 6), which describes the difference between what children can achieve in isolation and with expert guidance. This notion allows us to understand how caregivers have a role in ‘packaging’ alternative perspectives on reality in such a way that they can be readily assimilated by the children with whom they are interacting (Fernyhough, 1996). For example, appropriate and sensitively-pitched input from caregivers has been proposed to ‘scaffold’ (Wood, Bruner, & Ross, 1976) children’s developing SU (e.g., Meins, Fernyhough, Wainwright, Das Gupta, Fradley, & Tuckey, 2002).

A third relevant Vygotskian idea is that of *naïve participation* (Fernyhough, 2004a), in which, with adult guidance, children are drawn into practices that they will only later come to understand. For example, Bruner (1975) described how infants are initially able to agree with adults on a word’s correct use before they understand its meaning. Applying this idea to children’s use of mental-state terms, Nelson (1996) notes that children can use such terms before they understand the concepts that constitute their referents. Similarly, in their theory of how social understanding is constructed within interactions with others, Carpendale and Lewis (2004) argue that an “initial, fragile social understanding” (p. 91) can, with the right sort of experience, develop into a full conceptual understanding of mind.

Fourthly, the role of semiotic systems (such as natural language) in mediating and enhancing children’s developing SU can be considered in light of Vygotsky’s (1930-1935/1978) ideas of language as a psychological tool that can augment pre-existing cognitive capacities. The term *mediation* has a long history in the behavioral sciences, frequently being used to describe a situation where one entity plays an intermediary causal role in the relation between two other entities. In the more limited context of sociocultural theories of development, it can refer to the process whereby individuals’ understanding is refracted through the experience of others (e.g.,

Chesnokova, 2004). In its stricter Vygotskian sense, mediation involves the use of culturally-derived psychological tools, such as utterances in spoken or sign language, in transforming the relations between psychological inputs and outputs. As I shall argue later, the use of semiotic mediation in representing and reasoning about the mental states of others can crucially offset some of the cognitive challenges of these processes.

The fifth idea concerns the *dialogic* nature of higher forms of cognition. Vygotsky did not explicitly extend his remarks on the dialogicality of external social speech to the semiotically mediated, internalized cognitive processes that derive from it (Cheyne & Tarulli, 1999; Tappan, 1997; Wertsch, 1980). As such, this idea retains a particular status as a thread that can be drawn out of a certain interpretation of Vygotsky's writings, without representing a view that he explicitly endorsed. Perhaps as a result, it is the aspect of his theory that has been considered least in relation to SU development. A full examination of this idea and its implications for theories of SU is presented in the second part of this article.

One further idea that is often mentioned in relation to Vygotsky's ideas is *enculturation* (e.g., Astington, 1996; Nelson, Plesa Skwerer, Goldman, Henseler, Presler, & Walkenfeld, 2003; Raver & Leadbeater, 1993), according to which exposure to cultural norms of explaining behavior allows children to "internalize the folk psychology of their particular culture" (Astington & Olson, 1995, p. 184). As Astington (2004) has noted, enculturation accounts do not necessarily entail that children are passive participants in a process of absorption of cultural norms. That said, it is important to remain critical about the interpretation of enculturation as a Vygotskian concept. One point to note is that Vygotsky was interested in how specific interpersonal relations shape individual cognition, and had little to say about cultural norms and practices *per se*. Cultural influences, in his analysis, are largely restricted to particular patterns of social interaction (which are likely to be influenced by, but are not reducible to, broader cultural

practices), and to the repercussions of the use of culturally-derived psychological tools (such as elements of natural language) in mediating cognition. Furthermore, Vygotsky's concept of internalization entails that patterns of interpersonal activity are fundamentally transformed in the process of being reconstructed on the plane of individual cognition. Children's use of language, for example, undergoes syntactic and semantic abbreviation in its transition from social speech to inner speech (Vygotsky, 1934/1987). Without such transformations, the appropriation of cultural norms of explaining behavior should properly be considered an example of social learning rather than internalization.

Vygotskian Accounts of SU Development

Existing accounts of SU development have drawn on different combinations of Vygotskian themes. In this section, I review some of the most prominent of these accounts, with a particular focus on how they have employed the key ideas itemised above.

One of the first authors to make use of Vygotskian ideas in accounting for SU development was Nelson (1996). Nelson's primary focus has been on children's acquisition of conceptual SU through their entry into a 'Community of Minds' (Nelson, 2004; 2005; Nelson et al., 2003). Her work in this respect draws on a number of Vygotskian concepts, such as internalization. Although the mediation of cognition by psychological tools (such as utterances in natural language) is also acknowledged to be important for cognitive development in general (e.g., Nelson, 1996), the full implications of mediation specifically for SU development are not spelled out. For example, in her consideration of the role of children's own language in the construction of SU, Nelson's (2005) focus is predominantly on the use of terms that directly represent mental state concepts. Although she considers how increasing facility with language may more generally augment children's ability simultaneously to operate with differing representations of reality, she offers no detailed account of how such complex representations

emerge in ontogenesis, nor of how they relate to other key milestones such as the development of verbal mediation in non-mentalistic reasoning.

Another theoretical contribution to have emerged in recent years is that of Carpendale and Lewis (2004). In their integration of Piagetian, Vygotskian, and Wittgensteinian approaches, these authors view SU as constructed through children's experience of reflection on their own and others' activity, in the context both of their experience of objective reality and others' perspectives on that reality. They draw on a concept similar to the zone of proximal development to show how triadic engagement with others within the 'epistemic triangle' (Chapman, 1991) can scaffold children's acquisition of the correct use of mental state terms and concepts. Although they take care to show how such experience can account for the observed gradualism in children's developing understanding of others, they are not clear about the importance of concepts such as mediation, dialogue, and internalization (Ferryhough, 2004a). For example, they note that "language mediates children's knowledge of reality" (p. 89), without detailing how this mediation might work nor committing themselves to a specifically Vygotskian (or otherwise) reading of this term. Theirs remains, therefore, an essentially neoPiagetian account which sees no primary role for verbal mediation in SU.

In another recent attempt to account for social influences on SU development, Symons (2004) draws on Vygotsky's concept of internalization as a mechanism for children's acquisition of self-other understanding through interpersonal engagement. This account places weight on children's ability to participate in conceptual (and thus to some extent theory-driven) conversations about mental states, which is arguably not likely to occur until children have already acquired some theory-like (see Note 1) mental state understanding. Symons argues that conversations about mental states allow children to internalize concepts of self and other, which can then be used as a basis for reasoning about the relations between mental states and behavior.

Although Symons' theory sees a role for the internalization of mental state language, there is no reference in his account to the syntactic and semantic transformations that Vygotsky proposed to accompany internalization, nor to how internalization is preferable to more orthodox conceptions of social learning as an explanation for a child's mastering the usage of mental state terms and concepts.

Vygotskian concepts are also employed by Garfield, Peterson, and Perry (2001) in their examination of the connections between mentalizing development and language acquisition. They suggest that the observed associations between language ability and theory-of-mind performance can be explained in terms of language constituting a second necessary condition for the acquisition of SU, alongside early triadic engagement with others. Garfield et al.'s use of Vygotskian ideas in accounting for these connections remains problematic, however. They offer no real detail on how language acquisition might interact developmentally with existing social-cognitive capacities, nor on what roles internalization and semiotic mediation might have in this process. Despite other valuable contributions, their account of SU development is therefore only Vygotskian to the extent that it appeals to the principle of naïve participation, or children's ability to engage in social interactions before they fully understand them.

A fifth theoretical contribution employing Vygotskian concepts is that of Tomasello et al. (2005). Central to this account is the distinction made by Tomasello, Kruger, and Ratner (1993) between intentional-agent understanding (which emerges between about 9 and 14 months, and underpins infants' developing ability to comprehend animate, goal-directed, and intentional behavior) and mental-agent understanding (which is in place by about age 4, and equates to what others [e.g., Perner, 1991; Wellman, 1990] have termed a 'theoretical' theory of mind). Tomasello et al. argue that the fusing of intentional-agent understanding with a motivation to participate in collaborations with others in which intentions, goals, emotions, and perspectives

are shared ('shared intentionality') results in species-unique forms of cultural cognition. Of particular interest is their claim that the internalization of interpersonal exchanges paves the way for the construction of 'dialogic cognitive representations' on which participation in collective endeavours is founded. However, they explicitly reject a role for language in this early internalization process, and thus, for this part of the developmental story at least, put themselves at odds with the view of development espoused by Vygotsky (Fernyhough, 2005).

My aim in the remainder of this article is to set out an alternative model of SU development which places particular emphasis on two implications of Vygotsky's ideas: the role of semiotic mediation in mental functioning, and the dialogic nature of the higher mental functions. In the next section, I set out the main features of the Dialogic Thinking framework for understanding the development of the higher mental functions. I then attempt to show how the proposed model can fill some of the gaps in existing treatments of the issue, and leads to distinct predictions which are suggested as goals for future research.

The Dialogic Thinking Framework

The Dialogic Thinking (DT) framework (Fernyhough, 1996; 2004a; 2004b; 2005; in press) draws on Vygotskian and neoVygotskian ideas in exploring the implications of the internalization of mediated interpersonal activity for individual cognition. In so doing, it highlights an assumption implicit in Vygotsky's writings but never properly examined by him: namely, that the resulting forms of cognition preserve the dialogic nature of the interpersonal exchanges from which they derive. As described in more detail below, the internalization of dialogue necessarily entails the internalization of the alternative perspectives on reality manifested in that dialogue, and the consequent restructuring of cognition to enable the simultaneous accommodationⁱⁱⁱ of multiple perspectives upon a topic of thought. I argue elsewhere that this view of cognitive development can account for the flexible, open-ended

nature of human thought, as well as making sense of much of the evidence for social-environmental influences on cognitive development (Fernyhough, 1996; in press).

The DT framework is thus an attempt to put some flesh on the venerable idea that thinking involves a conversation with oneself (Bibler, 1975/1984; Janet, 1926; 1929; Mead, 1934; Plato, undated/1953; Rochat, 2001). Introspection tells us that we frequently ‘think in’ natural language (Carruthers, 2002; Dennett, 1997; Hurlburt, 1990). Furthermore, the verbal thinking upon which we can sometimes introspect often appears to us as a kind of dialogue between distinct perspectives on reality (Fields, 2002; Tappan, 1997). The dialogic nature of human subjectivity has formed the basis of an important theory of self-organisation (Hermans, 1996; 2002; Hermans & Kempen, 1993; 1995), and yet the cognitive-psychological implications of the dialogicality of human experience remain unexamined (Rochat, 2001). Although there has been some attempt to outline the psychological (Fernyhough, 1996) and neurobiological (Lewis, 2002) preconditions for the emergence of internal dialogue, these approaches have to date provided little in the way of testable hypotheses with which psychologists might work.

The key to understanding how dialogue can incorporate different, semiotically manifested perspectives on reality lies in the work of the Soviet linguist and philosopher, M. M. Bakhtin (e.g., 1986). Bakhtin’s ideas about the sociocultural situatedness of utterances in everyday language—that is, their ability to betray the position of the speaker with respect to the physical and social worlds—have proved particularly fruitful for psychologists working within the sociocultural paradigm (e.g., Cheyne & Tarulli, 1999; Hermans, 2002; Hermans & Kempen, 1995; Tappan, 1997; Wertsch, 1980; 1991). Specifically, an assimilation of the Bakhtinian concepts of *voice* and *dialogue* can provide a powerful extension of Vygotsky’s theory, capable of speaking to some of the issues of most concern to modern developmental psychologists (Fernyhough, 1996; 1997; Fernyhough & Russell, 1997).

In Bakhtin's theory, a voice is a way of speaking that reflects the perspective of the speaker. By virtue of the fact that we each occupy a unique position in space and time, every speaker has a unique perspective on reality which is reflected in the signs that individual uses to communicate with others. As well as betraying the perspective of the speaker, linguistic utterances typically reflect the perspectives of those who have used those words before, as well as being continually oriented towards a possible response from a real or imaginary interlocutor. On this definition, dialogue is the phenomenon whereby differing perspectives on reality, manifested in sign systems, come into ongoing and open-ended conflict. It was this ability of human discourse to accommodate multiple perspectives that, for Bakhtin, made dialogue the fundamental process in human meaning-making.

For present purposes, the most important aspect of Bakhtin's work is his characterization of dialogue as involving a simultaneous accommodation of multiple perspectives (Ferryhough, 1996; Holquist, 1990). The DT framework is founded on one important implication of this Bakhtinian idea: namely that, in internalizing dialogic exchanges, the individual does more than merely appropriate the utterances of the other. If Bakhtin is correct to claim that an individual's utterances in dialogue are reflective of his or her orientation to reality, then the internalization of dialogic exchanges (or, in Vygotsky's [1931/1997] terms, their reconstruction on the intrapsychological plane) will necessarily involve some adoption of the other's perspective. By taking on the utterances of the other through the internalization of dialogue, one is also actively reconstructing some aspect of their perspective on physical and social reality. It is therefore possible to see certain forms of mental activity as an ongoing dialogic interplay between internally reconstructed (internalized), semiotically manifested perspectives on reality (Ferryhough, 1996; 2004a). The problem of understanding other minds thus shifts from the question of how an isolated epistemic subject could ever come to know about the non-observable

mental states of another epistemic subject, towards a consideration of how such mental states might be manifested in the concrete semiotic exchanges which are subsequently internalized to ground the individual's mediated thinking.

The emphasis on semiotic mediation is critical here. Of fundamental importance for our ability to engage in interpersonal dialogues is our use of natural language (typically spoken language, but also encompassing sign language) to describe reality for ourselves as agents, or to represent our intentional relations to reality. As Bakhtin (1984; 1986) noted, human languages are uniquely equipped to represent the speaker's orientation to, or perspective on, reality. By representing these intentional relations for ourselves in a systematically interpretable system of signs, we give them a material form which crucially reduces the processing costs involved in operating with them (Clark, 1998; 2006). When this process becomes dialogic, individuals have the basis for operating flexibly with the multiple perspectives of the people with whom they are socially engaged, and thus eventually for understanding how orientations to reality can direct human behavior.

My term for these semiotically manifested intentional relations is *perspectives*, by which I intend to pick out a set of orientations to the world that is specific to a particular physical, temporal, and sociocultural location. Given the importance attributed by SU researchers to children's understanding of epistemic states, it is worth considering how this concept of a perspective relates to the more familiar concept of belief. A perspective, as defined here, is not necessarily a belief, although, as evidence for its veridicality is gathered, it may become one. For a proclivity to believe to become an actual commitment to the truth of a proposition, information concerning the subject's own orientation to the world must be evaluated. The process of 'belief fixation' (Fodor, 1983) must further involve the commitment to the truth of a proposition that characterizes genuine belief (Hamlyn, 1990). My suggestion here is that an individual who has

acquired the capacity to conduct internalized, semiotically mediated dialogues will be able to operate with a range of often contradictory *perspectives* (used in the broad and inclusive sense outlined above) which, depending on the available information and the corresponding levels of commitment to their truth, will vary in the extent to which they are held as occurrent or standing *beliefs*. For example, I can participate in a debate about the existence of UFOs and temporarily adopt the different perspectives possible on the topic, without necessarily being committed to any of them as beliefs.

A second point is that the perspectives involved in mental dialogue are not exclusively perceptual. My account here owes much to that of Barresi and Moore (1996), who argue for a construal of the term *intentional relations* that incorporates perceptual and epistemic as well as conative and affective elements. In addition to a visual perspective on an element of reality, a perspective may thus involve an affective orientation to a situation (Hobson, 1995; Vygotsky, 1934/1987), a situated motivation to act, and so on. What is critical to the establishment of dialogue is firstly that these perspectives are semiotically manifested, and secondly that more than one such perspective can be represented at the same time.

A third point to make about the interplay of perspectives in internal dialogue is that they preserve the triadic intentional relations (Barresi & Moore, 1996) of perspectives in external dialogue. That is, they bear relations to each other as well as to the element of reality to which they are directed (Ferryhough, 2004a). These triadic intentional relations are depicted in Figure 1 (similar depictions are found in Hobson, 1993, and Tomasello, 1999). Each agent has a perspective on (a) the 'object', or element of reality being jointly attended to (the thick lines in the diagram); and (b) the other agent's perspective on the object (thin lines). As in external dialogue, the element of reality in question may or may not be physically present. Instead of the Aristotelian logical relations of identity/non-identity, the relations that obtain between

perspectives are the dialogic relations of agreement/disagreement (Hermans & Kempen, 1995). In external dialogue, two or more linguistic agents typically share information, collaborate, argue, and so on, from distinct perspectives on reality. Even *agreement*, in dialogue, implies that the agents concerned occupy different positions in the world (Hermans, 1996; Hermans & Kempen, 1993). This *difference* in perspective is criterial for our describing an exchange as dialogue. As I shall argue below, the origins of internal dialogue in social exchanges with sensitive caregivers (particularly early triadic interactions centered around objects) ensures that thinkers are constantly open to the differing perspectives on reality offered by their interlocutors. Indeed, an implication of the DT framework is that the individual's cognition is fundamentally structured, through experience of social interaction, to expect such alternative perspectives.

A final point about the dialogic interplay of perspectives concerns the extent to which it follows the temporal patterning of external dialogue. Vygotsky (1934/1987) argued that the reconstruction of external dialogue on the internal plane involved important structural and semantic changes. For example, the development of inner speech is characterized as a continuous process of abbreviation, whereby 'given' information is omitted and only 'new' information included (Wertsch, 1979). Likening inner speech to cases of external dialogue where well-established shared assumptions between the interlocutors mean that only minimal overt speech is needed, Vygotsky argued that the reduction of the "phonetic aspect" of inner speech ensures that it is "carried out almost without words" (1934/1987, p. 275). One implication of this extensive abbreviation of inner speech is that mental dialogue develops away from the 'give-and-take' patterning of external dialogue, to a situation where multiple perspectives are represented at the same time. It is this *simultaneous* accommodation of multiple perspectives that makes the concept of internal dialogue particularly useful in accounting for the developmental evidence (Ferryhough, 1996; 2004b).

To summarize, the DT framework entails construing the higher mental functions as involving a simultaneity of multiple perspectives on reality, represented in systematically interpretable sign systems such as natural language. These multiple perspectives preserve the triadic intentional relations of interpersonal dialogue, and are routinely and flexibly co-ordinated in an open-ended and self-regulating manner.

Ontogenetically speaking, the DT framework holds that inner dialogue develops through the internalization of semiotically mediated exchanges between individuals, following a developmental trajectory from social speech, through the intermediary stage of private speech, and ultimately to fully covert inner speech (or verbal thought). This process of internalization is accompanied by processes of semantic and syntactic abbreviation, one result of which is the discarding of the linguistic ‘packaging’ of the perspectives involved, so that utterances in inner dialogue become less fully articulated in language. A second result is the abbreviation of the give-and-take structure of external dialogue, so that multiple perspectives are manifested simultaneously rather than in an alternating, temporally unfolding form (Fernyhough, 1996; 2004b). Evidence for the syntactic abbreviation of children’s private speech has been provided by a number of studies (Feigenbaum, 1992; Wertsch, 1979; Winsler et al., 2003), suggesting support for Vygotsky’s account of the development of children’s overt and partially internalized speech-for-self.

The following example illustrates some of these processes in action. This transcript was taken from a three-and-a-half-year-old child solving a jigsaw puzzle (representing a lorry with different colored blocks of ‘cargo’) in the presence of her mother (Fernyhough, 1994; C=child, M=mother; C’s utterances in bold type).

- C: (*Looks at model, places purple piece at correct location.*) **That goes there, does it?** (*Sees other purple piece already placed incorrectly.*) **Ah...** (*Looks at model.*) **That shouldn't go there, should it? Who put that there? Not me.** (*Removes incorrectly placed purple piece.*)
- C: (*looking at model*) **Help... where's the orange bit?** (*Points to model. Finds orange piece.*) **There.** (*Places orange piece at correct location.*) **Goes... in the corner.**
- C: (*Points to a gap where a cargo piece should go.*) **What goes there, then, Mummy?** (*Looks at model.*)
- C: **White!** M: You tell me. (*simultaneously*)

The dialogic nature of the child's speech is clearly apparent in this extract. At several places the child appears to be asking questions of herself and then answering them. For example, in making the utterance "That shouldn't go there, should it?", the child adopts an alternative, adult perspective on the task and represents it for herself in overt speech while a response can be generated. In internalizing this dialogue, the child is consequently internalizing the adult's perspective on this element of the task^{iv}. In addition, the child's dialogue with herself is abbreviated relative to what would be expected in full external dialogue. From a Vygotskian viewpoint, the self-generated dialogue recorded here represents an intermediate step along the path of the internalization of external dialogue, during which children's dialogue with themselves becomes both more abbreviated and more covert. This process of abbreviation is further evidenced in a transition from *expanded* to *condensed* inner dialogue (Ferryhough, 2004b), in the course of which the external-linguistic origin of the dialogue becomes progressively more obscure.

This developmental scheme is represented in Figure 2. As in Figure 1, thick lines represent each agent's perspective on the object, while thin lines represent each agent's perspective on the other's perspective. At Level 1 (*external dialogue*), overt dialogue between children and caregivers displays the characteristic give-and-take structure of conversation. At Level 2 (*private speech*), children begin to conduct these dialogues in their own overt (and then gradually subvocalised) speech-for-self. At this stage, the interlocutor's contribution (P2 in the diagram) is generated by the child (as, for example, in the above transcript, where the child both generates the question and answers it herself). At Level 3 (*expanded inner dialogue*), the give-and-take structure of external dialogue is manifested internally as a process of talking silently to oneself. At Level 4 (*condensed inner dialogue*), the syntactic and semantic abbreviation of external dialogue is complete, and inner speech becomes a dialogic interplay between alternative perspectives which bears little structural or acoustic relation to the external dialogue from which it was derived. It is at this final stage that verbal thought becomes the act of "thinking in pure meanings" described by Vygotsky (1934/1987, p. 280).

It is important to note that this scheme is not intended to represent a one-way trajectory of development. Rather, it allows for movement between the four levels as processing demands change. For example, demanding cognitive conditions may result in a transition from Level 4 (condensed) inner speech to Level 3 (expanded) inner speech, or even to Level 2 (private) speech (Ferryhough, 2004b). This is consistent with the evidence from introspection that we experience a more explicit inner dialogue when a task is challenging (representing the Level 4 → Level 3 transition). Under very demanding conditions, we may even speak to ourselves out loud (Level 4 → Level 2), an observation that is also consistent with the evidence that children's (Behrend et al., 1989; Winsler & Diaz, 1995) and adults' (Duncan & Cheyne, 2001) private speech increases under cognitively challenging conditions. There appears to be a cognitive pay-off in reinstating

the linguistic packaging of inner dialogue and holding it in phonological memory, or ‘farming it out’ to the speech articulation system for overt performance (Clark, 1998; 2006; Dennett, 1997).

Explaining Typical SU Development

I now turn to considering what the DT framework can offer for our understanding of SU development. In this section, I suggest that an appreciation of the developing dialogicality of children’s thinking can fill two gaps in our current understanding. Firstly, it can help us to understand how experience of mediated social exchanges can build upon existing social-cognitive competences in effecting a transition from intentional-agent to mental-agent understanding. Secondly, the DT framework, with its emphasis on semiotic mediation, makes possible an interfunctional^v account of SU development which can make sense of the overwhelming evidence for a linguistic (or more general mediational) component in SU.

From Intentional-Agent to Mental-Agent Understanding

Any satisfactory account of SU development must be able to show how children’s broadening opportunities for social interaction build upon and are constrained by their existing social-cognitive capacities. One challenge is to determine which innate or early-developing social-cognitive capacities underlie children’s later SU development. Another is to specify which kinds of social experience are relevant. Much progress has been made in recent years in delineating the social-cognitive skills that infants bring to their earliest social interactions. Although there has been considerable debate about the timetable of infants’ developing understanding of others, there is an emerging consensus that infants entering the second year of life have a conception of the caregiver as an *intentional agent*: that is, as an actor with intentional relations to reality. Tomasello et al. (2005) describe a developmental scheme whereby infants progress from an understanding of other people as animate agents (6–9 months), through an understanding of the pursuit of goals (9–12 months), to an understanding of how actors are able

to choose rationally between different goal-directed action plans (12–14 months). Each milestone in social-cognitive competence makes possible a new advance in the sophistication of the infant's social exchanges. At around 6 months, infants can interact directly with another animate agent in dyadic interactions that involve sharing behavior and emotions. Towards the end of the first year, infants can share triadic goal-directed interactions with a social partner. At some time around 14 months, infants can cognitively represent the shared goals and action plans of the dyad. This fully-fledged intentional-agent understanding, coupled with the species-specific motivation to share intentions with others, forms the basis for children to engage in shared intentionality, or “collaborative actions in which participants have a shared goal (shared commitment) and coordinated action roles for pursuing that shared goal” (Tomasello et al., 2005, p. 680).

While both richer (Vaish & Woodward, 2005) and leaner (Moore & Corkum, 1994) interpretations of the data on infants' understanding of intentionality are possible, a full evaluation of this debate is beyond the scope of the present article. Rather, my focus will be on how intentional-agent understanding^{vi} is converted into richer forms of SU. My arguments will draw on Tomasello et al.'s (1993) distinction between three levels at which a thinker can hold a conception of a person. In this view, the social-cognitive capacities typically investigated in SU research are a relatively late developmental achievement. It is not until around age 4 (the age at which children typically begin to succeed on standard false-belief tasks; Wellman, Cross, & Watson, 2001) that children treat others as *mental agents*, or as actors who hold representations of reality that may differ from their own. The third level of development is attained around age 6, when children come to conceive of others as *reflective agents*, understanding them as actors capable of holding representations of their own representations of reality.

The contribution that the DT model can make in this respect is in providing a link between intentional-agent and mental-agent understanding. Currently Tomasello et al.'s account has little to say about the transition between these two levels of social-cognitive competence, not least because they regard intentional-agent understanding to be the pre-eminent developmental accomplishment from which the most important species-specific forms of cognition flow. There are reasons for doubting this claim, however. Firstly, Tomasello et al.'s account appears to attribute considerable cognitive sophistication to 14-month-old infants, while leaving open the question of what remains for subsequent development to do in building upon these early social-cognitive achievements (Fernyhough, 2005). Secondly, Tomasello et al. remain uncommitted to any possible role for language in the developing capacity to operate with dialogic cognitive representations. Thirdly, although Tomasello et al. appeal to a Vygotskian notion of internalization in accounting for the construction of these representations, they admit that they have no cognitive-developmental account of this process.

It is here that the DT model of SU development can be useful. On this account, the transition between intentional-agent and mental-agent understanding is not a direct trajectory involving the gradual modification of underlying abstract epistemic structures (Nelson, 2005). Rather, the link is indirect, and is mediated by language and other semiotic systems. The key to understanding the link between these two forms of understanding can be found in the social-cognitive consequences of the ability to operate with internal dialogues. In internalizing dialogue, and thus the semiotically mediated perspectives of their interlocutors, children's thinking becomes permeated by a rich array of different perspectives (Fernyhough, 1996; 2004a). To put it another way, engaging in an internal dialogue with a virtual other involves taking on the perspective of that other. This adoption of the other's perspective does not, in the early stages of internalization, involve any reflective awareness of the multiplicity of perspectives that make up

internal dialogue (see Note 4). Just as young children are able, for example, to adopt a role in sociodramatic pretence before they have any explicit metacognitive understanding of their role-taking (Perner, 1991), so too are children able to adopt the perspectives of others through fully or partially internalized dialogue before they attain a complete folk-psychological understanding of mind. For example, in the jigsaw puzzle example given above, the child is able to adopt perspectives previously held by the adult without necessarily showing any metacognitive or metalinguistic awareness that this is happening. Rather than seeing internal dialogue as being dependent upon the pre-existence of a fully-fledged representational theory-of-mind, the DT model holds that any such folk-psychological competence is a relatively late-developing outcome of, *inter alia*, the internalization of dialogue.

The DT model may therefore explain how children are able to operate with other perspectives in the absence of any folk-theoretical understanding of how mental states determine behavior. Another way of looking at this is to consider the role played by representations of mental representations in the DT model, as compared to alternative theories. Theory-theory accounts of SU development (e.g., Perner, 1991) typically require that, at some point in the developmental process, children acquire the capacity to represent the mental states of others and use such representations to predict and explain behavior. As several authors have pointed out (e.g., Carpendale & Lewis, 2004; Nelson, 1996), some such accounts make considerable cognitive sophistication (the ability to reason with metarepresentations) a prerequisite of important developments in SU, as well as paying insufficient attention to the gradual, socially-embedded nature of SU development. In contrast, the DT model would see representations of mental states as relatively late-occurring products of SU development. The only sense in which young mind-readers are required to *represent* the mental states of others is the extent to which

dialogic, mediated social exchanges already represent the different perspectives of the participating agents.

A second point is that external and internal dialogue involves a simultaneous multiplicity of different perspectives. Success on many theory-of-mind tasks requires more than simply the ability to represent another epistemic subject's mental representation of a state of affairs; it entails the further requirement that this alternative perspective on reality be represented alongside the participant's own perspective. Consider, for example, the unexpected-transfer task described by Wimmer and Perner (1983). In the most common version of this task, a child sees a protagonist's desired object moved from one location (say, a blue box) to another (say, a red box) in the protagonist's absence. Success on such a task (i.e., correctly predicting where the protagonist will look for his or her object) requires more than a simple overwriting of the child's own perspective ('the object is in the red box') with that of the naïve protagonist ('the object is in the blue box'). Rather, it requires that the child be able to hold both the naïve and informed perspectives about the state of affairs at the same time (Ferryhough, 1996; 2004a).

This need to account for the simultaneous accommodation of different perspectives presents a challenge to those theory-theoretical accounts which trace the understanding of perspectival difference to specific high-level cognitive capacities. In Perner's (1991) theory, for example, the relatively sophisticated function of metarepresentation is invoked to explain how children are able to compare two representations of the world. Other theory-theoretical accounts, such as that of Bartsch and Wellman (1995), address evidence that the understanding of perspectival difference is evidenced some time before children achieve success on formal tests of theory-of-mind reasoning. Bartsch and Wellman's analysis of children's use of contrastives (Shatz, Wellman, & Silber, 1983) demonstrates that young children can represent perspectival difference in their own speech before they would be expected to pass false-belief tasks.

Contrastives can be construed as elements of speech which incorporate different possible perspectives on reality, such as the difference between an epistemic state and reality, or between two individuals' differing thoughts about the world. For example, Bartsch and Wellman report three-year-old Adam's utterance, "It's a bus; I thought a taxi." (p. 206). In subsequent work (Wellman & Liu, 2004), meta-analytical data have been combined with findings from a new task battery to show that children's understanding of diverse beliefs precedes their understanding of false belief. Such evidence is consistent with the idea that children become able to represent perspectival difference (in dialogic private speech and inner dialogue) before they acquire the conceptual understanding of mind proposed by theory-theorists to be necessary to represent false beliefs. Bartsch and Wellman's careful analysis of contrastives involving mental-state terms has yet to be replicated for utterances that represent perspectival difference without any explicit reference to mental states, such as the private speech illustrated in the jigsaw example above. Until such research can be conducted, it is worth noting that contrastives were relatively uncommon in Bartsch and Wellman's (1995) database, raising the possibility that they will be outnumbered by utterances in which children represent different perspectives without explicit reference to mental states. The DT model would hold that such multi-perspectival utterances will represent a natural outcome of the internalization of perspectives proposed to result from the internalization of dialogue.

The DT model thus gains support from evidence that young children use language to represent different simultaneously-held perspectives on reality. A similar emphasis on simultaneity is present in Gordon and Olson's (1998) argument that mentalizing performance is likely to be limited by children's ability to update information that they are already holding in mind. One way of offsetting the cognitive challenges involved is to assign different representations to different social agents (Meins & Fernyhough, 2007). In terms of the DT model,

this capacity is underpinned by children's ability, in inner dialogue, to assign different representations to different virtual interlocutors, and thus simultaneously hold multiple perspectives in mind. In the case of the behavior-prediction unexpected transfer task mentioned above, this might occur through the child's conducting an abbreviated inner dialogue in which the perspectives of both protagonists ('the object is in the red box' and 'the object is in the blue box') are manifested simultaneously. Note that such a situation would not require the child to *represent* the beliefs (here, perspectives) of the protagonists, beyond the extent to which they are already represented in the internal, condensed dialogue. When it comes to predicting the behavior of the naïve protagonist, the child will have a representation of the relevant perspective on the basis of which to compute a predicted response, without any necessary conceptual understanding of that perspective as a belief. Children's justifications of their own responses on the task might involve conceptual mental-state language, but this would not be a necessary corollary of success on this task.

Several implications follow from this view of children's behavior on the unexpected transfer task. Firstly, it remains an open empirical question whether children employ private or inner speech while engaged in this task. As far as private speech is concerned, it is worth noting that overt private dialogues might be relatively uncommon in such instances, if internalization is already established (as Vygotsky's theory would predict) by this age. Further, there are several reasons why classic false-belief tasks might not be ideal contexts for eliciting private speech, such as that they do not encourage children to adopt a protracted reasoning process in producing an answer (Carpendale, Lewis, Susswein, & Lunn, in press). An alternative might be that children conduct private dialogues in condensed or expanded inner speech, the empirical study of which can of necessity only be indirect. One possibility would be to employ a dual-task paradigm to assess whether interference with children's phonological processing (for example, through

articulatory suppression) compromises their SU task performance. Future studies might also investigate the relative contribution of dialogic SU to children's developing mastery of the hierarchy of tasks described by Wellman and Liu (2004). It may be that internal dialogue is sufficient for success on those tasks at the lower and middle stages of the hierarchy (such as those requiring an understanding of knowledge access and explicit false belief), while additional conceptual SU is necessary for those tasks higher up in the hierarchy (such as that requiring an integration of information about belief and emotion). A further possibility for future research is to investigate manipulations to classic false-belief tasks in which children are directly invited to use dialogic reasoning, either through presenting the task materials in the form of a dialogue, or by providing a dialogic context within which children can make their responses. If the DT model is accurate, such manipulations would be expected to produce success on false-belief tasks at earlier ages than would be observed on the tasks' formally identical classic equivalents.

On the present model, success on typical theory-of-mind tasks involves not so much the alteration of a body of conceptual knowledge as the development of an ability to accommodate multiple perspectives simultaneously in predicting and explaining behavior. Thanks to their experience of social situations in which alternative perspectives on reality are readily offered (Fernyhough, 1997; see below for further discussion of caregiver input in this respect), children already have the 'open slot' (the ability to accommodate the alternative perspective of an interlocutor) necessary for engaging in internal dialogue before they begin to demonstrate formal theory-of-mind competence. One consequence of this is that children will show early SU competence in naturalistic contexts, such as has been observed to occur some time before children are successful on formal tests of false-belief understanding (Carpendale & Lewis, 2004; Lewis, 1993; Tomasello et al., 1993). For example, Wellman and Liu (2004) showed that an understanding of the diversity of desires precedes an equivalent understanding for beliefs,

allowing children to be successful on tasks such as judging that another person will desire an object that does not match one's own desire (see also Wellman, 1990). From the perspective of the DT framework, this kind of SU is not dependent upon a formal, folk-psychological theory of mind, but rather on the fact that children's early interpersonal experience ensures that, even in toddlerhood, they are open to the alternative perspectives of their social partners.

The DT model thus outlines how gradually more sophisticated levels of SU can emerge through the interactions made possible by more primitive forms of understanding. Specifically, the engagement in interpersonal exchanges necessary for the internalization of dialogue is dependent upon the child attaining intentional-agent, though not necessarily mental-agent, understanding. Furthermore, the principle of naïve participation is as relevant here as it is in the area of language acquisition (Nelson, 2004). That is, infants are able to participate in interpersonal dialogic exchanges long before they demonstrate any conceptual understanding of other minds (Hobson, 1993; Rochat, 2001; Trevarthen, 1980). This evidence suggests that opportunities for the internalization of dialogue, which Vygotsky considered to begin very early in development, exist during the prelinguistic gestural dialogues of infancy, and continue through early verbal exchanges. This explains how there can be very early, pre-theoretical SU which stems directly from the child's engagement in patterned interpersonal exchanges in which alternative perspectives on reality are routinely and readily offered. The specific types of social experience which might be relevant here are considered in the next section.

The Role of Semiotic Mediation

The acquisition of language in the second year of life transforms the child's opportunities for social interaction. One consequence of language acquisition is that infants begin to engage in linguistic dialogues with caregivers and other social partners, and thus begin the process of internalization of these dialogues into overt self-directed (private) and ultimately inner speech

(Vygotsky, 1934/1987). As described in the previous section, the DT model holds that the emergence of dialogic forms of thought, within which different semiotically manifested perspectives can be represented simultaneously, forms the basis of the individual's ability to operate with the perspectives of others.

The suggestion that language has a critical role to play in SU development is not a new one. Astington and Baird (2005b) categorize previous attempts to understand the role of language in SU development as involving conversational pragmatics (exposure to the differing perspectives of social partners; e.g., Harris, 1999; Lohmann & Tomasello, 2003), lexical semantics (learning the correct usage of mental state terms; e.g., Peterson & Siegal, 2000), and complementation syntax (acquiring, through language acquisition, a grasp of the syntactic structures necessary to use mental-state language to attribute differing perspectives to others; e.g., de Villiers & de Villiers, 2000). Each of these theoretical alternatives makes different predictions about what kinds of language input will be important, and in which kinds of social interaction these forms of input might be expected to be embedded. In this section, I examine the predictions made in this respect by some prominent examples of each of these approaches, and compare them with those made by the DT model.

What Astington and Baird (2005b) term the conversational pragmatics approach has been pioneered by Harris (1996; 1999; 2005; see also Tomasello, 1999). In Harris' discourse-based model, any interactions which expose children to alternative perspectives on reality will be expected to lead to improvement on theory-of-mind tasks. In contrast, syntax-based accounts (e.g., de Villiers & de Villiers, 2000) would predict that only language input which enhances children's understanding of complement-taking verbs (such as *think*) will lead to improvements in SU. Harris's proposals gain support from training studies which have attempted to determine the importance of language that presents evidence for perspectival difference. For example,

Lohmann and Tomasello's (2003) findings suggest that exposure to perspective-shifting discourse (requiring children to adopt alternative, linguistically-represented perspectives on the same element of reality) and sentential complement syntax make independent contributions to improvements in theory-of-mind reasoning. Particularly important forms of discourse in this respect are disagreements about the truth of a proposition, adults' misinterpretations of children's utterances, and adults' clarification requests. These serve to draw children's attention to the fact that adult interlocutors' perspectives on the world do not necessarily coincide with their own. Lohmann, Tomasello, and Meyer (2005) suggest that the form of discourse that is most powerful in conveying these lessons is reflective discourse which involves adult and child commenting on ideas previously expressed in the exchange. In terms of the DT model, all of these forms of perspective-shifting discourse exemplify the simultaneous multiplicity of perspectives that defines dialogue. Furthermore, they do not necessarily entail specific reference to mental states, meaning that the kinds of discourse contexts that are likely to lead to progress in SU development are not limited to those in which the psychological world is the focus of attention.

In his evaluation of this and related studies, Harris (2005) suggests that "discourse that emphasizes different points of view with regard to the same event or object is sufficient to lead to an improvement in children's performance on standard theory-of-mind tasks" (p. 76). In contrast, he interprets the evidence from training and other studies as meaning that the mastery of complement structures is of only limited importance in SU development. For example, in Hale and Tager-Flusberg's (2003) training study, improvements in theory-of-mind performance following training with perspective-shifting discourse could not be attributed to increased mastery of complement structures. Harris admits, however, that the growing evidence for the importance of perspective-shifting discourse is difficult to explain in terms of existing theoretical alternatives. In particular, it is unclear how exposure to different perspectives (without reference

to mental states) can promote the reorganization of existing conceptual knowledge about the mind (as theory-theoretical accounts might expect) or else enhance children's ability to project themselves imaginatively into other people's subjective states (as simulation theories might require).

The DT model provides a potential solution to this conundrum. The internalization of dialogue leads to a fundamental restructuring of children's cognition which allows multiple perspectives to be represented simultaneously. As the earlier discussion about the relation between perspectives and beliefs suggests, these different points of view on reality do not need to be couched as epistemic states. For example, consider the following exchange of alternative perspectives, in which a child says "It's raining," followed by the caregiver's response, "The sun seems to be breaking through." On Harris' discourse-based model, this kind of exposure to alternative points of view (corresponding to, for example, the Discourse Only training condition in Lohmann and Tomasello's [2003] study) should lead to improvements in theory-of-mind performance. Not only is there no explicit reference to epistemic states in this exchange, there is also no necessity for each perspective to have, for each respective interlocutor, the status of an epistemic state. Since perspectives are not necessarily beliefs (see above), there is no need for the interlocutors to be committed to the truth of their propositions. Dialogue represents alternative perspectives while giving no direct information about epistemic states, in part because, as argued earlier, perspectives do not have to correspond to epistemic states.

Lohmann et al. (2005) take a slightly different view of the studies reviewed by Harris (2005). They suggest that evidence for the efficacy of perspective-shifting discourse can be accommodated alongside findings about the value of training in propositional attitude constructions (which merely represent grammaticized versions of the looser discourse structures represented in perspective-shifting discourse). Despite the common ground between Lohmann et

al.'s discourse-based account and the DT model, important distinctions remain. Crucially, Lohmann et al. offer no cognitive-developmental account of how exposure to perspective-shifting discourse has its developmental effects, nor do they offer any analysis of what 'perspective' means in this respect. They mention Vygotskian internalization as a possible way in which children "begin to develop concepts and social-cognitive skills" (p. 249) but take no position on the importance of semiotic mediation and other processes in this developmental story. Rather, they seem to endorse a theory-theoretical account of SU development, in which children, through exposure to perspective-shifting discourse, are able to relate different, linguistically-manifested perspectives to their own beliefs about the world. Theirs is therefore essentially an individualistic account which sees SU development as involving a growing body of knowledge about the social world.

Discourse-based models thus draw attention to the question of whether what matters for SU development is specifically exposure to perspectives on reality couched in terms of mental states, or exposure to any perspective-shifting discourse (not necessarily involving mental-state references). A second class of theories, those concerned with lexical semantics, have argued for the primacy of exposure to language involving explicit references to mental states. In their account of how SU is constructed in the context of interactions within the epistemic triangle, Carpendale and Lewis (2004) argue for the importance of communicative exchanges in which children learn to talk about the psychological world by reflecting on their own and others' activity. For example, exposure to discourse involving mental-state terms is held to be crucial for learning the criteria for correct application of these terms. Although Carpendale and Lewis explicitly reject a theory-theoretical account of SU development, their account nevertheless entails that it is only talk in which beliefs, desires, intentions, and so on are the focus of attention that should help children in learning to talk about the psychological world. While Carpendale and

Lewis can account for the evidence for social-environmental influences on SU development in terms of the extent to which the child's relationships are 'cooperative' (Piaget, 1932/1965), they must still maintain that the relevant exchanges within such relationships be focused on the psychological world. In contrast, the DT model and other discourse-based approaches would hold that any dialogic exchanges, not only those that are about psychological processes, can enhance SU development. What matters is that the child is exposed to different perspectives; it is not important that these should involve talk about beliefs, desires, and intentions.

Some recent empirical findings are relevant here. Peskin and Astington (2004) obtained pre- and post-training measures of theory-of-mind performance for 4-year-olds in two conditions, one in which children were read picture books modified to include high frequencies of metacognitive language, and one in which the same pictures implicitly required participants to think about alternative perspectives, while not being accompanied by any explicit metacognitive language. Children in the second group (no metacognitive language exposure) scored more highly on a battery of false-belief tasks than those in the first group (who had been exposed to metacognitive terms). Peskin and Astington concluded that exposure to explicit metacognitive language may be less important in theory-of-mind development than experience of situations where one is required actively to construct mentalistic interpretations of behavior. Such an interpretation is consistent with the view that it is language (specifically dialogue) that *represents* the content of differing mental states, rather than being *about* those mental states (in any theoretical or metacognitive sense), that is of primary importance in SU development.

That is not to say that conversations explicitly focused on mental states can play no role in children's developing SU. Firstly, talk involving mental states, such as the conversations involving contrastives described by Bartsch and Wellman (1995), will frequently involve the exchange of alternative perspectives argued to be important for SU. Secondly, to the extent that

children eventually develop a folk-psychological theory of mind, talk about specific theory-theoretical concepts such as beliefs and desires will undoubtedly be important in acquiring those concepts. Thirdly, the evidence for children's early use of such terms (e.g., Shatz et al., 1983) suggests that such linguistic expressions might have some value in reifying others' unobservable mental states, without necessarily forming part of any theory-theoretical system^{vii}.

All of these potential benefits of exposure to mental state language should be considered secondary to the developmental implications of the internalization of dialogue. Other implications of the DT model which distinguish it from alternative discourse-based models, particularly relating to the importance of semiotic mediation, are considered in the next section. I conclude this section by returning to the issue with which it began, namely how to explain the transition from intentional-agent to mental-agent understanding. The developmental pathways through which this transition is proposed to be effected are represented in Figure 3. Two caveats need to be made in relation to this figure: firstly, it is intended to show general developmental patterns rather than specific causal pathways, and secondly, it incorporates ideas from a variety of theoretical accounts, not all of which share the Vygotskian perspective outlined here. Items in the middle column of the figure represent the levels of social-cognitive competence attained at different ages, while items in the right-hand column depict the changing interactional experiences with which individuals are involved from birth. Thick arrows represent primary developmental pathways; thin arrows represent secondary pathways. One purpose of this diagram is to illustrate how the development of social-cognitive competence is constrained by and in turn constrains the types of social experience individuals can enjoy (Tomasello et al., 1993). In addition, the diagram demonstrates how caregivers' ability or willingness to construct such interactions can have profound implications for children's developing SU.

These roles of caregivers and other social partners take two main forms. Throughout infancy and the preschool years, caregivers are frequently observed to construct gesturally and linguistically mediated dialogues with their children in which the intentional stance is taken (Ferryhough, 1996, 2004a; Garfield et al., 2001). Specifically, they have a role in offering alternative perspectives on reality in such a way that they can be readily assimilated, such as, for example, in their early triadic interactions centred around objects (Hobson, 1993), their verbal scaffolding of children's performance on complex cognitive tasks (Wood, Bruner, & Ross, 1976), or their pitching of tutoring interventions within the zone of proximal development (Meins, 1997). For example, Meins (1997) describes how a mother rated as sensitive in her tutoring strategies goes to some lengths to provide alternative perspectives on a collaborative box-construction task (particularly suggesting turning over pieces that did not previously fit) that are tailored to the child's current level of functioning. Children's experience of reciprocal exchanges with caregivers in which alternative perspectives are routinely offered, coupled with the fact that they have internalized this mediated activity, ensures that individuals' thought remains constantly open to the alternative perspectives provided by a real or virtual interlocutor.

During the period that follows the emergence of intentional-agent understanding, language input from caregivers has an important secondary role in scaffolding the acquisition of folk-psychological mental state terms and concepts (Meins et al., 2002; Carpendale & Lewis, 2004). As discussed in the next section, individual differences in caregivers' ability or willingness to structure children's social input will be reflected in individual differences in children's attainment of milestones in SU. In this scheme, the construction of a theory-theoretical understanding of mind is both a relatively late achievement, and one which is developmentally dependent upon the child's internalization of the alternative perspectives encountered in early interpersonal exchanges.

An obvious objection here is that the DT model places too much emphasis on natural-language competence, and would thus exclude prelinguistic typically developing infants, and children with sensory impairments (e.g., deafness) and developmental disorders (e.g., developmental dysphasia). The DT model avoids this charge by making explicit that any systematically interpretable system of signs can form the basis of internalized dialogue. It would thus incorporate both sign languages and prelinguistic gestures such as pointing, both of which have been shown to be internalized in a Vygotskian fashion (Delgado & Montero, 2005; Goldin-Meadow, 1999). In the next section, I consider how this model can help to explain individual differences in SU relating to different social experiences. In the final section, I consider how limitations in the child's experience of interpersonal dialogue, such as might stem from sensory impairment or developmental disorders, will have consequences for the child's developing SU.

Explaining Individual Differences in SU Development

Since the groundbreaking studies of Dunn and colleagues (e.g., Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991), an impressive body of work has grown up relating individual differences in SU to specific social-environmental influences (see Carpendale & Lewis, 2006, and Hughes & Leekam, 2004, for reviews). Dunn et al. (1991) found that children's theory-of-mind performance at 40 months was predicted by their exposure, seven months earlier, to causal talk about mental states and by mothers' attempts to control the behavior of siblings. In explaining these and related findings, Dunn (1994) argued that certain types of family-based social interaction are important for SU development because of the opportunities they provide for learning about others' differing orientations to reality. As Carpendale and Lewis (2006) point out, this and other important studies nevertheless fall short of explaining precisely which aspects of interaction with siblings and other family members are most valuable in promoting SU development.

In this section, I focus on predictions made by the DT model with respect to three particular issues. Firstly, I consider what kinds of interaction are likely to have the greatest influence on children's developing SU, and when in development those effects might be most likely to occur. Secondly, I examine the DT model's predictions about how SU development relates to the emergence of semiotic mediation in other cognitive domains. Thirdly, I consider predictions following from the DT model in relation to issues around culture and enculturation.

Quality and Timing of Social Input

The developmental scheme outlined above makes several predictions about what kinds of social experience should relate to children's developing SU. One factor that may contribute to caregivers' ability to construct effective dialogues with their children is their willingness to adopt the intentional stance in interactions with their children, or their mind-mindedness (Meins, 1997; Meins, Fernyhough, Russell, & Clark-Carter, 1998; Meins et al., 2002; 2003). In a series of longitudinal studies, Meins and colleagues have found maternal mind-mindedness (operationalized in terms of mothers' appropriate linguistic references to their infants' internal states) to be a stronger predictor of children's later theory-of-mind performance than other key social-interactional variables such as security of attachment and maternal sensitivity (Meins et al., 2002). It still remains to be determined how mind-mindedness relates to the quality of dialogues between infant and caregiver, although its proven value in predicting attachment security (Lundy, 2003; Meins et al., 2001) suggest that it represents "one facet of a broader attunement between mother and infant" (Meins, 2004, p. 116).

In the developmental scheme outlined in Figure 3, children's social partners have a part to play at two main stages: the initial construction of triadic interactions and subsequent linguistic dialogic exchanges (from birth to around age 2), and the construction of conversations about mental states (from age 2 onwards). Mind-minded caregivers will be influential at both stages in

presenting alternative perspectives on reality in such a way that they can be readily internalized. For example, discourse that involves scaffolding has been shown to encourage the internalization of self-regulatory dialogues, evidenced as private speech (Winsler, Diaz, & Montero, 1997). Meins et al.'s (1998) findings from a complex box-construction tutoring task showed that mothers' sensitivity in scaffolding their children's performance (defined as their willingness to adjust the specificity of their tutoring interventions in response to child feedback) was positively correlated (with a non-significant medium effect size) with their mind-mindedness in an interview requiring them to describe their children. If these preliminary findings are confirmed by future studies, it will additionally be important to determine which point of caregiver input is most critical for the child's developing SU. In their longitudinal study, Meins et al. (2003) presented evidence that it was early, rather than later, mind-mindedness that was most important in fostering the development of SU. In contrast, those theories that have emphasized caregivers' roles in encouraging conversations specifically about the psychological world (e.g., Carpendale & Lewis, 2004; Symons, 2004), as opposed to constructing dialogues in general, would seem to entail the prediction that later, rather than earlier, caregiver input would be of most importance.

In summary, more research is needed to determine: 1) the kinds of social interaction that are important for SU development, 2) how these relate to other social-environmental variables that have been postulated to play a role, 3) how any influence of caregivers in promoting the internalization of dialogue translates into objective indices of internalization such as private speech, and 4) at what points in development these influences have their greatest effects. A focus on children's involvement in dialogues with caregivers and other social partners may help to direct research in this area, and to remedy the fact that existing relational theories of SU development give few details about the kinds of caregiver intervention that are most likely to facilitate SU construction (Meins, 2004).

SU Development and the Shift to Verbal Mediation

The DT model's linking of SU development to the internalization of dialogue distinguishes it from neoPiagetian accounts which postulate no specific role for language or other semiotic systems in SU reasoning. For example, Carpendale and Lewis (2004; 2006) claim an important role for language in the construction of conversations in which children develop "the ability to talk about the psychological world" (2006, p. 239), without aligning themselves to a Vygotskian view of mediation (Fernyhough, 2004a). Similarly, Lohmann et al.'s (2005) discourse-based account envisages no role for semiotic mediation. On their account, language is seen as a source of information about the social world, but it is not suggested that it plays any constitutive role in reasoning about social processes. Indeed, such a role for language is explicitly rejected in Tomasello et al.'s (2005) related account. Empirically speaking, this leads to one important point of divergence between the DT model and the theories of Carpendale and Lewis (2004) and Lohmann et al. (2005). Specifically, the DT model would entail that SU is developmentally linked with the emergence of semiotic mediation in other cognitive domains. For example, it would predict that SU development will proceed in parallel with the emergence and subsequent internalization of self-regulatory private speech, which, according to Vygotsky, provides a window onto the development of verbal mediation of thought and behavior.

In order to understand how the interfunctional (Vygotsky, 1934/1987; see Note 5) relations between SU and private speech might unfold over the preschool and early school years, it is useful to consider Vygotsky's claims about the developmental course of verbal self-regulation. In this analysis, private speech follows a quadratic developmental trajectory through early and middle childhood, emerging in the preschool years and subsequently 'going underground' (Vygotsky, 1934/1987) to form inner speech (or verbal thought). Evidence for this curvilinear relationship has been provided by several studies (e.g., Kohlberg, Yaeger, &

Hjertholm, 1968; Winsler & Naglieri, 2003). One would therefore predict that correlations between private speech and laboratory assessments of SU will differ according to whether children are observed during the waxing or waning phases of private speech. Specifically, such correlations should be positive during the phase in which private speech is emergent, and should then turn negative in the period during which private speech is becoming more covert, as children who are further along the road of internalization use less overt self-directed speech.

To test this hypothesis, Fernyhough and Meins (in press) investigated whether self-regulatory private speech and theory-of-mind performance demonstrated changing patterns of association with increasing age. In three separate cross-sectional studies conducted with children of 49, 56, and 71 months, these authors obtained measures of SU through age-appropriate theory-of-mind tasks. Private speech measures were obtained from free-play interactions (49 months) and from problem-solving episodes focused on an executive task (56 and 71 months). Partial correlations, controlling for age and verbal ability, were computed for the relation between self-regulatory private speech and theory-of-mind performance. In accordance with predictions, the sign of the correlation between private speech and theory-of-mind performance changed from positive in the youngest children ($r = .51, p < .05$), to almost zero ($r = -.11, n.s.$) in the middle age-group, to negative in the oldest group ($r = -.48, p < .005$). The authors argued that this pattern is consistent with the assumption that continued use of overt self-regulatory speech in middle childhood reflects a delay in the process of internalization (as, according to Vygotsky, such speech has typically been internalized by this point), and would therefore be expected to be associated with poorer theory-of-mind performance.

Despite certain methodological limitations (such as their cross-sectional design and the heterogeneity of theory-of-mind assessments employed), these authors conclude that self-regulatory private speech might provide a mechanism for the child to build upon existing SU

capacities through the internalization of dialogic exchanges with others. They also point out that further light may be shed on this relation by investigations of the occurrence of mental state language in children's private speech. Furrow, Moore, Davidge, and Chiasson (1992) demonstrated correlations between mothers' and children's use of mental state terms in samples of parent-child talk. To date, the occurrence of such terms in children's self-regulatory private speech has not been investigated. Two points can be made in assessing this research prospect. Firstly, caregivers' general sensitivity to mind is likely to be reflected in behaviors other than mental-state language use (Harris, 2005; Lundy, 2003, Meins et al., 2003). Secondly, the DT model would hold that mind-related utterances should be rarer in children's private speech than utterances that reflect perspectival difference without making any explicit reference to mental states. This is because, as explained in the previous section, the DT model sees explicit mental-state discourse as being of less importance for SU development than dialogues presenting alternative perspectives on reality without reference to mental states.

Despite these complexities and open empirical questions, evidence for a relation between PS and ToM is consistent with the view that the preschool and early school years witness an across-the-board shift towards verbal mediation in a variety of domains. Generally speaking, Vygotsky's claims about the emergence and subsequent internalization of private speech, particularly its relations with social context, task difficulty, and task performance, have been well supported (Berk, 1992; Winsler, 2004). Cross-task and cross-context stability in private speech production has been demonstrated in recent empirical studies (e.g., Winsler et al., 2003). Evidence for a domain-general shift towards verbal mediation has been presented by Al-Namlah, Fernyhough, and Meins (2006), who reported that children's use of self-regulatory private speech accounted for a significant amount of the variance in their use of phonological recoding of visually presented material in a short-term memory task. If theory-of-mind performance and

verbal self-regulation are indeed linked by a domain-general shift towards verbal mediation, it might provide an alternative explanation for the observed links between mentalizing performance and executive functioning in early childhood (e.g., Carlson & Moses, 2001; see Fernyhough, forthcoming, for further discussion). Although there is not yet any direct evidence that developmental associations between these variables are mediated by self-regulatory private speech, strong associations have been found between children's use of such speech on an executive task and their performance on the same task (Al-Namlah et al., 2006; Fernyhough & Fradley, 2005), suggesting that private and inner speech may mediate performance on classic measures of executive functioning.

Culture and Enculturation

Given the emphasis in Vygotsky's writings on situating development within its sociocultural context, it would seem important for any application of his ideas to SU development to consider children's exposure to sociocultural practices which may vary across cultures. If a conceptual folk-psychological understanding is a relatively late addition to forms of SU founded on the internalization of dialogue, one might expect that differences relating to culture-specific traditions for explaining behavior (e.g., Lillard, 1998) might also emerge relatively late. Instead, any early-emerging cultural differences in SU should relate to differences in children's exposure to dialogic social exchanges. Although a thorough evaluation of the model's power to explain cultural differences in SU development lies beyond the scope of this article, one issue that should be addressed is whether the model makes specific predictions for situations where children's social-interactional experiences differ from those pedagogical exchanges, typical to Western cultures, described by Vygotsky. For example, Rogoff, Paradise, Arauz, Correa-Chávez, and Angelillo (2003) note that many non-Western and non-industrialized cultures privilege a form of learning in which children learn through careful observation of others

rather than through dialogic interaction. The DT model would predict that, because SU is not transmitted through instructional contexts, such differences in socialization practices should not translate into cultural differences in SU unless they impact upon children's broader opportunities to engage in interpersonal dialogues. It seems likely that, in many cultures where learning occurs through intent participation, children and adults will nevertheless engage dialogically in other everyday non-learning contexts. In cultures where non-instructional dialogic interaction with adult caregivers were indeed found to be infrequent, any effects on internalization might be partly compensated for by interactions with siblings, peers, and extended family. On this view, SU development would be seen to be founded on basic human interactional processes expected to be relatively invariable across cultures (Carpendale & Lewis, 2004). Future cross-cultural research might consider the relative contributions of these various social experiences to specific milestones in SU development, thus adding to the small body of existing research relating cultural differences to Vygotskian internalization (see Al-Namlah et al., 2006).

Another possible future research avenue concerns the effects of enculturation on non-human primates, whose SU capacities have been the subject of much empirical interest in recent years (e.g., Tomasello et al., 2005). Tomasello et al. (2005) propose that apes show many of the component skills that make up intentional-agent understanding (such as an understanding of goal-directed behavior), but that their progression to higher levels of SU (such as mental-agent understanding) is limited by their failure to engage in shared intentionality. The DT model would hold that the transition from intentional-agent to mental-agent understanding involves the further requirement that the collaborative exchanges and dialogic cognitive representations that result from shared intentionality be semiotically mediated—otherwise, the internalization of such exchanges would have nothing to act upon (Fernyhough, 2005). Currently, Tomasello et al.'s claims in this respect are difficult to tease apart empirically from those of the DT model, as

shared intentionality would seem to be necessary for both the construction of mediated dialogues and the kinds of exchanges seen by Tomasello and colleagues as fostering further SU development. It is at least plausible, however, that future research with enculturated language-trained apes might separate out the relative contributions of shared intentionality and language to SU development. Although even highly enculturated primates such as the bonobo Kanzi show no human-like motivation to share intentions (Tomasello et al., 2005), they nevertheless engage in certain familiar social behaviors such as playing with toys (Savage-Rumbaugh, 1990). Future research in which the social interaction of enculturated apes is heavily scaffolded (to compensate for the lack of an innate motivation to share intentions) might be able to determine whether (as Tomasello and colleagues suggest) particular kinds of interaction are sufficient for the transition to mental-agent understanding, or whether (as the DT model would hold) such social experiences would not be effective without the additional component of mediation by language or other sign systems.

Explaining Atypical SU Development

The DT model has clear implications for the study of atypical human populations. In this section, I consider SU development in individuals with autism and sensory impairment. Given that much of the relevant empirical work has not yet been carried out, parts of the following are necessarily speculative, but nevertheless contain several specific proposals for future research.

SU in Autism

Given that it is only fairly recently that the focus of SU research has turned to explaining its development within a social context, it is perhaps not surprising that there have been few attempts to explain how atypical social experience can have profound influences on SU development. In the most well-known of these accounts, Hobson (e.g., 1993; 2002) has argued that SU is developmentally determined by the ability to engage in socio-affectively patterned,

intersubjective exchanges with other people. According to Hobson, the deficits in SU and symbol use observed in children with autism (and in children affected by blindness and deafness) stem from such individuals' lack of opportunity for engaging in interaction within the 'relatedness triangle' (Hobson, 1993), and thus learning about the differing intentional relations that others can have to reality. What is currently lacking in Hobson's account is precise detail on the cognitive-developmental mechanisms through which these SU and symbol-use deficits might arise.

The DT model may help to fill this gap in Hobson's account. Firstly, it proposes detail on the kinds of social interaction through which normal and atypical social experience can have their effects. Secondly, it predicts associations between SU deficits and other cognitive deficits that are not readily accounted for by the current theoretical alternatives. For example, the DT model would predict that individuals whose limited social experiences restrict their opportunities for the internalization of dialogue will have difficulties with flexible, open-ended thinking (Ferryhough, 1996), difficulties that formed part of the original characterisation of the syndrome of autism (Kanner, 1943). In addition, the model would predict that restricted opportunities for the internalization of dialogue will result in deficits in self-regulatory private speech and inner speech, with all the implications for the development of self-regulation of cognition and behavior. While much work remains to be done on verbal mediation in autism and other developmental disorders, some existing findings are relevant in this respect. Baltaxe and Simmons (1977) reported that the bedtime soliloquies of individuals with autism lacked the dialogic structure usually exhibited by such speech forms. Hurlburt, Happé, and Frith (1994) used an experience sampling and interview technique to demonstrate that three high-functioning individuals with Asperger syndrome reported far less inner speech than had previously been reported by normal adults, a finding supported by first-person accounts of autism which suggest a

preponderance of visual rather than verbal imagery (e.g., Grandin, 1996). These findings are consistent with the view that even verbally fluent individuals with autism are limited in their use of verbal dialogues to regulate their own behavior (Fernyhough, 1996; Tomasello et al., 1993). More generally, these predicted deficits in verbal self-regulation are in line with characterisations of autism which see executive and theory-of-mind dysfunction as going hand in hand (e.g., Hughes & Russell, 1993). There is also a growing body of evidence for inner speech deficits in autism which, given the assumed importance of inner speech for self-regulation, may account for some of the executive deficits associated with the disorder (Joseph, Steele, Meyer, & Tager-Flusberg, 2005; Russell, Jarrold, & Hood, 1999; Whitehouse, Maybery, & Durkin, 2006).

SU in Sensory Impairment

Hobson's account opens up the possibility that varied constraints on social experience will lead, via different developmental pathways, to autism-like symptoms. One relevant research area in this respect is that relating to congenital deafness. Deafness has been a focus of SU research because of the obvious limitations it imposes on social interaction, particularly that mediated by language, and because any atypicalities in SU development are not confounded by other disabilities. Evidence of developmental delay in theory-of-mind in deaf children born to hearing parents (Peterson & Siegal, 1995) has been proposed to bear witness to the importance of social input in SU. These effects are said to be mediated by these children's late acquisition of sign language (resulting from their own parents' relative lack of fluency in sign language), as compared with deaf children of deaf (and hence sign-fluent) parents, who show no such delays in SU acquisition (Woolfe, Want, & Siegal, 2002). Such findings are also interpretable within the DT framework, which would see native-signing children to be equivalent to hearing children in all relevant opportunities for the internalization of dialogue (in this case, those mediated by sign language). It should be noted that research into deafness has not yet been able to determine which

specific kinds of sign-mediated interaction are most important in native signers' acquisition of SU. In line with the foregoing arguments, the DT model would predict that it would be signing interactions in which different perspectives are presented, but not necessarily framed in mental-state terms, that will be most important (and, by implication, represent the form of social input most critically lacking in late-signing children).

The DT model would make further predictions not entailed by other theories of SU. Of most immediate empirical interest might be the prediction that native signers should show none of the atypicalities in the emergence of semiotic mediation that would be expected in late signers. That is, their private self-regulatory signing should follow a similar developmental trajectory (and show similar relations with task difficulty and task performance) to that observed in hearing children. In comparison, late signers should be delayed in the emergence and internalization of private signing, and these delays should in turn be related to their SU. Examining SU development within the context of children's overt use of semiotic mediation would appear particularly worthwhile in the study of this population, given that research into children's private signing (and other self-directed gestures) is still in its infancy (Goldin-Meadow, 1999).

Conclusions

My aim has been to set out a model of SU development in which other minds can be understood to the extent to which they interpenetrate in social and internalized dialogue. This internalization process builds upon capacities for intentional-agent understanding which allow triadic interactions, centered around objects, in which perspectives on reality are shared. The emergence of language and the child's beginning participation in linguistic exchanges herald the beginning of a progression from social dialogue, through the intermediate stage of private speech, towards fully internalized inner dialogue. The resulting dialogic forms of thought provide the basis for children's capacity to adopt and operate with (in a pre-reflective manner; see Note

4) the internalized perspectives of their social partners. In a secondary developmental pathway, conversations about mental states with sensitive caregivers present children with opportunities to learn the correct usage of mental-state terms and concepts, allowing them ultimately to enter into sophisticated folk-psychological ways of explaining and predicting the behavior of others.

I have suggested that several benefits result from adopting such an approach. Firstly, the DT model speaks to our intuition that SU must be at least partly dependent upon social experience, particularly that which builds upon pre-existing SU competence. Secondly, it allows us to examine the development of SU within a broad, gradualist context of social-cognitive development. Thirdly, the DT model proposes detail on the cognitive-developmental mechanisms that might lead from particular types of social interaction to enhanced SU, specifically those relating to the internalization of mediated dialogue. Finally, the DT approach is effective in accounting for the evidence concerning the typical development of SU, findings of associations between individual differences in SU and social experience, and atypical development.

The DT model thus represents a departure from previous theories of SU. In unpacking Vygotsky's suggestions about the importance of semiotic mediation and internal dialogue, the DT model adds to the body of theory which sees SU as involving interfunctional (Vygotsky, 1934/1987; see Note 5) relations between different domains of cognition. In addition to the empirical tests of the model proposed here, much theoretical and conceptual work remains to be done. Most importantly, researchers should work to specify in greater detail the mechanisms by which external interpersonal exchanges are reconstructed on the plane of individual cognition. One problem in this respect is that Vygotsky's theory requires us to rethink our notions of 'inner' and 'outer' as they apply to human psychology, and to be sensitive to the various ways in which mind can 'extend beyond the skin' (Geertz, 1973; see also Clark, 1998; Clark & Chalmers,

1998). In an important development in clarifying this aspect of Vygotsky's theory, Tomasello et al. (1993) have considered internalization as a form of cultural learning, whereby the individual gradually comes to take the other's perspective in thinking. Internalization is thus developmentally constrained by children's emerging concepts of others as intentional, mental, and reflective agents. A central assumption of the DT model is that children's conceptions of the minds of others cannot develop entirely independently of their experience of them (Barresi & Moore, 1993; Hobson, 1993). At the same time, Tomasello et al. are correct to point out that children's developing pre-theoretical and theoretical conceptions of others are bound to influence the kinds of interpersonal exchanges they will be able to enjoy.

It is here that another objection to the DT model is likely to emerge. I have argued that children's ability to operate with simultaneously-held multiple perspectives in social reasoning is dependent upon their internalization of mediated interactions with others. Surely, though, the ability to engage in dialogue is itself dependent upon the presence of a certain degree of social-cognitive sophistication? It is for this reason that SU development has sometimes been seen as developmentally primary to the emergence of mediated thinking (e.g., Rochat, 2001). This issue boils down to the question of what is the minimal level of interpersonal understanding necessary for engagement in dialogue. I have proposed that intentional-agent understanding is sufficient, especially when caregivers (who, if they are mind-minded, will be acting at the mental-agent level) are active in pitching their interventions appropriately and adopting the intentional stance in constructing dialogues with their charges. Engagement in dialogue, and therefore the internalization of dialogue, is accordingly a precursor rather than a consequence of later developments in SU. If this is so, it is predominantly due to the sensitive interactional context that mind-minded caregivers are hypothesized to provide.

Another way of thinking about this question is to ask how, if we are to take seriously the pragmatic, socially effective qualities of language, the social-cognitive capacities that underpin such language use can themselves be dependent on language (Tomasello et al., 2005). The first response is that, as noted above, engagement in dialogue with sensitive caregivers can begin from the very earliest stages of life. Furthermore, the internalization of such dialogic exchanges requires only intentional-agent (not mental-agent) understanding. The second response is that children are able to enjoy the semiotic, representational, and hence mediational functions of language before they are fully conversant with its social uses. That is, the cognitive benefits of representing the alternative perspectives of others in language are apparent well before children have the social-cognitive skills necessary for a conceptual understanding of those perspectives.

I conclude by considering the phylogenetic status of dialogic SU. One plausible reason why non-human primates fail to develop human-like SU is because they do not enjoy mediated social exchanges with conspecifics. To what extent do the present claims about SU development constitute a claim for the species-specificity of these cognitive processes? Tomasello and Rakoczy (2003) suggest that the capacity to engage in social interactions underpinned by intentional-agent understanding of others is what makes human thought and culture distinct from any comparable phenomena elsewhere in the animal kingdom. For these authors, intentional-agent understanding allows human infants to engage in interpersonal exchanges mediated by conventional sign systems, and thus enter into the flow of knowledge transmission particular to their culture. This (probably biologically determined) intentional-agent understanding is transformed into mental-agent understanding after, *inter alia*, several years' experience of perspective-shifting discourse. Like Lohmann et al.'s (2005) account, Tomasello and Rakoczy's view of SU development remains an essentially individualistic account of how children can obtain evidence (through linguistic encounters with the perspectives of others) on how their own

perspectives differ from those of others (Carpendale & Lewis, 2004; Harris, 1996). While experience of perspectival conflict is undoubtedly an important part of this process, it is only to the extent that these alternative perspectives can be internalized and simultaneously accommodated in social reasoning that the child's formative experiences of sharing perspectives with others can continue to play a role in their reasoning about others' mental states (Fernyhough, 2004a). In the model presented here, this accomplishment is made possible by the fundamental restructuring of the child's cognitive architecture that results from the internalization of dialogue. In setting out how this developmental milestone is achieved within the context of specific sociocultural practices, the DT model allows us to trace some defining characteristics of our adult cognitive processes back to the social and cultural milieux within which we develop.

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Notes

ⁱ The term ‘theory of mind’, with its implications of a theory-like understanding of how mental states govern behavior, is frequently replaced by the less theory-laden ‘mentalizing’, ‘mind-reading’, or ‘social understanding’. In the present article, I follow Carpendale and Lewis (2004; 2006) in favouring the term ‘social understanding’, because it can encompass the pre-theoretical understanding of other minds demonstrated in infancy and the early preschool years, as well as more sophisticated later forms of mentalizing. When referring specifically to the folk-psychological understanding of mental states first evidenced between the ages of around 3 and 5, the terms ‘theory of mind’ and ‘mentalizing’ are used. Although a proper consideration of such usages is beyond the scope of this article, it is noted that all of these terms may obscure important distinctions between forms of mentalistic understanding, such as the difference between understanding beliefs and desires. The extent to which the present account requires children to have any ‘theoretical’ understanding of mental states is considered later.

ⁱⁱ The higher mental functions (Vygotsky, 1930-1935/1978) are defined in contrast to the elementary mental functions, which are unconscious, involuntary, and driven entirely by environmental stimulation. By virtue of its being accessible to consciousness, under voluntary control, and, as I shall argue, mediated by signs, I assume that reasoning about other minds qualifies as an example of a higher mental function. For a discussion of commonalities between the elementary mental functions and Fodor’s (1983) modular input systems, see Fernyhough (1996).

ⁱⁱⁱ The use of the term ‘accommodation’ in this context is not meant to carry any Piagetian or Baldwinian implications. The intention is simply to convey that a multiplicity of perspectives can exist simultaneously within, or be accommodated by, an inclusive cognitive structure. The term

is generally preferred to ‘representation’, which presupposes some unwarranted (in this context) social-cognitive or conceptual understanding.

^{iv} Note that this representation of the other’s perspective does not necessarily involve any metacognitive reflection on co-existing perspectives. The process through which the child becomes able to reflect on the simultaneity of multiple perspectives that makes up her internal dialogue is considered below, when the application of the DT framework to SU development is examined.

^v Vygotsky characterized his approach as focusing on the problem of “interfunctional relationships” (1934/1987, pp. 43-44), by which he meant the changing developmental relations between cognitive functions such as thinking and language. The emphasis in his theory on semiotic (particularly linguistic) mediation is thus consistent with his interfunctional approach (Ferryhough, forthcoming).

^{vi} It might be objected that Tomasello et al.’s account attributes a degree of conceptual understanding to infants which overestimates the sophistication of the cognitive structures underlying their social behavior. My own use of the term ‘understanding’ is not meant to imply any conceptual understanding of how mental states underpin behavior, which, I argue below, is a relatively late-occurring developmental achievement.

^{vii} I am grateful to an anonymous reviewer for this suggestion.

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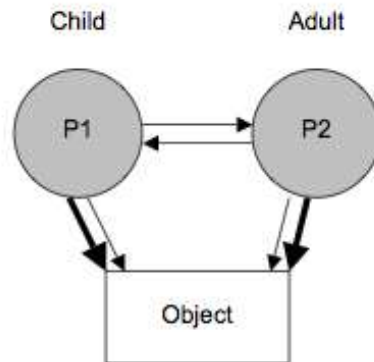


Figure 1: Triadic intentional relations in dialogue

(P1 and P2 represent the different perspectives accommodated in the dialogue. Thick lines represent each agent's perspective on the object. Thin lines represent each agent's perspective on the other agent's perspective on the object, and are thus in two parts: from agent to agent and from agent to object.)

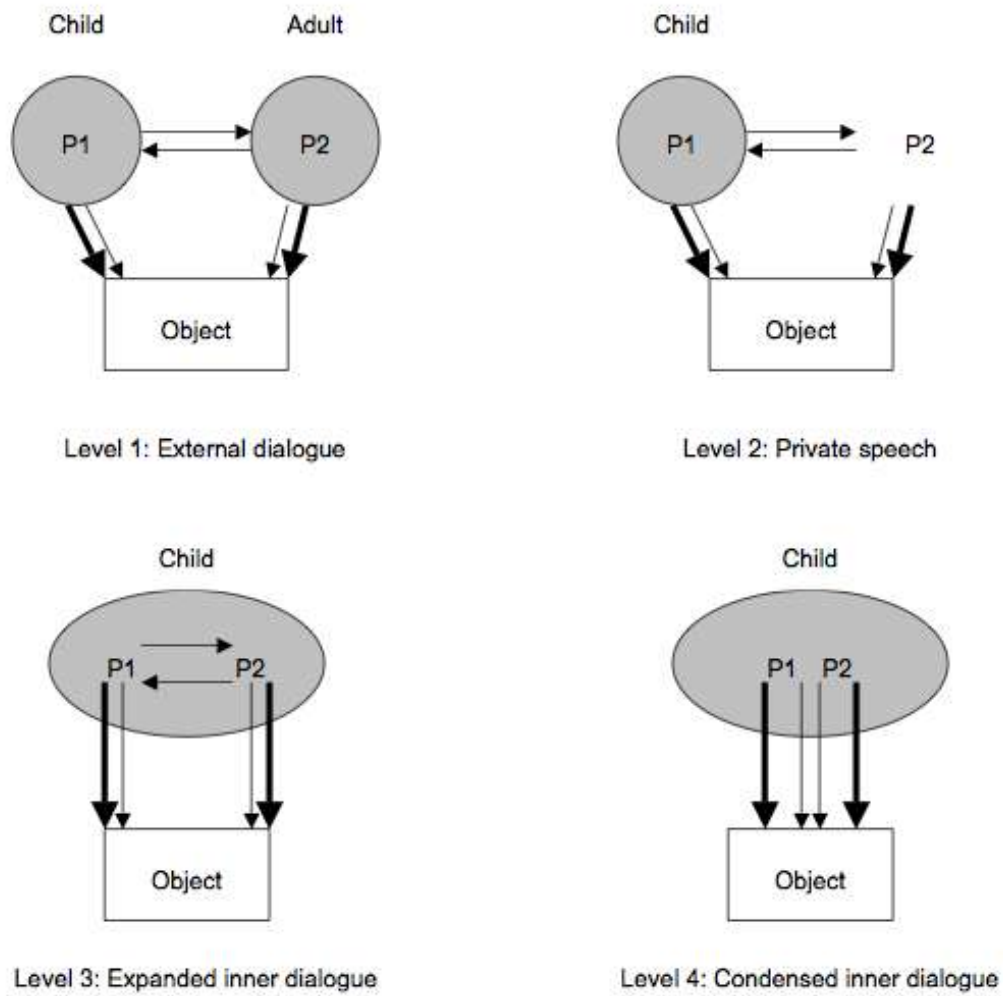


Figure 2: A four-stage developmental scheme for the internalization of dialogue

(P1 and P2 represent the different perspectives simultaneously accommodated in the dialogue.)

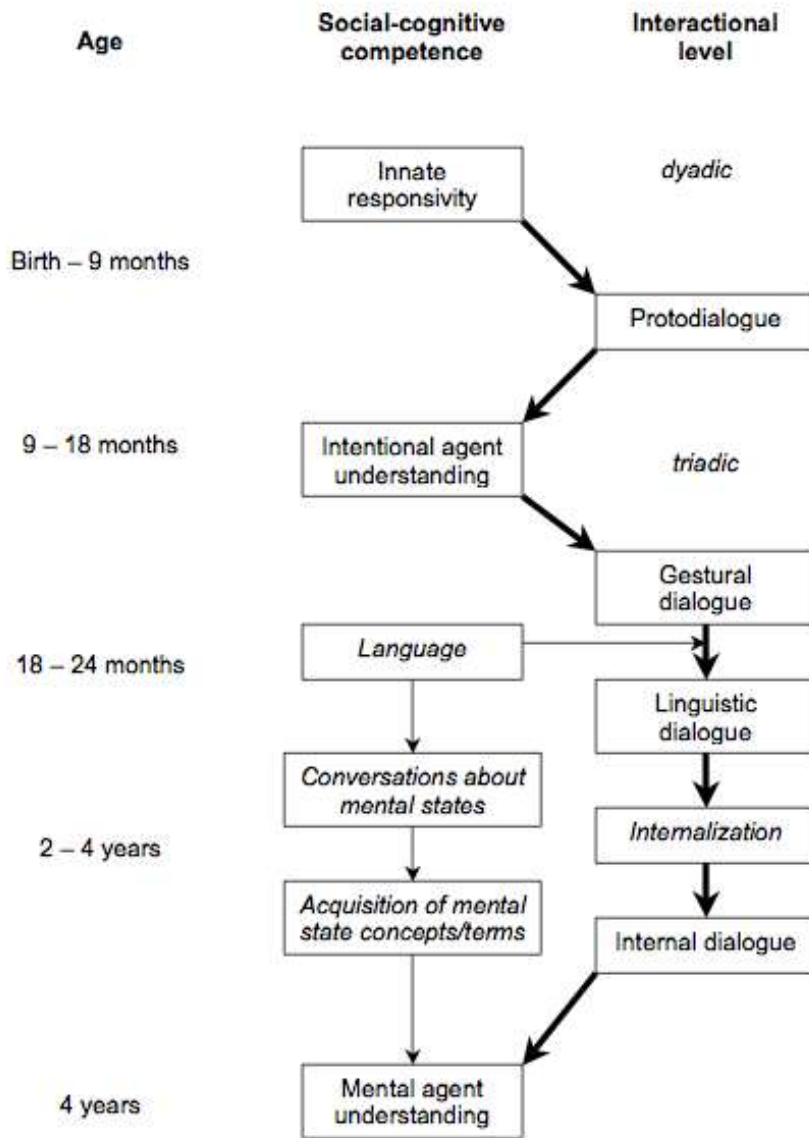


Figure 3: A developmental scheme for the emergence of social understanding

(Thick lines represent the primary developmental pathway; thin lines represent secondary pathways.)