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CHILDREN'S EARLY CONSTRUALS OF SUBJECTIVITY:

UNDERSTANDING THE INTERPRETIVE MIND

by

DANIELA PLESA

A dissertation submitted to the Graduate Faculty in Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy. The City University of New York

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ABSTRACT

CHILDREN'S EARLY CONSTRUALS OF SUBJECTIVITY:

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DANIELA PLESA

Adviser: Professor Katherine Nelson

Understanding the interpretive aspect of mental activity constitutes a later development in children's 'theory of mind', emerging in middle childhood. This research examines children's reasoning about the possibility and sources of interpretive diversity when confronted with other people's discrepant interpretations regarding: 1) attributions of intention to protagonists involved in an everyday event; 2) perception of reversible visual images. The study also relates children's interpretive understanding skills to aspects of their language and narrative competence, to identify potential contributing factors to the development of psychological understanding in middle childhood, beyond the description of age-related differences

One hundred and twelve children between six and ten years of age viewed individually a videotape in which puppets enacted a modified 'change of location' scenario. Children first recounted the event, then listened to the two puppets' verbal accounts including discrepant attributions of intention for the act of moving a cookie (hiding vs. saving for later sharing). Responses to whether it made sense for the two characters in the skit to entertain different interpretations and why, were categorized into: 1) none/irrelevant; 2) subjectivist/relativist; 3) informational source; 4) intentional or

personality-related explanations. Explanations were also rated for complexity. Children obtained scores based on the number and complexity of explanations proposed. The 6-7-year-olds suggested significantly fewer intentional/personality-related explanations than the 8-9- or 9-10-year-olds.

The examination of similar reasoning processes in the context of a perception-based task, requiring judgements about the legitimacy of two interpretations of the 'Man-Mouse' reversible figure, and of a 3rd interpretation of the image unrelated to the specific drawing, indicated significant differences between each of three age-groups in the proportions of justification-types proposed (categorized as: none, subjectivist/relativist and stimulus grounded/complete). More subjectivist/relativist explanations were suggested by the 8-9-year-olds than by the other age groups.

Controlling for age, interpretive task performance remained positively and significantly correlated with language scores and several narrative-competence measures. Regression analyses indicated expressive language scores, use of intentional narrative in recounting the event, and age, as best predictors for interpretive understanding performance for both tasks. The roles of language and narrative competence in the development of an interpretive understanding of mental life are discussed in terms of their implications for the development of epistemic stances throughout childhood.

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This project could have not been completed without the cooperation of the public school teachers and children's parents, whose openness to research made data collection possible. My gratitude goes to all of them, and especially to the children whose eager participation and marvelous minds were the inspiration and reason for this project.

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CHAPTER I

INTRODUCTION

> The primary function of the mind is not to take in information from the world and submit it to various kinds of processing through some complex system of filters. Rather, its constant activity is to create its own representations of the world.
> (W. Chafe, 1990, p. 80)

In our 'folk model of the mind' subjectivity appears as an inalienable aspect of being human. Its conditions of possibility are sought primarily in the interpretive character of our mental activity. Mind is not just a mirror to reality/nature, but actively attends to, selects, organizes, represents, misrepresents, transforms and even distorts its own inputs. The 'mature' conceptualization of the knowing process implies acknowledging its inherently constructive, subject-dependent nature. As Chandler and Boyes (1982) note, "Knowing of any sort (...) is a relational act which samples and structures the interaction between persons and events by selectively assimilating and organizing experiences in ways which accord them human meaning" (p. 387).

How do children come to acknowledge *that minds interpret experiences*, that the same reality may be construed subjectively in different ways by different people, that the knowing process itself is as much subject-dependent as it is object-centered? Arriving at this constructivist epistemology involves a rather sophisticated understanding of persons as agentive, mindful creatures, with their own subjective orientations toward the world.

The development of children's understanding of people's mental lives has become

the focus of extraordinary attention and research efforts in the last two decades since the first explorations into what has come to be known as 'children's theory of mind' (for reviews, see Astington, Harris, & Olson, 1988; Butterworth, Harris, Leslie, & Wellman, 1991; Carruthers & Smith, 1996; Frye & Moore, 1991; Lewis & Mitchell, 1994; Whiten, 1991). This area of developmental investigations redefined many of the more traditional topics of social cognition and metacognitive development research, in terms of children's understanding of mental states such as desires, beliefs, pretense, intentions, and their relationships with behavior. Of central interest have been the questions of when and how children come to demonstrate a grasp of the fundamental concepts of our "folk psychology", conceptualized mainly in terms of representational processes underlying various mental states in self and others. This framing of the research priorities in its turn led to an almost exclusive focus on early childhood, when most of these basic mentalistic concepts are considered to emerge.

However, in spite of the explosion of interest and extensive research on young children's conceptions about their own and others' mental lives, the developmental course of psychological understanding beyond the years of early childhood remains largely uncharted. When studies have focused on *later* 'theory of mind' developments, the interest was primarily in carefully documenting the *content* or the *timing* of children's *knowledge* about various characteristics of mental activity, including its interpretive aspect (Beal, 1988; Carpendale & Chandler, 1996; Chandler & Carpendale, 1998; Chandler & Lalonde, 1996; Fabricius, Schwanenflugen, Kyllonen, Barclay, & Denton, 1989; Flavell, Green, & Flavell, 1995; Flavell & Miller, 1998; Lalonde & Chandler,

1995, 1997; Montgomery, 1992; Perner & Davies, 1991; Pillow, 1991; Pilow & Weed, 1995; Taylor, Cartwright, & Bowden,1991; Wellman & Hickling, 1994).

Alongside the preoccupation with establishing the timing and developmental course of mentalizing abilities in young children, there has recently been a growing interest in the issue of individual differences in theory of mind understanding. Research motivated by this interest has brought attention to, and identified a series of factors possibly involved in, and clearly related to performance on theory of mind tasks, such as language abilities, social skills, attachment security, parenting styles (e.g., Brown, Donelan, McCall, & Dunn, 1996; Carpendale, Chandler, & Lalonde, 1997; Cutting & Dunn, 1999; Dunn, 1995; Dunn, Bretherton, & Munn 1987; Fonagy, Redfern, & Charman, 1997; Hughes, 1998; Jenkins & Astington, 1996; Lalonde & Chandler, 1995; Watson, Nixon, Wilson, & Capage, 1999).

The present study brings together the two lines of research by focusing on children's developing understanding of interpretive diversity in middle childhood, considered not just as a function of age, but in relation to the development of language and narrative discourse abilities.

One goal of this research is to closely examine children's reasoning about the possibility and sources of interpretive diversity when confronted with other people's discrepant interpretations related to two different processes: 1) attributions of intention to protagonists involved in an everyday event, and 2) perception of ambiguous visual images. Two interpretive tasks were devised to enable a comparison of children's judgements about the possibility and sources of differences in interpretations in two

domains - behavioral and perceptual: one task presented children with an event involving people interacting, and the other task presented them with a visual display involving perception of reversible drawings. A main assumption guiding the investigation was that children's reasoning about issues regarding the possibility and legitimacy of interpretive diversity in different domains may have larger implications for their conceptualization of the knowing process, and their evolving epistemic stances.

Another aim of this study is to relate children's interpretive understanding skills to certain aspects of their language and narrative competence, in order to identify potential contributing factors to the development of psychological understanding in middle childhood. An exploration of these relationships is needed to arrive at a more complex picture of the system of competencies and influences involved in this development, beyond the description of age-related differences and accomplishments.

The special epistemic status currently accorded to knowledge about minds has drawn enormous attention to those aspects of cognitive (and sometimes to related social, emotional, linguistic) development, which seem to set aside psychological understanding from other 'intellectual' achievements. Theoretical arguments supporting this position have fostered a research agenda which managed the feat of growing at exponential rates in relatively short time, while remaining confined to the investigation of a rather brief period of childhood, and subscribing to a view of mind conceived as individually owned, decontexted and disembodied, functioning mainly as a representational and information-processing device or cognitive mechanism (Nelson, Henseler, & Plesa, 2000). A brief analysis of some of these arguments may help evaluate the current state of the field and

suggest ways for overcoming its limitations.

Perspectives on psychological understanding: The 'theory of mind' research program

Knowledge of people may be considered a special epistemic perspective relative to other forms of knowing, in that the objects of knowledge themselves are subjects or agents with their own orientations to reality. People's mental orientations to the world are never completely transparent, nor are they sufficiently constrained to allow for objective, accurate predictions or explanations in terms of 'necessarily following behaviors'. Whether the objects of knowledge are considered to be overt behaviors or their underlying mental premises, the knower is faced with the challenge of establishing links between what people do/say and what motivates, justifies or explains and predicts their actions, because the mental underpinnings of behaviors are unobservable, 'inner states'.

When what is to be known is constituted of propositional attitudes and not matters of fact, understanding that there may be a multiplicity of possible relationships between attitudes and their contents, relationships ranging from subjective matters of taste, opinion, point of view, to more objective (i.e., logically constrained) links between specific information (e.g., fact-beliefs) and action, proves to be an essential feature of social cognition. Such understanding has been shown to be a developmental achievement which most theorists tie to children's understanding of the nature of human minds in general - to their developing 'theory of mind'. Knowing people as thinking, believing, wishing, fearing, hoping, intending creatures requires the ability to understand that they

entertain mental states or propositions about reality which "could be unique to individuals and may be different from reality" (Mitchell, 1996, p. 21) and in consequence, such propositions are referentially opaque to observers.

The notion of "referential opacity" was used by Quine (1961) to characterize embedded sentences that contain verbs of propositional attitude, such as mental state terms (think, believe, desire - i.e., "Jane thinks that her doll is asleep"), which specify a relation between the content expressed by a proposition (i.e., "the doll is asleep") and its holder ("Jane thinks..."). The content of the proposition must be assessed within the framework of the holder's mental world and not by reference to reality in order to grasp its meaning. The ability to handle the referential opacity of propositional attitudes has been often emphasized as "a fundamental basis for an understanding of mind as an organ that interprets and represents reality" (Mitchell, 1996, p. 20). Mitchell (1996) goes on to say that "If a child can be shown to possess the concept of referential opacity, then we have a very sound reason for suspecting that the child could have an understanding of mind" (p. 21).

However, as other researchers have argued (Chandler & Sokol, 1999; Olson, 1988; Russell, 1996), psychological understanding cannot be reduced to the grasp of referential opacity of propositional attitudes. This understanding involves increasingly sophisticated ways to conceive the relationships between people's (internal, subjective) construals of situations and matters of fact, including recognizing the subjectivity of the knower's own construal of situations involving people's intentional states and actions. From this perspective, the essential question of social cognitive development becomes

one of explaining how children come to attribute internal, mental states to self and others in order to make sense of the complexities of social life.

From making sense of social life to 'theory of mind'

Ordinarily, we make sense of our experiences by subjectively constructing interpretations of events. In the context of social life in particular, when events invoive other people, such interpretations usually take the form of *mentalistic explanations of behavior*, based on attributing to the protagonists intentional states, such as beliefs, motives, intentions, desires, goals, emotions, as premises of action. Imputing mental states to others was first proposed by Premack and Woodruff (1978) as the criterion for "having a theory of mind", in a study on chimpanzees' cognitive abilities, (in particular those of implanting false beliefs into the mind of another, with deceptive intentions). This study and its subsequent claims initiated a lively debate leading to an explosion of research that focused on the development of children's conceptions about their own and others' mental lives (see Astington, Harris, & Olson, 1988; Butterworth, Harris, Leslie, & Wellman, 1991; Carruthers & Smith, 1996; Frye & Moore, 1991; Lewis & Mitchell, 1994; Whiten, 1991). Since then, the phrase 'theory of mind' has come to denote a variety of views on psychological understanding, ranging "from the tendency to impute mental states (Premack & Woodruff, 1978) to a complex system of knowledge about minds and behavior" (Lillard, 1997, p. 268).

The first systematic investigations of children's understanding of mental states conducted in the early 1980s' (e.g., Bretherton & Beeghly, 1982; Johnson & Wellman, 1980; Shatz, Wellman, & Silber, 1983; Wellman, 1985; Wimmer & Perner, 1983; see

Astington, Harris, & Olson, 1988) launched the idea of the theoretical character of children's understanding of minds, which is considered "theory-like in that it specifies causes, provides explanations, embraces specific ontological distinctions and is coherent (Wellman, 1990)" (cited in Lillard, 1997, p. 268). This view has been since challenged from a variety of positions suggesting alternative ways to conceptualize children's developing psychological understanding (see Chandler, 1988; Gellalty, 1997; Harris, 1994; Hobson, 1991; Nelson, 1996; Russell, 1996), but the phrase 'theory of mind' remained the prevalent label for this area of research. Thus, in spite of disagreement regarding the appropriateness of using the term "theory of mind" to characterize children's developing understanding about how minds work, or how people endowed with minds act in the social world, most researchers have adopted the label as a shorthand for a new approach to social-cognitive development (see Flavell & Miller, 1998).

Recently though, interest has shifted from the fervent debate concerning whether the child's understanding of mind is theoretical in nature or not, to carefully documenting and tracing the steps and factors involved in the development of specific mentalizing abilities, from infants' recognition of intentionality to adolescents' understanding of epistemic relativity (see Frye & Moore, 1991; Lewis & Mitchell, 1994 for summaries of such research). Although the 'mechanisms' or processes by which children develop a theory of mind are still the object of intense theoretical controversies (see Astington & Gopnik, 1990; Carruthers & Smith, 1996), most researchers assume that the end product of this development is a conception of mind consonant with our folk psychology. As described by D'Andrade (1987), "In the folk model of the mind, the different kinds of

internal states and processes are organized into a complex causal system" (p. 120). According to our adult folk psychology, the relationships between perception, beliefs, desires, intentions and actions can be conceptualized as causal links which -- as assumed in this view -- could be inferred by anyone who has information about a protagonist's particular intentional state in a given situation (Botterill, 1996).

But, in endowing children with theoretical structures that are described in the vocabulary of our adult theories, psychologists might, in fact, lose track of the much more complicated route from children's personal experiences as participants in a social world to their evolving conceptualizations of people's actions in terms of 'unobservable' mental premises and their respective causal links to behavior. In real life social situations children and adults alike engage in interpretive constructions based on experiential, gradually developed "pragmatic explanatory schemes" (Nelson, Plesa, & Henseler, 1998, p. 23) which may include as a component "the logical causal formula connecting perceptions, desire, beliefs and actions", but cannot be reduced to, or explained away by the causal principles postulated to constitute a theory of mind: "People typically embed these principles in scenarios, stories, narratives or explanatory complexes woven to take account of the motivations of all the players in the situation as well as moment to moment changes in mental and material states" (ibid., p. 10). Why then have most investigators, for almost two decades, framed their research questions in terms of when and how children acquire an integrated causal-explanatory system of concepts that enable them to relate behaviors to mental states for purposes of (unambiguous) explanation and prediction, instead of asking how they construct (collaboratively, supported by familiar

others and cultural practices) *explanatory narratives* for making sense of people's behavior in the complex social world they participate in? The answer may lie in the field's almost exclusive focus on the **representational** aspect of mental activities, featured as the uniquely defining function of a reified, disembodied, individually owned mind.

The "representational" mind

Most research in this area was founded on the assumption that developing an understanding of mind relies on the development of representational capacities (e.g., Perner, 1991; Wellman, 1990; Whiten, 1991). Enormous attention was focused primarily on preschoolers' knowledge about beliefs, desires, and pretense - as they relate to real states in the world. An impressive number of studies have explored various aspects of the question: When do children demonstrate an understanding of the *representational nature of mental states* and how do they arrive at such an understanding?

The special property of representations is that of **standing in a certain relationship with states in the world**: - correspondence, misrepresentation (i.e., false beliefs), special construals (i.e., subjective interpretation). In the 'theory of mind' research paradigm it is assumed that understanding the nature of the mental is demonstrated by passing the test for appreciating the possibility of mental states to misrepresent (i.e., understanding false belief). A restricted set of tasks - with numerous variations - has been widely used as a litmus test for this understanding, such as the "unexpected transfer task" (Wimmer & Perner, 1983), in which the child is asked to predict the behavior or thinking of a character uninformed about the change in location of a desired object, or the

"deceptive box task" (Gopnik & Astington, 1988) designed to probe for the child's own previous and another's predicted false belief about the content of a familiar box, after the child's initial belief had been contradicted by opening the container and revealing its unexpected contents. Thus, passing various tests of false belief understanding has come to be regarded as a marker of acquiring a theory of mind. In effect such tasks (i.e., the 'standard Theory of Mind tasks') are devised as more or less logical puzzles in which the child's own perspective on the experimental situation is treated as irrelevant. The problems that preschoolers have with false belief are considered to stem from a "conceptual deficit" (e.g., Perner, Leekam, & Wimmer, 1987) manifested as: inability to reflect on the representational relation linking beliefs to reality (i.e., inability to metarepresent), or inability to hold contrasting representations in mind in order to attribute a false belief, especially when one has been informed about the real state of affairs, or inability to conceive the possibility of multiple representations of a situation depending on the characteristics or constraints imposed on the person holding a belief by his or her informational access history, current situation, personal biases, and so on.

However, the difficulties children may have with psychological knowledge, in contrast to knowledge about the physical world, may stem not exclusively from the representational nature of mental states, but from their *intentional character* associated with their referential opacity for 'observers' (Brentano, 1874/1973).

Representations or intentional interpretations?

Commenting on the elusive meaning and 'multiple notions' of intentionality encountered in the discourse of both philosophers and psychologists, Feldman (1999) lists

several such views of increasing specificity. These views could be ordered from the "aboutness" definition, meaning "that some mental state is directed at something else, usually an object in the mind " (p. 320), to the notion that emphasizes the psychological component of any intentional event, which "must include a good deal of real world knowledge - about people especially"(ibid.), to finally, the view according to which "true intentionality cannot be expressed without language, perhaps not without complex utterances containing (at least) a propositional attitude and a proposition" (ibid.). Given the agreement that "intentional events always include a person who has a psychological mode [e.g., wish, hope, believe] ranging over contents" which may remain private, or may be expressed implicitly in action, or may be "given symbolic expression using speech or other symbolic systems" (p. 322). Feldman highlights the role of *interpretation* as complementary to any intentional event: "One of the two basic constituents of intentionality is a psychological mode that packages personal meaning for public consumption. The interpretive exercise is a challenge, requiring one to understand the inner life of another from public expression. The form that this understanding takes, at the first step, is assigning an intention to an action or utterance" (p. 317). The process is never a simple, causal one though, for cultural patterns of interpretation are in fact engaged at all steps of this exercise, which the child cannot accomplish alone, by constructing theories from first principles and revising them based on new/conflicting "data". From the perspective of development, the research problem is to understand *how* children arrive at intentional interpretations of behaviors (Macnamara, 1991). The problem becomes much more complex when considered in the context of children's real

lives, instead of framing it as the study of an isolated process of cognitive change. Many different experiential factors, especially socially shared events in which children's inferences about the possible underlying premises of people's behaviors are assisted (shaped, supported or counteracted) by familiar others' explanations and conversations about those experiences may contribute to children's gradual access to the 'landscape of consciousness' (Bruner, 1986) beneath the actors' observable actions in the world.

Some of these factors are just starting to be uncovered in recent studies on children's theory of mind (and more generally, in social cognitive development research), especially when those studies focus on individual differences in children's performance, or on precursors of mentalizing abilities sought, among other factors, in characteristics of and interactions in family contexts, early conversational exchanges and play, especially joint pretend (e.g., Brown, Donelan, McCall, & Dunn, 1996; Carpendale, Chandler, & Lalonde, 1997; Cutting & Dunn, 1999; Dunn, 1988; Dunn, 1995; Dunn, Bretherton, & Munn 1987; Jenkins & Astington, 1996; Lalonde & Chandler, 1995; Lewis, Freeman, Kyriakidou, Maridaki-Kassotaki, & Berridge, 1997; Moore, Furrow, Chiasson, & Patriquin, 1994; Perner, Ruffman, & Leekam, 1994; Siegal & Peterson, 1994)[1].

Understanding the possibility of misrepresentation is insufficient for deciphering

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[1] From a different research tradition than the 'theory of mind' framework, such factors have been extensively investigated in relation to children's language, communicative development and development of social understanding (Brown, Donelan-McCall & Dunn, 1996; Dunn, 1988; 1995; Dunn, Bretherton, & Munn, 1987), narrative development (Hudson & Shapiro, 1991; McCabe & Peterson, 1991; Peterson & McCabe, 1983), memory for past experiences (see Fivush & Hudson, 1990; Nelson, 1993) or understanding of emotions (see Saarni & Harris, 1989).

the complex relationships between people acting in the world on the basis of their construal of reality and the actual state of affairs. This relationship is rarely objectively given: whenever an intentional component is involved, the relation is *subjectively* established, both through the participants' agency and the observers' interpretation of it. Thus, understanding that there is no guaranteed one-to-one mapping between an overt behavior and its possible underlying mental premises, but that this relationship is mediated by meaning, dependent on the knower's subjective perspective, goes beyond establishing causal connections between perceptions, beliefs, desires and actions in a problem-solving fashion, as is assumed in a large part of the "theory of mind" literature. It means, inter alia, understanding that intentional states are the basis for action because people are *agents*. The experience of agency is prior to (not derivative from) the mental function of representing reality (see Russell, 1996). As Russell argues:

> To say a child "has a theory of mind" is normally taken to mean that he or she takes thinking to consist in having mental representations towards which different kinds of orientation (e.g. belief that, hope that, fear that) can be adopted. It means subscribing to the folk psychology of thought, in fact (...)
>
> [But] we can neither explain nor predict an agent's behavior if we are only in possession of facts about his or her purely cognitive orientation to some possible state of affairs. (...) [F]or a child to grasp this relation between believing, desiring and doing, he or she will need some understanding of disposition, because to understand that others are subject to desire must be to understand something about what kinds of things they are naturally disposed to desire;

while understanding *this* is to understand something about other agents that is sub-cognitive, something about their essential needs rather than something about their epistemic and rational natures. (pp. 181-184)

In this sense, representational capacities may not be the essential foundation but just a component of psychological knowledge. Russell (ibid.) explicitly warns against equating the acquisition of a theory of mind with the acquisition of a theory of mental representation, emphasizing that "To understand what it means for a propositional content to represent a possible state of affairs is necessary and central to a theory of mind; but there is much of a non-representational character that has also to be grasped "(ibid., p.184). The "success" of psychological knowledge rests on understanding how people come to act in certain ways based on an intrinsically complex weaving of information, belief, dispositions and motivations which make up the subjective character of their orientations to reality.

The experience of one's own agency, of possible conflicts between one's desires and states of affairs in the world might be the basis for understanding that people in general function in similar ways. Understanding the representational nature of their mental states might be a by-product of deriving from social experience 'rules' for interpreting behaviors in relationship to what one knows or assumes about people, who rarely are the indistinguishable 'generalized other', but most often are particular persons, familiar or not to the child. Surely from this perspective the standard false belief tasks, in spite of the extraordinary attention paid to rigorous experimental manipulations and controls, could not tap into the kind of experientially-derived knowledge that goes into

understanding belief-formation and other mental processes attributed to people in the real world.

A purely representational treatment of children's developing psychological understanding has been under attack from several different positions. Russell (1992) justly characterized the theory of mind research area, based on a representational account of psychological knowledge, as having "inherited Piagetian theory's problems while ignoring his insights " (p. 512). Among the main problems, Russell mentions the almost exclusive reliance on a set of tests to discover the presence or absence of a concept, and the consideration of language as "just one among other symbolic functions" which is also viewed as transparent (i.e., considering that what is said by children accurately reflects what they think), while the merits of the Piagetian clinical interview method are bypassed in favor of the seemingly unambiguous results of carefully controlled experimental tasks. Piaget's main insight, the view "that mind is as much activity as it is representation" (Russell, 1992, p. 512) has been eclipsed by intense focus on understanding the nature of representations and on representational levels as basis for acquiring a concept of mind.

Solving the false belief type of tasks requires understanding the relationship between mental representations and reality, but involves nothing about the intentional nature of the people who hold representations and how they come to entertain them. In actuality, people always make implicit assumptions about motives, goals, knowledge states, intentions of the protagonists entertaining beliefs, as well as about those of the interviewers/experimenters inquiring about them. In a sense, one could argue that the definition of 'reality' at any particular moment is 'person-dependent' to the extent that the

meaning of an individual's behavior within a certain experimental context is implicitly dependent upon that subject's interpretation of the experimental situation itself, at least as much as it is on the experimenter's assumptions.

As numerous studies have pointed out (e.g., Gopnik & Astington, 1988; Gopnik & Graf, 1988, O'Neil, Astington, & Flavell, 1992; Taylor, 1988; Wimmer, Hogrefe, & Perner, 1988; Zaitchik, 1991), interpreting young children's failure on false belief tasks in terms of inability to form metarepresentations, or to 'hold in mind' conflicting representations is not the only explanatory possibility; other explanations have been proposed, such as failure to grasp the causal relations between informational access (perceptual experience for most of the standard false belief tasks) and belief formation, or failure to inhibit the salience of one's own updated knowledge state -- reality bias-- (Mitchell & Lacochee, 1991), or executive control failures (Frye, Zelazo, & Palfai, 1995; Hughes, 1998), explanations that consider some of the basic processes by which beliefs (true or false) are formed and attributed in the context of experimental tasks. However, this understanding of belief formatior and its causal link to action, tested within the confines of motivationally neutral scenarios (as in standard false belief tasks in which an object is moved to a different location without the protagonist's knowledge about the change, or the content of a box is shown to contradict a previous belief) may have little relevance for characterizing children's social cognition, their incipient understanding of the intricate mental underpinnings of people's behavior in everyday situations. Such processes of social understanding imply often complex, multiple mediations from interactional and socio-liguistic experiences to psychological knowledge.

If psychological knowledge is built on processes of attributing mental states to self and other as premises of behavior, then the child needs to take into account the *agentive nature of self and other* before the attribution of beliefs could be intentionally justified. Although intentional states themselves may not always involve *conscious motivation*, agency implies a sense of choice or 'freedom' in choices of action, and a degree of awareness of this 'special condition' of people might be a prerequisite for developing psychological understanding. What sets apart the world of people from the physical world is precisely the intentional nature of its "objects". The objects of social cognition are derived from processes in which subjectivity is a constitutive force, opening possibilities for interpretation because of the underlying intentional structure of social events. The intentional component which is the 'source' of interpretive diversity in mental state attribution is practically ignored or carefully restricted in standard theory of mind tasks. From this perspective, we are still far from a complete answer about what is involved in belief-attribution or attributions of other mental states, besides representational abilities, which might turn out to be a necessary condition but surely not a sufficient one.

Mediational accounts of psychological understanding

Recently, developmental research has started to grapple with the kinds of social-cognitive-linguistic and cultural factors involved in these processes reflecting the development of an understanding of mind (see chapters in Lewis & Mitchell, 1994, by Baldwin & Moses, Dunn, Shatz, Robinson, Siegal & Peterson, Lewis). A more discerning conceptualization of mind involves the fundamental insight that, as Shanker

(1992) specified, "mental states are 'attributions' to people from some point of view rather than 'inferences' to hidden inner experiences that **cause** behavior" (p. 181). This is a particularly important consideration in examining how minds work in the social domain - where the objects of knowledge are constituted by intentional states of people. Such knowledge becomes relevant in dealing with the complexity of social life and may be closely related to children's increasing familiarity with events in which human interactions become meaningful *through the interpretive accounts of other people.*

The importance of coming to make sense of a situation through the mediation of another's interpretation or through available cultural tools which guide people's meaning-making processes has been emphasized in several research traditions, consonant with mediational, participatory, experiential views of development (Bruner, 1990; Donald, 1991; Nelson, 1996; Vygotsky, 1978; Wertsch, 1985). For instance, the premise of narrative accounts of thought and of "worldmaking" (Goodman, 1978; Bruner, 1986, 1990) is recognizing that cognitive operations of meaning-making are shaped and exercised by appropriating culturally canonical forms of organizing experience, as constituted in narratives. As Bruner (1990) suggests, we use culturally-informed narratives to make sense of behavior, especially when confronted with breaches in our everyday expectations, when faced with "trouble" (Burke, 1945; Lucariello, 1990)[2].

In a similar vein, discussing cultural variations in theory of mind, Lillard (1998)

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[2] The definition of narrative assumed here is not that of a temporally ordered sequence of events, but of a form of discourse/thought which involves, as Kenneth Burke first suggested, some 'drama' as result of an imbalance in the ratio of its main constituents: "characters in action with intentions or goals in settings using particular means" (Bruner, 1986, p. 20).

points out that it is the experience of "noncanonical events that stimulates people to develop explanatory narratives" (p. 5), and in this sense "the stories serve to link the exceptional to the ordinary" (p. 7). From this perspective the study of narratives may offer clues to the child's developing understanding of how minds work, although the evidence is indirect, being embedded in the larger processes of developing sense-making strategies for understanding experience, especially when confronted with "trouble". Thus, researchers who are interested in mapping children's developing understanding of various aspects of mental activity are confronted with a dilemma which goes beyond methodological concerns: the intentional world of narratives might be too rich to permit the uncovering of the specific processes by which children come to link behaviors to 'inner premises', while, at the same time, controlled experimental tests of isolated mental state understanding may be too decontexted to reveal how such processes function in real life and how they change over time.

From an experiential framework of studying development (Nelson, 1996), *experience in an intentional world*, a world encountered by the child as partially interpreted by the people around her is the basis for constructing psychological understanding: if this knowledge requires indeed inferential processes, it cannot be identified however, with an individual endeavor of constructing sets of concepts (even when remaining largely implicit) coherently linked within a 'theory-like' conceptual structure. In contrast, it is from its beginnings a 'collaborative construction': it develops within culturally-contexted activities in which people interact, and is mediated through intersubjective processes between children and the familiar people surrounding them,

with whom they have close emotional connections (parents, care-givers, siblings). Without the interactional experiences in which the infant's own behavior is interpreted and treated by others as if intentionally/psychologically motivated, the child could not develop a sense of mental selfhood, of 'psychic reality'. This emphasis on the transactional beginnings of understanding the psychological world of self and other is consonant not only with a Vygotskian (1966, 1978) perspective on development, but also with developments in contemporary psychoanalytic thinking (e.g., Fonagy & Target, 1995; Hobson, 1993; Mayes & Cohen, 1994; Target & Fonagy, 1996), which contrast with the 'theory-construction' view of mainly cognitive precursors of theory of mind (e.g., representational abilities). Thus, Target & Fonagy (1996) stress the central role of the child's emotional relationship with the parent or other care-giver who

> (...) fosters the child's sense of his mental self through complex linguistic and interactional processes, mainly through behaving towards the infant in a way that leads him eventually to share the assumption that his own behaviour (and that of others) may be best understood in terms of ideas and beliefs, feelings and wishes (....) Unconsciously and pervasively, the caregiver ascribes a mental state to the child with her behaviour, this is gradually internalised by the child, and lays the foundations of a core sense of mental selfhood (....) Understanding the nature of the mental world cannot be done alone, it requires discovery and recognition of the self in the eye of the other (p. 463).

Moreover, psychological understanding, in an experiential perspective on

development, is not only in its origins a social, intersubjective, collaborative process, but continues to evolve in close interdependence with children's growing participation in the interpretive practices of their culture, as part of their dynamic knowledge system about the world, undergoing numerous reorganizations over time. In this view it is never 'completed' and does not always function as a coherent, causal-explanatory system for explaining and predicting action, because there is more to human behavior than what can be accounted for by relationships between the representational content of minds and reality. As Dennett remarks (1988) "Sometimes attributions of belief appear entirely objective and unproblematic, and sometimes they appear beset with subjectivity and infected with cultural relativism" (p. 496).

What philosophers such as Dennett (1988) take to be two antithetical theoretical options for characterizing belief attribution, respectively, realism - "the view that beliefs are objective things in the head which could be discovered and whose identities could be confirmed", and interpretationism, "the view that attributing a belief is a highly relativistic undertaking", (p. 486) appear to describe a proposed developmental progression in children's understanding of mental processes, from a *copy-view* to a *constructivist view* of the mental (Chandler, 1988; Wellman, 1990; Wellman & Hickling, 1994).

Beyond false-belief understanding

Although the meaning of 'constructivist' with reference to understanding 'the mind' is not uniformly agreed upon, nor is the relationship between constructive or interpretive and metarepresentational clarified, most researchers acknowledge that further

developments in understanding the properties of mental activity take place in middle childhood, after the famous 'age 4 transition', marked by understanding the possibility of false belief. Regardless of the particular brand of 'theory of mind'- explanation adopted (theory-theory, innate module, representational change, simulation, enculturation and socialization, etc.) there seems to be some agreement about such a developmental progression from naive realism, based on understanding beliefs as simple representations of reality, toward relativism, marked by understanding beliefs as subject-dependent and constructed subjectively on the basis of interpretive schemas.

The preferred modality for investigating children's developing understanding of the constructivist, interpretive nature of mental processes has been to present children with pictorial or verbal material with some built-in ambiguity or partially accessible to another, and to ask them what sense would the other person make of the material. In these studies, *attributing a different belief/interpretation to the other from one's own* is viewed as constituting proof that the child understands how people may construe the same situation differently, according to their subjective orientations. Although structurally similar, these types of tasks fall into two main categories related to the nature of the stimuli and procedures used:

a) studies using as stimuli partially covered pictures revealing only a restricted, noninformative part of a drawing (e.g., Chandler & Boyes, 1982; Chandler & Helm, 1984; Chandler & Lalonde, 1996; Perner & Davies, 1991; Pillow & Henrichon, 1996; Pillow & Mash,1999; Ruffman, Olson, & Astington, 1991; Taylor, Cartwright, & Boden, 1991). The purpose of such tasks is to probe whether children understand that a keyhole,

restricted view presented to another person would lead that person to a different interpretation of the picture than the one entertained by the child who already had access to the entire drawing.

b) studies using as stimuli double-meaning utterances or ambiguous verbal messages to probe whether children understand the relationship between the informational content of a message and how it may be interpreted by another person, with variations related to the status of the other listener/speaker (e.g., Beal, 1988; Bonitabus, 1988; Mitchell, Munno, & Russell, 1991; Mitchell & Robinson, 1994; Robinson, & Mitchell, 1992; Robinson, & Whittaker, 1985; Sodian, 1990).

Regardless of the special materials or procedures used, all these studies included a manipulation in the stimulus situation or in the 'target perceiver's' access to it which, in fact, made the situation 'phenomenally' different for the participants. They were never exposed to exactly the same situation because several 'objective manipulations' of the relationship between the perceiver to whom an interpretation was to be attributed, and the object of his/her interpretation were operated, such as: ambiguity built in the stimuli, partial informational access of the observer, a particular informational history of the perceiver, or specified constraints related to the perceiver's status (i.e., age and explicit previous biases). Also, these studies have not examined possible interactions between different attributional systems that might play a role in children's responses to such tasks. Thus, a common problem inherent in these experiments is the possible confounding of children's understanding of interpretive diversity with their understanding of ambiguity or with their understanding (or lack of understanding) of the relationship between

perceptual/cognitive experience (as defined by informational access or predetermined biases) and belief formation. The implicit emphasis in these studies is on the inferential processes involved in connecting the specifics of the perceptual experience or status of the perceiver to a resulting representation, and not on the inherent subjectivity of the interpretive processes. In other words, these experimental tasks involved more or less 'objective', stimulus- or situation-based reasons for the subjects' beliefs to be different, while the interpretive diversity manifested in making sense of social, interactional events is based on the intentional character of mental states and attributions. By virtue of their property of being 'about' things in the world, in the case of mental states, the same phenomenal reality may result in different subjective construals, equally valid as interpretations of the events.

Understanding the interpretive possibilities afforded by a social situation means realizing that people may give different meanings to an event involving other people because they make attributions *from a point of view*, even in the conditions of identical informational access/exposure/history. It also means understanding that there is no one-to-one unambiguous mapping between behavior and its underlying unobservable mental premises if people are conceptualized as agents endowed with free will. In this sense, a truly interpretive theory of mind would involve conceiving the mind's active, constructive character as manifested in implicit or explicit attributions of goals, intentions, plans, motives, expectations with all their possible mismatches with reality. This seems to be the basis for the emergence of a concept of subjectivity and for understanding people as agents or subjects, not only as actors in events.

Developmental milestones toward a constructivist view of mental activity

An uncontested finding of the 'theory of mind' research is that by the age of four years children are generally able to demonstrate (both in real life and in experimental contexts) the understanding that people act on the basis of what they know, believe, want, intend, and that there may be 'mismatches' between such mental states and reality (i.e., false beliefs). In tracing the progression of children's understanding of the characteristics of mind, Wellman (1990), in consensus with a majority of other investigators, suggested that 'theory of mind' development before five years of age is manifested in construing representations as internal, mental, nonmaterial, private, but not yet as subjective, or differentiated from one's own subjectivity/or from reality as copies. The more 'advanced' understanding that the same event could be *construed differently* by different people, or in different contexts, that multiple interpretations are afforded by the 'same phenomenal reality' is a later achievement, demonstrated systematically only around middle childhood (see Chandler, 1987 for an account of this developmental course).

Describing these developments in terms of 'epistemic stances', Chandler (1987) suggests that this later emerging understanding of interpretation represents the transition from an objectivistic tacit epistemology - naive realism of early childhood - to an increasingly relativistic view of knowing, which peaks in adolescence with the emergence of 'generic doubt', to be later 'solved' in the 'post-skeptical rationalist' epistemology of maturity. The difference between an earlier copy-view and a constructivist, interpretive view of mental life is considered to be a qualitative one, with larger implications for the developing person's conceptualization of the knowing process.

Thus, preschoolers' view of knowing is based on a default assumption of correspondence between beliefs and true states of the world, the 'mind-to-world direction of fit' model - as John Searle (1983) put it. By 4-5 years children start to conceive of mental life as representational by showing an understanding of the possible discrepancies between states of the world and states of belief (misrepresentations in false belief), but this accomplishment is not yet complete evidence for appreciating that knowledge is *interpretively constructed*, person-dependent, subjective. This more complex understanding that "minds also invariably transform their own inputs, an achievement that necessarily presupposes Searle's ' world-to-mind' direction of fit" (Chandler & Lalonde 1996, p.113), depends on acknowledging the possibility of subjective interpretation of the same situation, from a point of view, resulting from different attributions of intentional states, equally valid as subjective construals of events. Older school age children begin to move toward such an interpretive theory of mind - but what accounts for this progress remains largely unexamined in current research.

In summary, almost two decades of research into children's developing theories of mind have been marked by a very strong interest in the normative ages or developmental 'points' at which major conceptual changes in children's understanding of the mind seem to emerge, whether in a 'watershed', 'one miracle' manner (to use Chandler's metaphor), or as a more gradual accumulation of new 'cognitive skills'. The main focus has been on young children's understanding of the *representational nature of mental states and processes*, intensely investigated through numerous variations of the 'litmus test' of false-belief. There seems to be an important gap between the investigation of children's early

understanding of mental states, especially false belief, and the relative lack of research into their more mature understanding of the complex dimensions of mental activity, such as its subjective, interpretive aspect. When the effort to bridge this gap has been made, the focus was again on examining age-related differences, mostly on the basis of several variations of tasks involving ambiguous stimuli, taken out of narrative contexts which might better suggest the reality of social situations. Going beyond documenting age-related differences, to identifying and examining the linguistic, social, cognitive and experiential factors involved in the development of children's psychological understanding remains a much needed research effort.

The developmental story of children's understanding of mind continues over the years of middle childhood and adolescence. It is not a smoothly unfolding process driven exclusively by universal conceptual changes, but may depend on complex interactions between the factors mentioned, shaped by the child's social and cultural experiences, which could facilitate or hinder this particular development. If children may display evidence of a partial grasp of the concept of "subjectivity" -- as manifested in their understanding of legitimate differences in people's tastes, likes or dislikes, prejudices, opinions and preferences --, relatively early in their preschool years (Carpendale, 1995; Carpendale & Chandler, 1996; Flavell, Green, & Flavell, 1995), understanding epistemic relativity due to the person-dependent nature of the knowing process is a later conceptual development, in need of further systematic exploration.

The development of epistemological beliefs

Epistemological development has been the focus of several studies which investigated types and changes over time in people's beliefs about the nature and characteristics of the knowing process. Many of these studies emerged from a preoccupation with examining intellectual development after the formal-operations stage, and with aspects of metacognition (Dweck & Leggett, 1988; Kitchener & King, 1981; Labouvie-Vief, 1982; Perry, 1970; Schoenfeld, 1983), thus focusing on adolescent and adult populations.

Models of epistemic development - adolescence and beyond

One of the first systematic attempts to explore changes over time in adolescents' views of knowing related to the experience of college was Perry's longitudinal study of over 100 Harvard undergraduates, using questionnaires and in-depth interviews. On the basis of this research Perry (1970) developed a nine-stage model of epistemological growth, suggesting an evolution along the following path:

> [F]rom those simplistic forms in which a person construes his world in unqualified polar terms of absolute right-wrong, good-bad (...) [to] those complex forms through which he undertakes to affirm his own commitments in a world of contingent knowledge and relative values. The intervening forms and transitions in the scheme outline the major steps through which the person (...) appears to extend his power to make meaning in successive confrontations with diversity. (p. 3)

In Perry's developmental model the first five stages are characterized by increasing understanding of the relativity of knowledge and decreasing dependence on

authority figures for decision making, while the highest positions (6 to 9) reflect an understanding of the multiple possibilities for knowledge and of the role of individual responsibility "through the making of commitments in relativism" (Kitchener & King, 1981, p. 91). Although much research has been built upon this model, the assumptions of a predictable, invariant sequence of epistemological growth and that of more or less unitary epistemic positions which characterize an individual at a certain developmental moment have come under criticism. As Schommer (1990) points out, "beliefs about the nature of knowledge are far too complex to be captured in a single dimension" (p. 498), so she proposes in turn at least five dimensions that may be considered separate epistemological beliefs: structure (i.e., knowledge is best characterized as isolated facts or 'simple knowledge'), certainty (i.e., knowledge is absolute), source of knowledge, control and speed of knowledge acquisition. Schommer's research (1990, 1993) showed how these more or less independent types of epistemological beliefs were differently related to secondary students' comprehension, academic achievement, verbal ability, year in school and parents' education.

Another model meant to capture fine-grained shifts in people's epistemic positions has been proposed by Kitchener and King (1981), who focused on the relationships between certain assumptions about reality, about knowledge, and the logically corresponding forms of justification of beliefs in the intellectual domain. Kitchener and King suggest a model of seven stages in the development of 'reflective judgement', defined as "reasoning about the basis for knowing in relation to ill-structured problem solving" (Wood, 1984). In this research the youngest participants were 14-year-olds, the

other age/educational-level groups being college students and graduate-school students. They were presented a set of four dilemmas, each defined by two conflicting and contradictory points of view about an issue from science, current events, religion and history, and were asked to state and justify their points of view about the issue. The questions of the interview were "designed to elicit statements regarding their view about the nature of knowledge, of evidence and of the role of authorities in resolving a controversy, as well as their openness to alternative views or frames of reference" (Kitchener & King, 1981, p.104). To illustrate the logic of this developmental model, several aspects of the seven shifts in epistemic assumptions over time are briefly described as follows (King, Kitchener, Davison, Parker, & Wood, 1983):

> Stage 1 is characterized by a copy view of reality and knowledge, or the belief that there is an absolute correspondence between what is perceived and what is. Beliefs require little or no justification since it is assumed that one must only observe to know the truth.
>
> Stage 2 is characterized by the belief that there is an objective reality that can be known with certainty, but which is not known by everyone. Certain knowledge is seen as the domain of authorities who are presumed to know the truth, e.g., scientist, teacher (...) The individual moves from an egocentric single-category belief system, 'What I observe is true' to a two-category belief system: some beliefs are right and others are wrong.
>
> (...) Stage 3 offers further expansion of categories: right, wrong and uncertain. Alternative conceptions of reality, diverse points of view, different theories, etc.

are assimilated as areas of uncertain knowledge.

Stage 4 is characterized by the belief that while there is an objective reality, it cannot ever be known with certainty (...) knowledge claims are understood as being idiosyncratic to the individual.

Stage 5 (...) this belief [that knowledge is uncertain] is transferred to the realm of reality, with individuals claiming that reality can only be known through subjective interpretation of data.

[The major advancement in stage 6 is that] the individual has access to rules that allow him or her to make evaluations across these subcategories, e.g., choosing the position that has the more coherent argument or the less drastic consequences.

Stage 7 is characterized by the understanding that inquiry is an on-going process that can lead toward truth over the course of time and with the work of many individuals (...) as well as the inter- coordination of complex categories of reality and knowledge. (pp. 107-108)

Beyond the specific details of such models of epistemological development, several underlying assumptions can be detected and questioned, such as the assumption of normative or hierarchical stages, invariant sequences and domain-generality of individuals' epistemic stances. The common developmental thread of these models is the idea of an increasing awareness of the relativity of knowledge, but how the possibility of knowledge itself is 'saved' from "the unbounded relativism" of "anything goes" (Leadbeater, 1986, p. 292) differs from model to model, according to the contextual

constraints considered most important (e.g., personal commitment to a system of values in Perry's model, on-going critical inquiry and criticism of others, cultural-historical-ideological frames of reference, shared contexts of interpretation or paradigms, etc.)

Nevertheless, much theorizing around the complex issue of epistemological development remains largely speculative, and inevitably bound to the investigators' own epistemological assumptions. As Leadbeater (1986) noted with regard to adult cognition "we have little empirical support for believing these apparent differences in the resolution of unbounded relativism are either hierarchically ordered, representative of stylistic differences in reasoning, or associated with differing life experiences" (p.298).

Moreover, there is very little research on the development of epistemic stances prior to adolescence, except for investigations of specific metacognitive processes and of students' understanding of learning strategies. The link between young children's conceptions of mind - understood as representational but not yet as constructive - and adolescents' view of the relativity of knowledge and truth itself needs to be further specified and better explained in developmental research, by focusing on older children's emerging understanding of the interpretive dimension of our mental activities.

Epistemic development in childhood - understanding interpretive diversity

In terms of empirical research, several studies have addressed explicitly children's understanding of interpretation, their conceptualization of the subjective nature of the knowing process (see Carpendale & Chandler, 1996; Chandler & Lalonde, 1996; Pillow, 1991 for summaries of these studies). The majority of these studies used, as previously described, various tasks involving visual or verbal ambiguity, restricted informational

access (i.e., partial view of a scene, different onlooker histories, etc.) or prespecified characteristics/biases of the observers (e.g., liking or disliking characters in stories), to probe children's conceptualizations of interpretive diversity. Chandler and Lalonde (1996) cite research studies that indicate perspective taking (especially Flavell's 'level 2 perspective taking' - Flavell, 1978; Flavell, Everet, Crot, & Flavell, 1981) as precursor in children's understanding of interpretive diversity. However, showing an understanding of another's point of view in terms of visual perspective (i.e., asking the child how would a turtle laid out 'feet first' be seen by someone standing opposite the child) does not require realizing that different people find different meaning in the same objective matter of fact, because in this case they are simply exposed to a different phenomenal reality. The problem for the child is one about "different angles of regard" (Chandler & Lalonde, 1996, p. 121), which doesn't involve an appreciation of the subjectivity inherent in interpreting *the same phenomenal reality in different ways*. Focusing on interpretive diversity resulting from differential perceptual access (or visual perspective taking) is just the first step in examining the various sources people use for construing the possibility of interpretive differences.

If understanding subjectivity is based on conceiving our mental activity as essentially constructive, then any test of such understanding needs to probe for children's ability to acknowledge that the same phenomenal reality could afford multiple representations, *equally valid*. Based on this premise, Chandler and Lalonde (1996) put a different spin on tests of 'perspective taking' by presenting children with differences of opinion about a visual scene and asking them to evaluate those interpretations. More

precisely, to determine whether children can construe differences of opinion as justifiable markers of the interpretive character of people's mental activities, they shifted the focus of the test questions from asking children about the content of an observer's interpretation of a visual display to asking them to explain the possibility of different interpretations by different viewers who *disagree* about the identity of a picture. Using the method of 'droodles' based on covering a cartoonish drawing with a cardboard in which a window was cut to reveal only a nondescript detail of the picture, Chandler and Lalonde (1996) introduced an active disagreement between the responses of two protagonists (Raggedy Ann & Raggedy Andy) about the content of the drawing and asked children to justify those responses. The child participant had the opportunity to see the drawing in its entirety before the two protagonists were shown the restricted views. Only the 7-year-olds began to show an understanding that both protagonists could entertain different interpretations of the 'window', equally valid and different from their own, respectively. Those answers were classified as 'interpretive', while most younger children gave repetitive answers or 'reality error' answers, attributing to the two protagonists the belief which the informed child herself entertained.

Carpendale and Chandler (1996) further examined "the distinction between false belief understanding and subscribing to an interpretive theory of mind" (p.1686), suggesting a 'slow track' for a constructivist understanding of mental activity. A similar procedure using, instead of droodles, three different types of stimulus materials (i.e., homophones based on lexical ambiguity, ambiguous messages about the location of an object, and ambiguous pictorial stimuli - the duck/rabbit and rat/man reversible figures)

yielded similar results in terms of age-related differences. While all children over 5 years passed the false belief Maxi task, only 7-8 year-olds consistently passed the interpretation tasks.

Another series of recent studies shifted the focus from examining children's understanding of interpretive diversity related to built-in ambiguity of the stimuli, to their understanding that people form different beliefs resulting from internal or circumstantial characteristics of the perceiver. Taylor (1988) and Montgomery (1993) investigated whether children grasp the interpretive differences between perceivers/listeners that are due to age (i.e., adult, versus child versus baby). Both unambiguous (informative) and ambiguous (uninformative) messages or visual displays were used as stimulus material. Although 6-7-year-olds understood that an ambiguous message or picture was not informative, regardless of the listener or perceiver's age, before 8-9 years most children did not understand that the status of the perceivers themselves may influence the way a message or scene will be interpreted (e.g., they often erred by overattributing knowledge to babies).

In the same effort to examine children's understanding of interpretive diversity in relation to the status of the perceiver/listener, Pillow (1991) and colleagues (Pillow, & Weed, 1995) conducted several studies in which the characters of a series of stories were endowed with explicit prior beliefs, expectations or likes/dislikes about other protagonists in the stories, who committed morally or factually ambiguous acts. The child participant was asked to tell how the observer (the character with a known explicit bias) would interpret the deed of the protagonist whose ambiguous behavior is presented in the story

(e.g., as intentionally or accidentally producing damage). Not until the second grade were children able to consistently relate a character's interpretation of a social event to one's previous likes/dislikes and biases, thus showing an emerging understanding of the possibility and role of biased social cognition.

The results of these studies converge in showing that a truly constructivist understanding of mind emerges gradually over middle childhood, and is evidenced only when children consistently understand that psychological processes, subjective orientations mediate the experience of external events, especially social events. "How does this understanding come about and what are some of the factors involved in its development?" remain questions in need of further examination.

Narratives and psychological understanding

A different approach to investigating the development of psychological understanding is represented by research on children's comprehension and production of narratives, whether fictional or of personal experience. A long and rich tradition of exploring the many ways in which narratives constitute means for expressing the subjectivity and point of view of their authors, as well as of the protagonists and of the listeners/readers/tellers who interpret them, complements the relatively recent and restricted focus on children's conceptions of mental states as revealed in carefully constrained experimental contexts in the 'theory of mind' research paradigm.

What do narratives tell us about the mind?

In discussing "Some things that narratives tell us about the mind", Wallace Chafe

(1990) suggests that "narratives can be an important vehicle for mental research", because they give us evidence for "the fact that the mind does not record the world, but rather creates it according to its own mix of cultural and individual expectations" (p. 79-81). Consonant with Bruner's view of a narrative mode of thought (1986), Chafe draws attention to the ways in which narratives become means for expressing the subjective, interpretive nature of people's processes of making sense of experience, and thus, of "constituting reality". He illustrates this idea with reference to the research project named "The Pear stories" (Chafe, 1980; see Tannen, 1993) in which small groups of people from ten different countries were shown a short movie with no dialogue, presenting the following event:

> It showed a man picking pears from a tree, then descending and dumping them into one of three baskets on the ground. A boy comes by on a bicycle and steals a basket of pears. As he's riding away, he passes a girl on a bike, his hat flies off his head, and his bike overturns. Three boys appear and help him gather the pears. They find his hat and return it to him, and he gives them pears. The boys then pass the farmer who has just come down from the tree and discovered that his basket of pears is missing. He watches them walk by, eating pears. (p. 21)

As simple as this scene is, it affords multiple interpretations based on a variety of possible attributions of intentional states to the characters involved, and the people presented with the film offered very different narratives of the same visual input. Moreover, the participants "organized and altered the actual content of the movie in many ways" (Tannen, 1993, p. 21), according to their own structures of expectation. The researchers'

interest in this project was mainly in identifying the culturally constituted aspects of such structures of expectation, as well as how they get expressed linguistically in the subjects' retelling of the events as narratives.

In the same vein, research exploring the ways in which the use of linguistic devices may reflect interpretive, subjective stances expressed in different contexts of narrative activities, such as recounting personal experiences (Hudson & Shapiro, 1991; Labov & Waletzky, 1967; McCabe, Capron, & Peterson, 1990), reading and interpreting short stories (Feldman, Bruner, Kalmar, & Renderer, 1994; Leadbeater & Kuhn, 1989), writing, literacy and school work done individually and in collaboration (Daiute, 1995; Daiute & Dalton, 1993; Daiute & Griffin, 1993) brought a quasi-experimental, empirical approach to an area of inquiry which has been primarily the turf of literary theorists and philosophers of mind.

Frameworks and uses of narrative analysis

Psychologists' interest in the interpretive aspect of mental life as reflected in narrative activities, has emerged relatively recently, in conjunction with the 'Cognitive revolution' in the human sciences, marked by shifting the focus of attention from analyses of behavior, to the ways in which reality gets represented 'in people's minds'. As Fivush and Haden (1997) point out, "[w]ithin psychology, the study of narratives has emerged from two traditions, linguistics and cognitive schema models of memory" (p. 173).

The cognitive schema, or more specifically, story-grammar research has focused mainly on schematic organizations of the representation of events in narratives, and on their changes with development, assessed primarily through story production or recall

tasks (Mandler & Johnson, 1977; Rumelhart, 1975; Stein & Glenn, 1979; Trabasso, Stein, & Johnson, 1981). The most basic invariant components of a story schema – although somewhat different across story-grammar models – usually consist of setting information (introducing protagonists, specifying time and place), initiating events (some changes that evoke an internal response and trigger goal-directed actions by setting up a problem or obstacle), internal response, attempts to solve the problem and resolution of a problem or reaction to a problem or surprise action. Although the "inclusion of a protagonist who is motivated to carry out some type of goal-directed action, with the intention of attaining a goal" (Stein & Policastro, 1984, p. 118) is considered a defining feature of a prototypical story, in this framework the focus of analysis is on the conceptual-organizational aspects of **narrative structure** more than on the intentional landscape of the story or the subjective perspective of the author or audience on the events narrated.

The linguistic framework, on the other hand, emerged mainly from the work initiated by Labov and Waletzky (1967) on narratives of personal experience. In contrast to story grammars, "this approach focuses on the formal description of the language used to convey the occurrence and meaning of a narrated event to a listener, [based on] the assumption that narratives are interpersonal" (Fivush & Haden, 1997, p. 174). In order to convey to an audience an interesting, meaningful story (whether fictional or of personal experience) a narrative account must be organized around "high points", usually the points around which an obstacle, some surprising element that breaches expectations is about to be resolved in some way. In this "high-point" analysis framework (Labov &

Waletzky, 1967; Peterson & McCabe, 1983) the structural components of a good, complete narrative "include an orienting statement providing context, complicating action detailing the trouble that is the point of the story, an evaluation of the happening, a resolution, and perhaps a coda or formal ending" (Nelson, 1996, p.187). In this model, "narrative clauses", providing referential information regarding the successive events recounted and constituting the "event-line" or timeline of the narrative can be differentiated from "evaluative clauses", which provide "tributary information" (e.g., context, description of mental states, evaluated outcomes of actions, qualifiers, intensifiers, causality, etc.), disclosing the narrator's perspective on the events reported, and thus guiding the listener toward an interpretation of the events (Bamberg, 1991; Bamberg & Damrad-Frye, 1991).

In subsequent research, the analysis of evaluative devices has been emphasized and extended in several directions, and to all kinds of stories, personal, fictional, oral, written, collaborative, with careful interest for identifying developmental patterns in their use (Kernan, 1977; McCabe & Peterson, 1983; Umiker-Seboek, 1979), as well as patterns related to gender, ethnicity/race and a variety of sociocultural factors and contexts influential in shaping the choice and use of such devices (Daiute, 1995; Daiute & Griffin, 1993; Debold, 1995; Fivush, 1991; Miller,1994; Peterson & McCabe, 1983).

Moreover, in this line of research, investigators started to systematically explore individual differences marking subjective stances and interpretive profiles. For instance, well documented developmental changes in the use of internal state markers (including cognitions, emotions, feelings, perceptions, intentions, etc.) in narratives (Peterson &

McCabe, 1983; Stein & Policastro, 1984) have been shown to differ in relationship to type of narrative and context of elicitation (Hudson & Shapiro, 1990; McCabe, Capron, & Peterson, 1990), so that even 4-5-year-olds highlight what was emotional about an event and use markers of psychological causality in spontaneously elicited narratives of personal experience, while they almost never include information about characters' motivation, intentions, beliefs and other internal reactions in story reconstruction or retelling tasks during the preschool years (Stein & Glenn, 1979; Trabasso & Rodkin, 1994). As narrative activities involve a weaving of cognitive, affective and socio-cultural resources, their analysis could offer important insights for understanding children's expression of subjectivity, as well as their comprehension and interpretation of the intentionality and subjectivity of others, protagonists, authors, audience.

In summary, the essential contribution of narratives to our developing understanding of mind stems from their key role in providing means for organizing and making sense of experience, in ways that are consonant with culturally defined expectations about human behavior. More directly, narratives "provide psychological causality through explicit reference to characters' internal states, motivations, beliefs, and emotional reactions, and narratives provide individual meaning and personal significance through the explicit use of evaluative devices" (Fivush & Haden, 1997, p. 180). From this point of view, narrative analysis research has been very fruitful in showing when and how children come to manifest an awareness of the intentionality of others (and self) in stories and in life, as well as how they acquire and develop new means for comprehending and expressing internal states, perspective or 'voice' and subjectivity,

reflected in narrative activities.

In *narrative contexts*, the diversity of interpretive possibilities is inherent in the structure of events narrated, and could stem from the subjectivity imputed to the protagonists, as well as that of the narrator or listener/viewer/addressee. 'Somebody's point of view' becomes critical because the meaningfulness of narratives stems from the intentional structure underlying the events: motivations, goals and plans, intentions and desires, the 'unperceivable' stuff which is open to interpretation. For these reasons I believe that if we are to characterize children's emerging understanding of 'mind as an interpretive device', tests of visual perspective taking or ambiguous referential communication are less relevant than those based on narrative contexts in which human agency (not only differential access to information) is involved – and might account for opening the possibility of interpretive diversity. The 'evaluative components' of narratives have been considered markers of the personal, interpretive aspect of the author's perspective on the events narrated (e.g., Bamberg, 1991; Labov & Waletzky, 1967), and one of the dimensions through which the intentional premises of the actors' behaviors may be conveyed (Fox, 1991). In this respect, tasks meant to examine children's understanding of interpretive diversity would better approximate situations in which children might display such conceptual skills if they were 'contexted' in the form of narratives, which would require inferences regarding the intentional structure of the events presented.

However, narrative analyses as such could offer only indirect means for probing children's **epistemic positions** regarding how the mind works, how the process of

knowledge is conceived, how a concept of interpretation is developed. Thus, those who have been studying children's narratives in the context of early conversations about past events, or of literacy in school, and who have been working from the assumptions of Labov and Waletzky (1967), that the evaluative components reveal the narrator's and the protagonists' "subjectivity", have contributed to our understanding of how children express internal states and point of view in their stories and recognize internal states and subjective perspective in others. Nevertheless, as useful as this is to show that children are aware of the intentionality of others in story and in life, it does not provide specific evidence with respect to the development of their epistemic stances leading to an interpretive understanding of mind.

The making of narratives, whether of personal experience or fictional, whether in conversation, in writing or in recall tasks, represents a major vehicle for revealing how people offer different, sometimes multiple interpretations and use different linguistic and nonlinguistic devices to express their own subjective perspective on the events or to access others' implied psychological perspectives (Bamberg, 1991; Feldman et al, 1994; Tannen, 1980, 1993).

The interest of this study, though, is not in the recognition of the ways in which different people interpret the same reality and how they express their interpretive stances. The questions asked are related to children's ***epistemic positions*** with regard to matters of interpretation, such as whether children acknowledge that other people often legitimately engage in different interpretations of the same reality, how they arrive at this understanding, if they eventually do, as well as how they justify the epistemic stances

they take when confronted with interpretive discrepancies. Instead of exploring the participants' interpretive stances expressed in the subjectivity of their comprehension or production of narratives, this investigation focuses on children's epistemic stances with regard to how minds interpret reality, by putting the child-participant in the position of the observer of the multiple interpretations of others and asking her to make sense of this interpretive diversity. The issue at stake is a special construal of "subjectivity" in terms of the relativity of 'truth' to people's own orientations to events.

In particular, this study explored children's understanding of interpretive diversity resulting from the possibility of *ascribing different mental states to others, based on the same behavioral indices*. When and how do children start to understand that people engage in constructive interpretation of the underlying intentional structure of events, based on making attributions regarding the mental premises of people's behavior 'from a point of view'- were guiding questions for this investigation.

Aims of the present study

The present study proposed a way to probe the development of children's understanding of the interpretive aspect of mental activity, using several different measures and exploring relationships between the abilities they draw upon. First, I focused on how children made sense of two protagonists' *discrepant verbal accounts* of a simple event presented in a videotaped scene, in order to assess if and when children began to acknowledge the legitimacy of different interpretations of a certain behavior, and whether they located the sources of such interpretive diversity within the psychological

perspectives of the protagonists or in other aspects of the situation presented. Second, I compared children's understanding and explanations of interpretive diversity regarding *intentional premises of behavior* with their understanding and explanations of differences in interpretation in a 'non-intentional','non-social' domain, by administering a task which involved *perceptual interpretation* of double-meaning drawings. Finally, I related children's responses on the two 'interpretive tasks' to several factors considered relevant for the development of psychological understanding - such as narrative skills, language competence, and age. To this end, a story telling task and a standardized language development test were also administered.

The choice of two interpretive tasks with different content – one involving event-based interpretations of behavior and the other involving perception-based interpretation of reversible images – was motivated by an interest in exploring whether children's growing understanding of the possibility of interpretive diversity in different domains draws upon some general, age-related conceptual abilities - in which case one would expect similar performance on the two tasks within age groups; or whether it involves more specialized, domain-specific competencies, in which case children's performance on the two tasks would not necessarily be correlated.

The first interpretive task involved a scenario similar to that of the 'standard' false belief test known as 'unexpected transfer,' with several essential modifications, meant to probe children's understanding of the legitimacy of different interpretations (i.e., different attributions of intention) for the same action performed by a protagonist (who moves an object from one location to another). In the classic version of this task (Wimmer &

Perner, 1983) a protagonist, Maxi, puts some chocolate in a green cupboard and leaves the room. In his absence, another character (e.g., mother) moves the chocolate to a different location, a blue cupboard. The participants are asked to predict where Maxi *will look* for the chocolate when he returns to the room, or where Maxi *thinks* the chocolate is. The interest in this 'standard' form of the task is in examining children's ability to attribute a false belief about the location of the chocolate to Maxi, ability which has been shown to be in place only around or after four years of age.

In contrast, in the task chosen for this study a similar event is seen by the children, but includes showing the temporarily absent protagonist's behavior upon returning to the room (i.e., looking in the previous location). The characters' voices are not heard during the presentation of the event and their intentions are to be inferred by the viewers from the actions. Also, instead of 'the mother,' a 'sibling' moves a desired object (i.e., a cookie) from one place to another. This type of scenario invites observers' own interpretations of the intentional structure underlying the behaviors witnessed. Moreover, after the presentation of this event, and after children are asked to retell what happened in the film, the two protagonists (hand-puppets) reappear on the screen presenting their discordant accounts of the intentions involved in moving the cookie, according to condition. Both puppets tell their version successively, in systematic combinations of discordant interpretations.

Major research questions

The focus of the event-based interpretive task was the child's emerging understanding that different people can construct different representations of the same

event according to their subjective attributions of intentionality, and that such interpretations are not necessarily subject to arbitration by comparison to any 'true' version. In order to probe the emergence of this understanding, children were asked to explain why each protagonist told a different version of what happened, either attributing a deceptive intent to the other character (e.g., hiding the cookie), or attributing good intentions which resulted in misunderstandings (e.g., moving the cookie to save it for later sharing), but always in contrast with that character's own declaration of intention. "How do children make sense of this interpretive diversity?" – constitutes the main question around which the study was organized. In particular, the following research questions guided this investigation:

1) Is there a developmental progression from children's early attempts to choose between 'a wrong' and 'a correct' version, evolving toward understanding the possibility of multiple interpretations (i.e., different attributions of intention) as equally valid – given the psychological perspectives of the protagonists –, but derived from different motivations or intent-attributions?

2) Which are the main sources of interpretive differences spontaneously identified by children in a situation involving discrepant accounts of intention, as well as in a situation involving different perceptual representations?

3) Do children take into account people's psychological perspectives as relevant for evaluating diversity in interpretation beyond informational access differences?

4) What are the relationships between interpretive understanding abilities and linguistic and narrative skills at different developmental moments?

The second, perceptual-based interpretive task, required similar explanations regarding the possibility and legitimacy of three different interpretations, voiced by puppets, of a reversible-image (two plausible interpretations and one clearly implausible). This second task set up a situation in which similar questions were asked in a different context, which did not involve judgements about human actions.

Assumptions and main expectations

A guiding assumption of this investigation was that children's evolving understanding of the mental world depends on their increasing familiarity with the *complexities of sociality*, with the gradual change from viewing people just as participants in events (actors in a landscape of actions), to viewing them as interpreters of their experiences, or intentional agents carrying out motivated actions meant to influence others' mental states and, consequently, their behavior. From this perspective, an interpretive or constructivist concept of mind most likely emerges from experiences with the intentional diversity which, for instance, family interactions, conversations and play may afford, or narratives may convey through their "dual landscape" of actions and of consciousness (Bruner, 1986). More specific implications derive from this view, such as the following conjectures:

a) Understanding that people may hold different representations of the same situation, may give different meanings to the same experience – that people are subjective beings – comes about in the process of differentiating self from others, primarily through: 1. talk about experiences - i.e., communicating representations (possibly discrepant about a shared experience) between people; 2. increasing familiarity with narrative renderings of

events, which involve: intentionality (protagonists' motivated actions), causality (in the sequencing of events-outcomes of actions), evaluations (the 'meaning' of the experience for people), and an evaluative dimension or subjective perspective in interpreting the 'happenings' when telling a narrative (point of view of narrator).

b) The progress from a 'copy-model' understanding of representation to an interpretive understanding of mind is mediated by increasing competence in the *use of language* as a medium for rendering discrepant representations of events. Language permits making explicit differences in unobservable mental states and thus, in underlying motivations of actions – bringing about the possibility of conceiving the mind as a constructive, subjective agency in human interaction. It was therefore expected that linguistic competence and narrative skills may be related to the development of an interpretive understanding of mind, a hypothesis explored in this study.

The expectations regarding age-related differences in judging how it is possible for people to have different interpretations of the same event were supported by the findings of this study. Differences were expected along the following lines:

1. Young children (6-7-year-olds) would not distinguish the perspectives of the two protagonists involved in the scene as reflecting differences in attributions of mental states and intentionality, and thus, as equally valid subjective interpretations. They would try to choose a 'correct version' of the event, either by projecting their own understanding of the scenario as unique possible representation of the event, or by adopting the interpretation of one of the protagonists.

2. Older children (8-9-year-olds) would acknowledge the possibility of the two

protagonists to interpret the same action differently, because people can be wrong about the 'real' underlying motives involved in a behavior - without fully justifying the source of this, thus displaying an unqualified subjective orientation (e.g., people can be right or wrong according to their knowledge and beliefs in a certain situation, but cannot have different *valid* interpretations of the same experience).

3. Yet older children would acknowledge the reasons behind the discrepant interpretations of the same event offered by each protagonist - both in the incompleteness of their knowledge of the situation ***and*** in their subjective attributions of intention to other protagonists. They would justify their own interpretation (possibly different from those of the protagonists) as due either to their different access to the overall structure of the event, or/and to the subjective nature of meaning-making processes.

CHAPTER II

METHOD

Participants

One hundred and twenty-three children between the ages of 6 and 11 were recruited from six after-school and summer-camp programs in Cambridge[3]/Boston (MA) and the surrounding area. Eleven children (5 6-year-olds, 3 8-year-olds and 3 9-year-olds) participated only in one of the two interviewing sessions and completed only the two interpretive tasks (tasks 1 and 2), so they were not included in the final analyses. However, the transcripts of their responses on those two tasks were used (together with the transcripts from the pilot study - see Appendix A for details of the pilot work) in developing the coding categories for the interpretive tasks and in training a second coder for inter-rater reliability purposes. The remaining 112 participants (50 boys and 62 girls) were divided into three age groups:

(I) 48 6-7½-year-olds (M = 6 years, 9 months, range = 6.0 - 7.6; 19 boys and 20 girls);

(II) 48 7½- 9-year-olds (M = 8.2, range = 7.7 - 9.0; 20 boys and 28 girls) and

(III) 16 older children: 9-10½-year olds (M = 9.9, range = 9.1 - 10.11; 11 boys, 5 girls).

All children used English as their first language. A relatively broad socioeconomic range was represented in the sample, although all children attended public schools. The sample's ethnic composition was 56% European-American, 25% African-American, 9%

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[3] Although all children attended public schools, two of the schools served predominantly children from professional middle-class families, one after-school-care program enrolled predominantly children from lower income and working-class backgrounds, while the others had a mixed student composition drawn from middle-class and working-class families.

Latino-American, 6.3% Asian-American and 3.7% mixed race or other. Only children who had their parents' signed informed consent and who gave their own verbal assent for participation were included in this research.

Stimulus materials

1. Event-based interpretive task. For the first interpretive task a short video was produced, presenting a modified film version of the "Maxi task" with three puppets (Emma, Peter and their Mother) as protagonists. The video is 4 minutes long and shows a miniature kitchen where 'the mother-puppet' brings in a bag of groceries. Either Emma or Peter, according to **scenario-condition (version A or B)**, is present and begins to help unpack the groceries, while the other puppet brings in a big box. The sibling-puppets (Emma and Peter) open the box and find a big cookie in it. At that time the mother calls one of the protagonists (P1) out (i.e., Peter in *Version A*, Emma in *Version B* of the scenario). The telephone rings and the other sibling (P2) leaves the cookie in the box and goes to answer the telephone outside the kitchen. In the meantime the first protagonist (P1) returns with another bag of groceries and starts unpacking. A rice bag just unpacked is broken, and the puppet takes the cookie out of the box and puts it away in a drawer, and then puts the rice bag into the cookie box, then leaves the kitchen. The puppet who went to answer the phone (P2) returns to the kitchen, looks for the cookie in the box but finds only rice in the box. The movie stops on this scene. The soundtrack of the video is constituted by the voice of a narrator who tells the following story while the corresponding action is unfolding:

Version A

One day mom came home with groceries. There she is, going into the kitchen. Emma is there to help out. Peter brings in a box. Look, they open it ...and there is a big round cookie in it. They both like cookies. Now see, mom has more groceries in the car and she calls Peter to go and help her with the other things. So, Peter leaves the kitchen to go to the car. There is Emma with the cookie in her hand. The telephone is ringing, so Emma puts the cookie back in the box, and goes to the other room, to answer the phone. Here comes Peter again... He's bringing in some more groceries. Now he has a rice bag in his hand. Look, the bag is broken, the rice is pouring out. He takes the cookie out of the box, he puts the cookie away in the drawer, and then he puts the rice in the cookie box.... Then he goes outside. Look, Emma is coming back, she has been talking on the phone in the other room, remember? She goes to the box, remember what she's looking for? - the big round cookie. But there is rice in the box.

In scenario-version B the two sibling-puppets play reverse roles, everything else being identical. After seeing the film, children were asked to retell what happened (with prompting if needed), and then they watched a second part of the videotape, in which each of the two sibling-protagonists appeared on the screen and told his/her version of what happened. More specifically, the puppet who moved the cookie to the drawer appeared first (P1) declaring either his/her intention to hide the cookie, or his/her intention to save the cookie to share it later, according to **condition (I or II).** Next appeared the other sibling-puppet (P2) who *always attributed a discrepant intention to the sibling who had moved the cookie from the one he/she declared.* Throughout this report the puppet who moves the cookie - regardless of gender - is referred to as Protagonist 1 (P1) while his/her sibling is referred to as Protagonist 2 (P2).

Thus, in **Condition I** the protagonists' discrepant accounts are represented by the first puppet (P1) *declaring deceptive intent* (i.e., to hide the cookie from his/her sibling),

while the second puppet (P2) *attributes good intention to his/her sibling* (i.e., to save the cookie for sharing it later). In **Condition II** the first protagonist (P1) *declares good intentions* (i.e., to save the cookie to share it later), while the second puppet (P2) *attributes to him/her deceptive intent* (i.e., to hide the cookie). Within each age group participants were distributed randomly, but in equal numbers, between the two conditions and scenario-versions described above (see procedure).

2. Perception-based interpretive task. The second interpretive task (modeled after Carpendale & Chandler, 1996) involved showing children the classic 'man-mouse' reversible figure (Bugelski, 1960 – see figure 5 in Appendix B) and asking them whether it made sense or not for two puppets to endorse each, one of the two 'readily available interpretations' of the ambiguous image, to explain their answer, to predict another child's interpretation of the line drawing and to evaluate a third puppet's unlikely ('deviant') interpretation of the same stimulus. In cases where the child had difficulties identifying both the mouse and the man in the double-meaning drawing, the 'duck-rabbit' (Attneave, 1974; Jastrow, 1900) reversible figure was used instead. This was necessary only for 6 participants.

3. Narrative task. A wordless picture book - "Frog, where are you?" (Mayer, 1969) was used to elicit story narratives from participants. The book consists of 24 pictures showing a boy and his dog searching through a forest for a pet frog which escaped from a jar. During the search the protagonists go through a series of adventures involving interacting with animals, mistaken identity and finally finding the lost frog reunited with an entire family of frogs. The book was chosen because it depicts a variety

of situations in which the emotional and cognitive states of the protagonists could be inferred, and because it has been widely used in other developmental research on children's narrative competencies (e.g., Bamberg, 1991; Bamberg & Damrad-Frye, 1991; Berman, 1988; Berman & Slobin, 1994; Tager-Flusberg, 1995).

4. Language competence test. The Formulated Sentences subtest of the Clinical Evaluation of Language Fundamentals - Revised (CELF-R; Semel, Wiig, & Secord, 1987) was used as a measure of participants' *expressive language* ability. The material consists of 22 test items represented by words or short phrases which the participants must use each in a sentence. Testing was interrupted after 5 consecutive incorrect responses, as required by the testing instructions. The Listening to Paragraphs subtest of the CELF-R was used as a measure of children's *receptive language* competence. The subtest consists of two brief narratives followed each by five questions about the content of the respective paragraph. All ten questions were administered and responses marked as correct or incorrect. The test provides different age-appropriate paragraphs that have been standardized for each two-year age interval from 6 to 14 years of age.

Procedure

Participants were interviewed individually in a quiet room provided with a VCR, at the location of the after-school or camp program (usually the child's school), by one female researcher. All the interviews were audio taped and later transcribed verbatim. Children participated in two testing sessions taking place about a week apart and lasting approximately 20-30 minutes each. In the first session each child watched one of the two

versions of the modified 'unexpected change of location scenario' in which a cookie was moved from a box to a drawer by one of the protagonists (P1) in the absence of the other (P2). Children received the following instructions:

E: "We are going to watch a short video with a little girl Emma, a little boy, Peter, and their mother. I'd like you to watch it carefully so that you remember what is happening in it. I need you to help me afterwards by answering some questions about this video".

In all conditions the child was first asked to recount what happened in the video (with prompting if needed). The instructions were: "Now tell me what happened in the film. Just tell me in your own words whatever you can remember from what we watched". If the participant didn't mention the essential moments of the event – the cookie being moved from the box to the drawer and the fact that the protagonist who had been away answering the phone (P2) looked for the cookie at its previous location – the experimenter asked questions about these specific moments, probing the child's understanding of the second protagonist's false belief (e.g., "What did Peter do when Emma was not in the kitchen, when she was speaking on the phone in the other room?"; "Why did Emma look in the box when she came back from the other room?").

Half of the children in each age group viewed **Version A** ("Peter moves the cookie") of the scenario in which the boy puts away the cookie, while the other half of the participants watched the version in which the girl puts away the cookie, **Version B** ("Emma moves the cookie"). This manipulation was intended to control for the effect of the protagonists' gender on children's judgements of the characters' intention-attributions. However, statistical analyses of children's responses for this task showed that the gender

of the puppet did not make a difference in children's judgements of intentionality, therefore versions A and B of the scenario will be considered together in all analyses.

After this 'pretest' meant to assure the participants' remembering of the event, each child, according to 'Verbal account-condition' (I or II) , watched and listened to the successive verbal accounts of Peter and Emma telling us about what happened that day. Participants in each age group were randomly assigned to one of the two conditions defined by the pairing of the protagonists' verbal accounts of the event. The puppets' accounts contained discrepant attributions of intentions, paired in the following combinations:

Condition I: Discrepant condition in which P1 declares deceptive intentions, while P2 attributes to him/her good intentions

Version A: (P1 = Peter; P2 = Emma)

Peter's account (P1):

That day mom came home from shopping and we helped her unpack the groceries. I brought in a box, and in this box there was a big cookie. I really like cookies. Then mom asked me to help her with the other groceries so I went outside to the car. When I came back to the kitchen, I hid the cookie in the drawer so Emma wouldn't know where it was. This way I could eat it all by myself later. I wanted to play a trick on her!

Emma's account (P2):

That day mom came home from shopping and we helped her unpack the groceries. Peter brought in a box and in this box there was a big cookie. I really like cookies. Peter went out to get more bags from the car and I had to go answer the phone, it was ringing in the other room. Then I came back to the kitchen for the cookie...So I looked in the box, but I found rice in there, not the cookie. Then I looked and looked and found the cookie in the drawer. Silly me! Of course, Peter must have put it there to save it so we could both eat it later, 'cause he needed to use the box for the rice.

Version B: everything identical to Version A, except that the puppets play reverse roles: P1 = Emma; P2 = Peter.

After viewing and listening to these discrepant accounts, children answered a series of questions (both open-ended and forced-choice) regarding the protagonists' declared and attributed intentions, followed by a critical question about how it was possible for the two characters to say different things about the event (i.e., to construe intentions differently). The following questions were asked for **Condition I, Version A**: (1) Did Peter want to share the cookie later with Emma, or did he want to hide the cookie from Emma and eat it by himself? (2) How can you tell? (3) What did Emma think? (with prompting, if needed: Why did Emma think Peter moved the cookie to the drawer? What did she say? Why did Emma think/say so?) (4) Was Peter being nice or was he being selfish? Why so? How can you tell? (5) Did Emma think Peter was being selfish or did she think Peter was being nice? Why so? How can you tell? (6) So, Peter said he moved the cookie to the drawer to hide it and play a trick on Emma. Emma said that Peter moved the cookie because he needed the box for the rice and was going to share the cookie with her later. How could that be? How come they said different things? (7) What do you think Emma will do next?

Condition II: Discrepant condition in which P1 declares good intentions while P2 attributes to him/her deceptive intent.

Version A: (P1 = Peter; P2 = Emma)

Peter's account:

That day mom came home from shopping and we helped her unpack the groceries.

I brought in a box and in this box there was a big cookie. I really like cookies. Then mom asked me to help her with the other groceries, so I went outside to the car. When I came back to the kitchen with more things, I needed a box to put the rice in it, so I moved the cookie into the drawer. I was going to tell Emma about it later, so we could share the cookie. I know how much she likes cookies!

Emma's account:

That day mom came home from shopping and we helped her unpack the groceries. Peter brought in a box, and in this box there was a big cookie. I really like cookies. Then Peter went out to get more bags from the car and I had to go answer the phone, it was ringing in the other room. Then I came back to the kitchen for the cookie. So I looked in the box, but I found rice in there, not the cookie. Then I looked and looked and found the cookie in the drawer. See, Peter wanted to trick me. He hid the cookie from me, in the drawer, so HE could eat it ALL by himself! Selfish Peter!

The following questions were then asked (the same as in condition I, except for the 6th): (1) Did Peter want to share the cookie later with Emma, or did he want to hide the cookie from Emma? (2) How can you tell? (3) What did Emma think? (with prompting, if needed: Why did Emma think Peter moved the cookie to the drawer? What did she say? Why did Emma think/say so?) (4) Was Peter being nice or was he being selfish? What do you think? (5) Did Emma think Peter was being selfish or did she think Peter was being nice? Why so? How can you tell? (6) So Peter said he moved the cookie because he needed to put the rice in the box and that he was going to share the cookie later with Emma. Emma said that Peter wanted to play a trick on her and hid the cookie in the drawer. How could that be? How come they said different things? (7) What do you think Emma will do next?

Version B: (P1 = Emma; P2 = Peter) Similar combinations of discrepant accounts and following questions were devised for scenario-version B in which the two puppets, Emma

and Peter, reversed their roles, all else being identical.

After answering this series of questions the participants were told that there was something else for them to see. The experimenter then placed a postcard size drawing of the 'man-mouse' reversible image (see figure 5 in Appendix A) in front of the child and then asked: "What do you think it is? " If the child offered only one interpretation, she or he was helped to 'see' the other figure by probing questions: "Could it be anything else? What if this is...(some detail of the drawing, e.g., a tail)?" Then two puppets (Mike and Mary) were presented to the child and each endorsed only one of the two interpretations. The child was asked if it made sense for Mary to think it's a man with glasses and for Mike to think it's a mouse[4]. The order of the puppets' interpretations was counterbalanced across participants. Each child was then asked a series of 3 questions: (1) ***Explanation*** question:"Why does (doesn't) it make sense?" (2) ***Prediction*** question: "If we show this drawing to another child what would the child think it is, or wouldn't you know what he or she'd first think?" If the participant made a definite prediction, the experimenter followed up with these questions: "How sure are you they'd say that: very very sure or not so sure?" and, depending on the answer "Why not?" or "How can you tell

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[4] This task was modeled after Carpendale & Chandler (1996), but using a different question format, because in the pilot study children tended to interpret the question "Is it okay for Mary to say it's a mouse and Mike to say it's a man?" in terms of permission (e.g., "Is Mary allowed to say ...etc."). To avoid this possible understanding of the question I replaced the phrase "Is it okay..?" with "Does it make sense for Mary to think it's a duck and for Mike...etc." which more clearly asks for a judgement about the validity of different interpretations of the same stimulus, instead of the permissibility of a verbal behavior. The authors mentioned above adopted a similar question modification in a second experiment reported, based on the same test.

for sure?" (3) ***Evaluation*** **of** an unlikely, ***deviant interpretation***. Then a third puppet was shown to the child and this puppet endorsed a very unlikely interpretation of the drawing (i.e., giraffe). The child was asked: "Jane here thinks it is a giraffe. Does it make sense for Jane to say it's a giraffe or doesn't it make sense? Why does/doesn't it make sense?"

In a second session, approximately a week later, each child was presented with the picture book "Frog, where are you?" (Mayer, 1968) and given the following instructions: "Here is a book with pictures. This book tells a story about a boy, a dog and a frog. First, I want you to look at all the pictures and then tell the story. You can still look at the pictures as you go along." Only if children interrupted their telling abruptly, general prompts were used, such as "What else?", "Go on...", "Is that all?".

After completing the storytelling task children were administered the two subtests (Formulated Sentences and Listening to Paragraphs) from the standardized language development test CELF-R.

Coding and scoring interpretive- task measures

Based on pilot work and on eleven transcripts from participants not included in the final data analyses, a coding manual was developed for analyzing children's responses to the interpretive tasks (see complete Coding Manual in Appendix A). The main interest in coding was to capture children's reasoning about the possibility of interpretive diversity in the intentional and the perceptual domains, so I focused on the content of their judgements, as opposed to scoring responses on a pass/fail basis according to a predetermined answer format.

For inter-rater reliability purposes 22 transcripts (20% of data) were coded by an independent second rater who was uninformed of the children's ages and goals of the study. For each measure inter-rater agreement was calculated as the total number of agreements divided by the total number of agreements + disagreements. The appropriate numbers are reported for each specific measure. All disagreements were resolved by discussion between raters.

TASK 1 . Event-based/intentional interpretive task

First, children's own retelling of the videotape scene was coded in terms of the following three measures:

1. Narrative type of child's own account of the scenario. Each child's retelling of the video-scenario was assigned one of three overall scores[5]: 0 = *no narrative* – if the child failed to produce a coherent account, mentioning some moments of the video scene in random order; 1 = *action-only narratives* – in which children did not spontaneously mention the protagonists' possible motives for actions but related only the happenings in temporal sequence; 2 = *intentional narratives* – in which the child spontaneously mentioned the protagonists' possible motives for actions or used other mental-state terms. Inter-rater reliability for this measure was 85.4%.

See Table 1 for examples of these narrative- types.

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It should be noted that this measure, although coded as categorical, could be considered along a continuous dimension of narrative competence or complexity, progressing from unstructured accounts of events, to increasing awareness of the mental landscape underlying those events. In this sense, at least an ordinal measurement scale could apply for this variable.

Table 1. Examples of Narrative-types of Children's Own Account of the Event

Type of account	Score	Example
No narrative	0	C*: Uhm, Peter put the cookie away. R**: What else? C: Later he had gone to...he put the rice in the box. R: What else happened? Do you remember what the girl did, Emma? C: She opened the box and found rice in there. R: Why did she do that? C: 'Cause she wanted the cookie.
Action-only narrative	1	C: Well, mommy came home and she had some groceries. She put them on the table and then she went back outside. And Emma came in with a box. And then the boy, uhm...., Peter came in, and they opened the box and there was a cookie in the box. Then mom called Peter to come help her with the groceries. And Emma was by herself, and the phone started ringing and she went to answer the phone. And Peter came back and..he had some groceries to put on the table. And there was rice and it had a hole in the bag. So Peter took out the cookie and put it in the drawer. He put the rice in the box and then went out. And then Emma came back and she looked in the box. But the cookie wasn't there. That's it.
Intentional narrative	2	C: Well, uh, Emma, she *wanted* the cookie, and Peter, he needed somewhere to put the rice. So he *hid* the cookie, maybe he *wanted* to have it later, but he *didn't want* Emma to have it, so he put the rice in the place where it [the cookie] was. And then when Emma came back off of the phone, she went to get the cookie, but she found the rice there instead. And she *wondered* where did the cookie go.

* C = child ** R = researcher

2. Intentional content of the child's own account of the scene. Considering both the children's spontaneous retelling of the video scene and their answers to the prompt questions, when those were needed, the *number of mental state words* used by participants was counted, scoring each such term as 1 point, and scoring as 2 points any mention of a 2nd order-belief term (e.g., Peter *knew* that Emma would *think he hid* the cookie). Inter-rater agreement was 73% on this measure.

Of particular interest was whether the child spontaneously attributed a certain intention to the protagonist who moved the cookie (P1), attribution which was then considered separately and categorized as either 'deceptive intent' (i.e., to hide the cookie), or 'good intent' (i.e., to prevent the rice from spilling). As more than one attribution is possible, the number of spontaneous attributions of intention to P1 for each child was also noted.

3. Explanation for the 2nd protagonist's false belief (P2). If children did not comment spontaneously on the 2nd protagonist's behavior as being motivated by a false belief, they were asked: "Why did (P2) look in the box?". Answers were coded as follows: 0 = no reason given, 'don't know'; 1 = thinking based on misinformation (P2 didn't know, thought it was there); 2 = lack of perceptual access (P2 didn't see her moving the cookie); 3 = last action performed (P2 left it there/in the box); 4 = other - implying an understanding of P2's false belief (P2 wanted the cookie).

As some children mentioned more than one of the above types of explanation, the number of justifications offered by each participant was also noted.

Inter-rater agreement was 82.5%.

In summary, the variables defined for analyzing the child's own retelling of the

video-scene were: 1. Narrative-type account (0; 1; 2); 2. Intentional content of the child's own account (0 to n), and separately noted, the child's spontaneous attribution of intention to Protagonist 1 (1; 2); 3. Explanation for P2's false belief (0; 1; 2; 3 ; 4;) and number of explanations mentioned (0 to n).

In the second part of this event-based interpretive task, after hearing the discrepant accounts of the two protagonists, paired according to condition (I or II), participants answered a series of questions meant to probe:

1. Children's own attribution of intention to Protagonist 1 and evaluation of that protagonist's behavior **after hearing both characters' verbal accounts.** Justification for the response was also required. Children's *attributions* [based on their answers to the questions: (Q1) Did P1 want to share the cookie later with P2, or did he/she want to hide the cookie from P2?, and (Q4) Was P1 being nice or was s/he being selfish?] were coded as follows: 1 = if the child's attribution of intention accords with P1's account; 2 = if the child's attribution of intention accords with P2's attribution .

Raters agreed 100% in coding for this measure.

Children's *justifications* [from answers to (Q2) How can you tell?] were coded as: 0 = 'don't know' or no reason; 1 = P1's declaration (e.g., P1 said so); 2 = personality traits of P1 (e.g., likes to play tricks, is nice); 3 = repetition/recounting of P1's action.

Inter-rater agreement was 98% for this measure .

2. Children's remembering of the declared and attributed intentions mentioned by the two protagonists in their different verbal accounts of the event. This control question (i.e.,

"What did P2 think?"), was scored as 0 = incorrect or 1 = correct.

Raters agreed 100% in coding for this measure.

3. Children's justification for the 2nd protagonist's attribution of intention to P1. The following categories of response to the questions regarding P2's evaluation of P1's behavior emerged [i.e., justifications for their answer to (Q5) "Did P2 think P1 was being selfish or did s/he think P1 was being nice? Why so? How can you tell?"]:

0 = no reason given, 'don't know'; 1 = lack of direct knowledge of someone else's intention (e.g., P2 didn't know P1's intent); 2 = protagonists' personality traits or inferences based on personality traits (e.g., P2 thought that P1 would play tricks on her); 3 = protagonists' wishes (e.g., P2 wanted the cookie too); 4 = repetition of P1 's action; 5 = communication gap/lack of informational source (e.g., P1 didn't tell P2).

Initial inter-rater agreement was 62.5 % for this measure, improved to 100% through further discussion.

4. Children's understanding of the possibility that people may arrive at different interpretations of the same action due to the opaque nature of intentions and the subjectivity of attributional processes. The 6th question of the interview – which briefly reiterates the two puppets' discrepant accounts of the intentions behind moving the cookie, and asks participants to explain 'how come they said such different things'– was critical for probing children's interpretive understanding, and responses to this question were coded in two ways:

a) ***Types of explanation*** for why the two protagonists could arrive at such

different interpretations of the event, coded as:[6]

0 = no reason, 'don't know'; 1 = relativist/subjectivist explanation (e.g., they are different people, think differently); 2 = informational source explanation (e.g., lack of direct perceptual access - P2 didn't see P1's action); 3 = intentional/personality-related explanation (e.g., people know their own mind but not another person's mind; P2 knows that P1 often likes to play tricks, etc.); 4 = other (e.g., it is a puppet show).

Raters agreed 91.7% in coding children's types of explanation for the discrepancy in the accounts of the two protagonists.

b) ***Main score*** for the 1st interpretive task, obtained by summing, for each participant, all the explanations given, after ranking and scoring the types of explanation as follows:

(i) 0 points for noninterpretive responses (e.g., participant considers one verbal account wrong and unjustifiable or fails to provide any reason why the two protagonists could arrive at discrepant interpretations of the event);

(ii) 1 point for relativist/subjectivist explanations only;

(iii) 2 points for informational source explanations;

(iv) 2 points for intentional explanations.

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Although initially coded as a categorical variable, when considering this measure along an underlying 'complexity dimension' (from 'no explanation' to explanations reflecting an awareness of mental-state characteristics), the types of justifications lend themselves to being ordered from less to more complex explanations; in some statistical analyses this measure was recoded as ordinal, considering the response type 'other' as 0.5 point, since it reveals less sophisticated reasoning about the possibility of multiple interpretations of an event than the other justification types; the resulting values, treated as scores were: 0; 0.5; 1; 2.

Thus, a child using three different types of explanation could obtain a main score of 5 (e.g., "Well, they are different people and they can't read each other's mind, and Emma didn't see Peter move the cookie, so she thought he wanted to hide it, she didn't know that he wanted to save it - and he just didn't tell her about it" or "They are brother and sister and they probably like to play tricks on each other, so she thought he hid the cookie when she was out of the room. But he didn't, they thought different things because they're not the same person"). Inter-rater agreement was 86.5% for this measure.

5. Children's prediction of the outcome of the scene by inferring P2's behavior [(Q7): What do you think P2 will do next?]. Categories of response were: 0 = 'don't know'; 1 = hiding/taking the cookie for self/revenge; 2 = sharing; 3 = emotions (e.g., getting mad, upset, feeling sorry); 4 = external resolve (e.g., telling mom); 5 = discussion, negotiation (e.g., talk about and clarify intentions).

As many children mentioned several possible outcomes, their total number of suggestions was also noted. Inter-rater agreement was 80% on this measure.

TASK 2 . Perceptual interpretive task

1. Ambiguous/double-meaning visual figures (modeled after Carpendale & Chandler, 1996). The "duck-rabbit" and the "man-mouse" drawings are double-meaning/reversible figures that call for two and only two different, equally valid interpretations (see figure 5 in Appendix A). Answers to the question asking whether both puppets' interpretations of the drawing made sense were scored as *fail* – if the child considered that it was not possible to sustain different interpretations (because one was wrong), and *pass* – if the

child considered that both interpretations made sense. Raters' agreement was 100%.

2. For the *explanation question* children's answers were scored as follows:

0 = no reason for either response to the 1st question (i.e., that the 2 interpretations made or didn't make sense); 0.5 = if the child, reluctant to declare both interpretations legitimate, tried to give some sound reason why only one interpretation made sense (e.g., If you look really carefully, it looks more like a mouse because this is the tail); 1 = if the child referred only to the relativity/subjectivity of personal opinions (e.g., they have different minds, they think differently); 2 = if both interpretations were considered valid based on the nature of the stimulus (e.g., it looks like both things).

If the child offered both the subjective/relativist and stimulus-grounded explanations, a score of 3 could be obtained for this particular question (1 + 2 from above). Inter-rater agreement was 93.75% in scoring responses to this question.

3. For the *prediction question* responses were scored as follows:

0 = if child made a precise prediction with certainty (i.e., s/he was very very sure about what another child would think it is); 0.5 = if child didn't make a certain prediction but offered no explanation for why it was hard to do so; 1 = if child didn't make a precise prediction and explained why it was impossible to do so. Coders' agreement was 94.3%.

4. For the *'deviant' interpretation question* answers were scored as follows:

0 = if the child considered the deviant interpretation to make sense, or not to, but could not explain why; 0.5 = if the child considered that the deviant interpretation made sense because of the relativity/subjectivity of personal opinions (e.g., if that's what she sees in it, she could think it is whatever she wants; people can see things very different[ly]...);

1 = if the child considered that the deviant interpretation didn't make sense and referred to the nature of the stimulus to justify why (e.g., it doesn't look like a giraffe because it doesn't have a long neck; it looks nothing like a giraffe, she's just making it up).

Coders' agreement was 98% in judging responses to this question.

5. Overall score for task 2. By summing the points scored on the *explanation, prediction* and *evaluation of the deviant interpretation* questions each child obtained an overall score (of maximum 5 points) for this 2nd interpretive task, that was based on judging perceptual interpretations.

TASK 3. "Frog story"-based narrative task measure

Children's stories based on a wordless picture book were elicited as a parallel, independent measure of competence in narrative production. Since my main concern was to investigate relationships between children's narrative discourse abilities and their developing psychological understanding, in particular the development of an interpretive theory of mind, I devised a coding schema meant to assess both aspects of the structural organization/complexity of the narratives, as well as specific content elements indicative of taking a mentalistic stance (such as use of mental state/intentional terms, use of socio-cognitive devices – inference, causality, negatives –, and use of affective enhancers). Starting from the coding schema described in Tager-Flusberg (1995) and Charman and Shmueli-Goetz (1998), I decided to use the following measures of narrative competence:

1. *Length of narrative*- represented by total number of propositions. A proposition is defined as a verb and its arguments (Stein & Glenn, 1979). See Coding Manual in

Appendix A for details and examples.

2. *Narrative structure*[7]. This variable was intended to convey a measure of children's competence for organizing story information into integrated, meaningful narratives. Children's ability to construct meaningful, well defined narratives, was considered to be reflected in the presence of several components of story-schema (Mandler, 1984; Mandler & Johnson, 1977; McGeough, 1992; Stein & Glenn, 1979; Trabasso & Rodkin, 1994) such as: a) setting information (e.g., the boy and the dog got a frog, they look at a frog); b) instantiation (frog escapes); c) theme (search for frog); d) obstacles (at least 3 such events - e.g. interaction with various animals); e) resolution (finding the frog); f) formal opening or ending. Each of these components received a score of 1 if present (0 if absent), leading to a **story structure score** between 0 and 6. Inter-rater agreement for this measure was 92.5%.

3. *Content components.* The evaluative devices used by children were classified into the following categories, with each mentioning of the respective element being counted within each narrative: a) *Intentional components* – defined as any references to mental states (cognitions, desire, volition, planning, intention, etc.) and intended

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[7] In defining this measure I departed from the coding schemas mentioned above (Tager-Flusberg, 1995; Charman & Shmueli-Goetz,1998) - which rely heavily on children's ability or willingness to follow conventions of story telling, by awarding 1 point each for the presence of a formal opening ('Once upon a time...') and of a formal ending ('They lived happily ever after..', 'The end')- these counting for 2 out of 4 or 5 points possible; In fact, apart from the fairy-tale genre, many stories and books for children do not use such conventional phrases as obligatory devices, and many of the older children in the present research chose not to use them in their own story-telling - which does not imply that they haven't learned these conventions.

behaviors, (e.g., tried to...) but excluding basic emotions; b) *Socio-cognitive components* - - defined as causal statements, inferences and negative constructions; c) *Affective enhancers* – represented by emotion terms, character speech, character names, sound effects, intensifiers and repetitions.

For complete definitions and examples for each category, see Coding manual in Appendix A. Reliability for the content components ranged between 75 and 100%.

Language Measures

Children's standard scores for the 'Formulating sentences' subtest of the Clinical Evaluation of Language Fundamentals - Revised (CELF-R; Semel, Wiig, & Secord, 1987) were used as measure of their expressive language skills, and their standard scores for the 'Listening to paragraphs' subtest of the same assessment instrument were used as measure of the participants' receptive language competence.

CHAPTER III

RESULTS

The results are organized in two main sections. The first section presents descriptive results for the various measures used, including analyses of differences by age group, gender, and condition, when appropriate. In the second section, relations between these measures are explored, to assess the contribution of the various factors considered in the analyses to children's performance on the interpretive tasks. More specifically, relations between age, language competence, and certain aspects of narrative abilities are examined with respect to the emergence of an interpretive understanding of mind, as reflected in children's answers to the event-based and perceptual interpretation tasks.

Categorical and ordinal measures were analyzed using nonparametric procedures, but when appropriate, those data were converted to score data and analyzed using parametric techniques (e.g., multiple regression and discriminant function analyses).

SECTION I - Descriptive Analyses/Univariate analyses

I. Event-based interpretive task

The following three measures were used as a 'baseline' assessment of children's understanding of the event presented in the video, before the key experimental manipulation was introduced (i.e., the presentation of the two characters' discrepant verbal accounts).

1. Narrative-type of child's own account. The distribution by age group of the three main types of narrative account produced by children in retelling the video-scene is

presented in Table 2[8] (see also Figure 1).

Table 2.

Distribution by Age-group for Children's Narrative-types of Own Account of the Event

Age group	N	No narrative	Action-only	Intentional
6 - 7½-year-olds	48	35.4	52.1	12.5
7½ - 9-year-olds	48	8.3	54.2	37.5
9 - 10½-year-olds	16	0	68.8	31.3
Total	112	18.8	55.4	25.9

Note: Percentages within age groups are presented[9]. For total, percentages within category.

Within all age groups more than half of the participants (52.1%, 54.2% and 68.8%, respectively) produced 'action-only' narratives, but significant differences emerged in the proportion of accounts categorized as 'no-narrative' versus 'intentional narratives'. Thus, a two-way contingency table analysis using the Pearson Chi-square statistic indicated a significant overall association between type of narrative account produced in retelling the video-scene and age group, X^2 (4, N = 112) = 19.51, $p < .001$. Follow-up tests conducted to better locate the differences in the proportions of different

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Given the interest of this research in children's ability to access the psychological perspectives of the characters involved in the witnessed event, coding categories for this measure implicitly correspond to ranking the children's own accounts of the scenario from less to more complex narratives (in an ordinal measurement scale).

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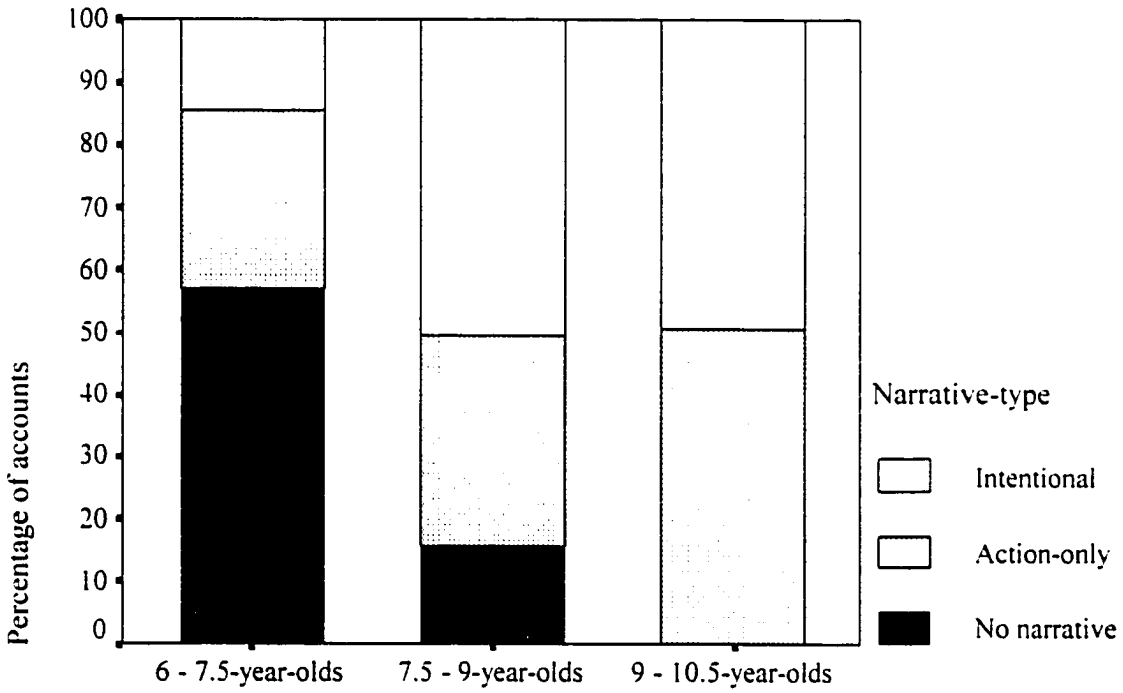
For ease of reading within the text the three age-groups will be referred to as 6-7-year-olds, 8-9-year-olds and 9-10-year-olds.

narrative-type accounts used by children, among the three age groups, revealed that 6-7-year-olds differed significantly from both the 8-9-year-olds, X^2 (2, $\underline{N}$ = 96) = 14.07, $\underline{p} < .001$ and the 9-10-year-olds, X^2 (2, $\underline{N}$ = 64) = 8.71, $\underline{p} < .01$, but that the two older age-groups did not differ significantly from each other in the proportions of different narrative-type accounts produced (see Figure 1).

Figure 1

Proportions of Narrative-type Accounts Produced by Children in the Three Age-groups



The 6-7-year-olds produced significantly more accounts coded as 'no-narrative'(17 of the total of 21 such accounts, or 81%) and less 'intentional' narrative accounts than the 8-9-year-olds and the 9-10-year-olds, (12.5% vs 37.5% and 31.3%,

respectively).

There were no gender differences in the proportions of different narrative-types of own account produced by children in any of the three age-groups, and no differences by version of the video-scene watched[10].

2. Intentional content of child's account. In spite of clear developmental differences in the types of narrative account children produced when telling about the event witnessed, differences in the actual *number of mental state terms* used, both in retelling the scenario and in answering probe questions, were not statistically significant by age group, gender, or version of the video scene watched. I should emphasize that, in contrast to the previously described measure, this variable takes into consideration, in addition to children's spontaneous account of the video-scene, their answers to the probe questions, which often included mental state references, (independent of the narrative type of account initially produced). Thus, even though relatively few children mentioned the characters' internal states in their own accounts of the event (only 26% of all narrative accounts were coded as 'intentional'), all but two children were clearly aware that Protagonist 2 acted on the basis of a false belief upon returning to the kitchen, as revealed by their answers to probe questions asking why the puppet looked in the box. Overall,

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However, a Chi-square analysis of the proportions of different narrative-type accounts by school-type (with 3 levels roughly corresponding to differences in the socio-economic and educational status of the families from which the majority of students in each of the programs came) was significant, follow up tests indicating that only for the 8-9-year olds there was a significant difference between the higher educational/SES level and the lower educational/SES level schools in the proportion of intentional narratives produced (46.2% for higher level versus 14.3% for the lower level schools, X^2 (4, N = 48) = 10.3, $p < .05$).

98.2% of the participants used at least one mental state term in talking about the video-scene. Among the 110 participants who did use mental state language, 31 (27.7%) used two mental state words, but only 8 children (7.1% of the sample) used 3 or more such terms (3 were used by 6 children, 4 by one child, 5 by one child). As expected, older children used more mental state terms (39.6% of the 8-9-year-olds used 2 or more mental states and 43.8% of the 9-10-year-olds used 2 or more such terms, compared to 27.1% of the 6-7-year-olds who used 2 or more mental state terms). However, these differences were not significant.

With respect to children's own spontaneous attribution of intention to P1, only 9 children (8%) in the entire sample explicitly attributed a certain intention to P1 in moving the cookie (of which 6 attributed a hiding intent), indicating that the vast majority of participants did not entertain specific, possibly biasing assumptions about P1's intention previous to hearing the two protagonists' accounts[11].

3. Explanation type for P2's false belief. In explaining why the 2nd protagonist in the video-scene (P2) looked for the cookie at the previous location 79 participants (70.5%) mentioned the puppet's *thinking* based on misinformation as basis for the action (e.g., P2 *thought* it was there). Eleven children (9.8%) referred first to the puppet's *lack of*

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[11] Although 30 (26.8%) children described P1's action in terms of the *need* to place the rice in the box to prevent its spilling – which suggests that they may have assumed that P1 was not intending to hide the cookie from his/her sibling – and two children (1.8 %) mentioned both possibilities, participants did not seem to be biased by their initial assumptions, but ready to change them according to condition (e.g., 20 of the above 30 children participated in Condition I, in which P1 declares his/her deceptive intent to hide the cookie, and all those children changed their opinion about P1's intention after hearing his/her declaration).

perceptual access to the change in reality (e.g., P2 *didn't see* the cookie being moved) as main explanation, and 19 participants (17%) first mentioned the *last action* performed by the puppet in the role of protagonist 2 (e.g., P2 *left the cookie* in the box). These answers all reveal an explicit understanding of the protagonist's false belief as basis for action, but significantly more children made direct references to the protagonist's thinking than to perception, last action or desire, X^2 (3, $\underline{N}$ = 110) = 134.3, $\underline{p} < .0001$. One child in the youngest age group gave a desire-based explanation (e.g., Because P2 *wanted* the cookie), which may reflect an implicit understanding of the protagonist's false belief, while two children in the same age-group declared that they didn't know why the puppet looked in the box. However, when further probed about the puppet's whereabouts in the movie, they both remembered that P2 was away from the kitchen and didn't see P1 moving the cookie (their first answers were scored 0). There were no significant differences by age group in the types of explanation children suggested for P2's behavior, with the majority (close to 70%) of participants in each age group mentioning first the puppet's thinking (i.e., not knowing about the change) as main reason for his/her action.

Besides the type of explanation mentioned first in justifying P2's action, I also looked at how many explanations were suggested by each participant. In each age group about half of the participants (52.1%, 50% and 50%, respectively) mentioned both thinking based on false belief *and* lack of perceptual access to the change in reality *or* the protagonist's last action as explanations for P2's behavior. A total of 57 participants (50.9%) suggested two types of explanation, but not more than two. There were no significant differences in the distribution or number of explanation types by age, gender

or version of the video-scene watched.

The next six measures apply to children's responses for the second part of this task, which probed their ability to take the perspective of each of the two protagonists in order to explain their disagreement. More specifically, in the second part of the event-based interpretive task children answered specific questions about the protagonists' intentions and about one character's attribution of intention to the other protagonist, *after having heard the discrepant accounts* presented by the two characters involved in the video-scene. Before the critical question regarding the possibility of different interpretations of the event, children's new (possibly reconstructed) understanding of the scene was probed, along the following measures:

1. Children's own intention-attribution to Protagonist 1 *after hearing the two discrepant accounts.* Whom do children believe when Protagonist 1 declares he/she intended to hide the cookie, while Protagonist 2 attributes to him/her the good intention of saving the cookie for sharing it later (Condition I), or when Protagonist 1 declares the good intention of saving the cookie to share it later, while Protagonist 2 attributes to him/her the deceptive intent of hiding it (Condition II)?

The majority of children in both conditions (93.8% of the sample) interpreted the first protagonist's action of moving the cookie in accordance with that character's ***declared* intention**, and only 7 participants (6.3%) considered the **intention attributed** by P2 as the real motivation for P1's action. As expected, all seven children who, in their interpretation, agreed with the 2nd protagonist's attribution of intention to P1 instead of P1's declaration, were participants in Condition II, in which the puppet who moved the

cookie declared the good intention of saving it for sharing later, while the other sibling suspected him/her of intending to hide the cookie for the selfish purpose of eating it alone. So, several children found it plausible that a person would declare a good intention – to save the cookie for later – when in fact, his/her intention was to hide it, but no child believed that someone would declare the intention to hide the cookie, when in fact, s/he was saving it to share it later. The difference between the proportion of children agreeing with P1's declared intention and those agreeing with P2's attribution of intention was significant by condition, X^2 (1, $\underline{N}$ = 112) = 7.47, $\underline{p} < .01$, and by age group, X^2 (2, $\underline{N}$ = 112) = 6.4, $\underline{p} < .05$. Six of the 7 children agreeing with P2's attribution of intention instead of P1's declaration were in the 6-7-year-olds group. There were no other significant differences for this measure.

Next, children were asked to **justify** how they arrived at their interpretation of the first protagonist's [P1] intention (Q: "How can you tell?"), and the majority (61.6%) indicated the character's own verbal declaration as main explanation (i.e. 'P1 said so'). Four children (3.6%) – all in the youngest group – did not provide any explanation, another 4 participants (3.6%), two in each condition, invoked the character's assumed personality traits to justify their attribution of intention (e.g., for Condition I: 'Because he [P1] really likes cookies, so he was probably being selfish because he wanted the cookie a lot...'; or, for Condition II: 'Because I know he [P1] wouldn't hide it if he knew...he knows that she likes cookies too..'), while 35 children (31.3%) answered by recounting P1's action as if the behavior was 'transparent' evidence of the character's intention (e.g., 'Because he put it in the drawer'). As a control question, participants were asked to

evaluate the first protagonist's action of moving the cookie into the drawer as either 'selfish' or 'well-intentioned' and two of the youngest children contradicted themselves by attributing deceptive intentions to P1 but then considering that P1 was being nice, not selfish. Whether these answers reflect a positive bias toward considering people always 'nice', or some idiosyncratic interpretation of the question (e.g., as referring to the puppet-characters in general, not to the specific action in the given situation), or a belief in the disconnection between intention and a suggested personality trait, or age- related logical inconsistencies and lack of familiarity with the expectations of the experimental discourse is difficult to appreciate with any certainty, and the two children were not dropped from the study.

2. Children's memory of the 2nd Protagonist's attribution of intention to P1. This control question was answered correctly by 105 children (93.8%). Of the seven children (6.3%) who failed to remember the 2nd protagonist's attribution of intention, four were in the 6-7-year-old age group and three in the 8-9-year-old group and 6 of them participated in Condition I. Thus, for a small number of younger children, remembering the 2nd protagonist's attribution of intention was more difficult when this attribution contradicted their own intention-attribution to P1, since all these children agreed with P1's verbal declaration in judging the intention behind that character's action. These seven children listened again to the 2nd protagonist's verbal account, after which all answered this control question correctly.

3. Next, participants were asked to suggest possible *justifications* for P2's attribution of intention to P1, a question which explicitly required them to take that

character's [P2's] psychological perspective into account, to 'put themselves in the shoes of P2. Ten children (8.9%), of whom only one was in the older age-group (see Table 3 for the distribution by age group), did not provide any justification for P2's attribution of intention, or offered a justification unrelated to the psychological perspective of the characters (e.g., 'Because there was enough cookie for both'; 'Because you should always share'). Of these ten children, seven participated in Condition I and three in Condition II, but this difference fell short of significance (Binomial test, $p = .21$).

Table 3.

Distribution of Justification-types for P2's Attribution of Intention to P1, by Age Group

	Age group			
Categories of justification	6 - 7 1/2	7 1/2 - 9	9 - 10 1/2	Total
No justification	10.4	8.3	6.3	8.9
Lack of knowledge about P1's intention	10.4	18.8	6.3	13.4
Personality traits of P1 or P2	58.3	50	50	53.6
P2's desire for the cookie	12.5	6.3	12.5	9.8
Recounting of P1's action	8.3	14.6	12.5	11.6
Communication gap	0	2.1	12.5	2.7

Note: Percentages withing age group are presented. For totals, percentages of each response category.

The majority of children in all age groups and conditions (53.6% of the sample) mentioned the protagonists' *personality traits or inferences based on personality traits* as explanation for P2's attribution of intention to P1 (e.g., 'Because P2 knows that P1 likes to play tricks..'; 'Because P2 is a nice person and P1 is a selfish person'). However,

children in all three age groups used all types of justifications, albeit in different proportions, with the exception of the 'communication gap' justification, which was not used by any of the youngest children.

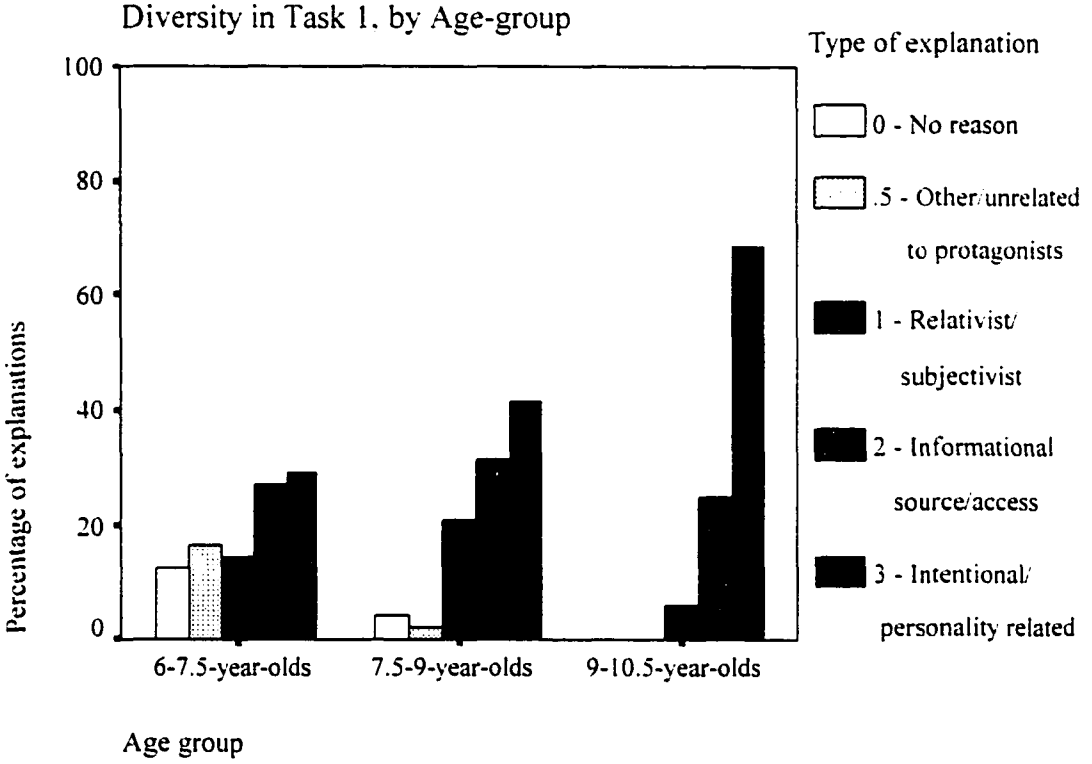
There were no statistically significant differences between the proportion of participants offering the above mentioned types of justification for P2's attribution of intention by age group, gender or condition they participated in. However, as shown in Table 3, for the youngest children the second most common justification was based on P2's desire for the cookie, while for the 8-9-year-olds the second most common explanation involved P2's lack of knowledge about P1's intention or, in other words, the older children showed an awareness of the opacity of other people's intentions and of the implicit subjectivity of the intention-attribution process. References to the lack of communication between the two protagonists (e.g., 'Because P1 didn't tell P2 that she was saving the cookie for later'), used as justification for P2's attribution of intention by three children, of whom two were in the oldest group, also imply an awareness of the opacity of intentions in the absence of communication about such inner states.

4. Types of explanation for the possibility of discrepant accounts of the event. The critical question of this task required children to justify whether and why it made sense for the two protagonists to give different interpretations of the same action. By examining which sources of interpretive diversity children identify when confronted with people's discrepant accounts of an event, and how they judge the legitimacy of such discrepant interpretations, the task was meant to tap into the reasoning processes involved in the transition toward an interpretive 'theory of mind'.

Figure 2 presents the distribution by age group of the five categories of response given to the request for justifying the possibility of different interpretations of the same behavior in the context of this task.

Figure 2

Proportions of Types of Explanation for Interpretive Diversity in Task 1, by Age-group



Overall only 8 children (7.1%) failed to understand that the same behavior could be interpreted in different ways by different people (their responses were scored 0). Of these participants, six were in the youngest age group and two in the $7^{1/2}$-9-year-olds group. Nine children (8% of the sample), of whom eight were in the youngest age group, although acknowledging the possibility that the protagonists could entertain different interpretations of the action, were uncertain about justifying such interpretive

discrepancies, or gave answers unrelated to any relevant aspects of the video-scene (e.g., the category of response labeled 'other': 'Because it is a puppet show', 'Maybe someone is lying', scored 0.5). The remaining 95 participants (84.9%) provided either one or a combination of explanations implying the following sources of interpretive diversity: (1) individual subjectivity or the fact that 'people are different' - *relativist/subjectivist explanations*; (2) lack of direct access to a change in a situation - *informational-source explanations*, and (3) *intentional explanations* implying the referential opacity of mental states (of others, not self) or aspects related to the psychological perspectives of the protagonists (e.g., personality traits, social-interaction characteristics) that may account for certain interpretations of intentions (see Table 4).[12]

In order to examine whether the differences in proportions of these types of explanation by age group were significant, I regrouped the 'other' responses scored 0.5 together with the 'fail' responses, scored 0, to obtain sufficient frequencies per cell for a chi square test. Table 4 shows the distribution of responses explaining the possibility of interpretive differences, by age group.

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[12] For this analysis only children's first proposed justification was taken into account for each participant. The measure which takes into consideration all the justifications suggested by each participant is the *main score for task 1*, and it will be presented later in the results section.

Table 4.

Proportions of Different Explanation Categories for Interpretive Diversity for Task 1, by Age Group

Age group	Categories of type of explanation (regrouped)			
	None/ irrelevant	Relativist/ subjectivist	Informational source	Intentional/ personality related
6 - 7[1,2]-year-olds	29.2	14.6	27.1	29.2
7[1,2] - 9-year-olds	6.3	20.8	31.3	41.7
9 - 10[1,2]-year-olds	0	6.3	25	68.8
Total	15.2	16.1	28.6	40.2

Note: Percentages within age group are presented.

A significant association was found between age-group and type of explanation for interpretive diversity offered. X^2 (6, N = 112) = 17.8, $p < .01$, suggesting a developmental progression from uncertainty about the sources of interpretive diversity regarding a certain behavior, to intentional explanations which take into account the special nature of mental states as basis for behavior and as source of interpretive diversity in judging behavior. A Kruskal-Wallis one-way analysis of variance also showed significant age-group differences for this measure. X^2 (2, N = 112) = 11.83, $p < .01$. Follow up pairwise comparisons to evaluate differences among the three age groups were conducted using the Mann-Whitney U test, controlling for Type I error across tests with the Holm's sequential Bonferroni approach[13]. The results of this test indicated significant

[13] Significance is evaluated at the corrected error rate of .016 for age-group comparisons, to maintain a familywise error rate of .05.

differences only between the youngest participants (who had an average rank of 28.45) and the oldest age-group in the study (with an average rank of 44.66), $z = -3.15$, $p < .001$. Although after partialling out the 0 and .5 scores, the differences among age groups on this measure fell short of statistical significance, X^2 (2, $N = 95$) = 3.90, $p = .14$, the distribution of types of explanation for interpretive diversity by age group (see Table 4) showed clear evidence for a developmental trend: thus, comparing the 6-7-year-olds' justifications with those of the 8-9-year-olds, there was an increase in the proportion of explanations categorized as *relativist/subjectivist* (from 14.6% to 20.8%), in the proportion of *informational-source explanations* (from 27.1% to 31.3%) and in the proportion of *intentional explanations* (from 29.2% to 41.7%). For the oldest group, the proportion of *relativist/subjectivist explanations* decreased to 6.3% and the proportion of *informational-sources explanations* decreased to 25%, while 68.8% of their responses were classified as *intentional explanations*.

When looking at children's scores for their explanations along a potential underlying dimension of increasing complexity – from lack of understanding the possibility of interpretive diversity to justifications based on invoking nonspecific, general human differences, to more specific justifications involving situational aspects that could lead to potentially different representations of the event, and finally, to more complex justifications based on appeal to the psychological perspectives of the protagonists in the respective situation –, a comparison of participants' mean scores for this measure reveals similar age-related differences.

Table 5 shows the means and standard deviations by age group for children's *first*

explanation of interpretive diversity suggested on task 1, as well as the means and standard deviations of their *main score on task 1* by age group, a measure which takes into account all the explanations proposed by participants for this task (the latter measure will be presented in more detail further). There were no significant differences for this measure as a function of gender or task condition.

Table 5.

Age-group Means and Standard Deviations for Interpretive Diversity Explanation Scores for Task 1 (Event-based Interpretive Task)

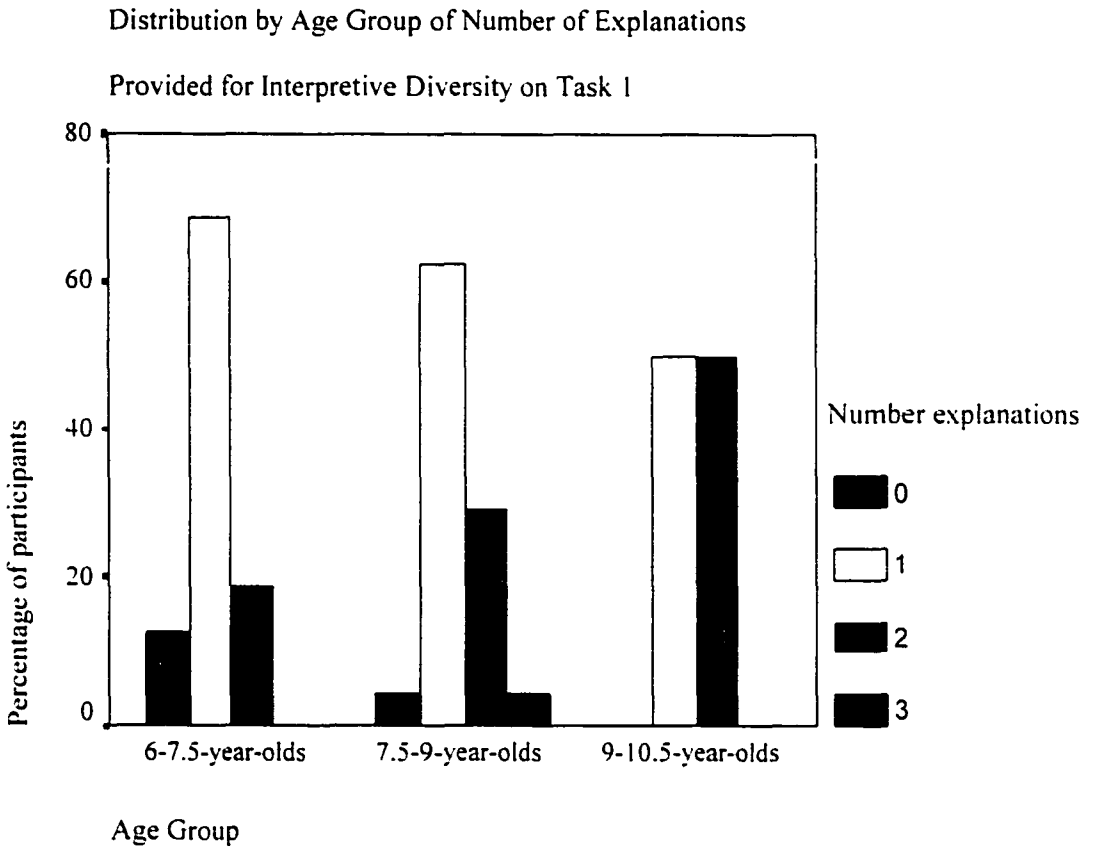
	First explanation scores		Main score on task 1	
Age group	M	SD	M	SD
6-7½-year-olds	1.65	1.10	1.52	1.23
7½-9-year-olds	2.09	.92	2.23	1.19
9-10½-year-olds	2.63	.62	2.69	.87
Total	1.98	1.02	1.99	1.24

Note: First explanation scores range = 0 - 3; Main score on task 1 range = 0 - 5.

As previously mentioned, several participants provided a combination of justifications for explaining the possibility that people could arrive at different interpretations of the same behavior. Of the 95 participants who provided relevant explanations for possible sources of interpretive diversity on this task, 31 (27.7% of the sample) offered two justifications and 2 children (both in the 8-9-year-old age group) suggested three different explanations. Figure 3 shows the percentage of participants in each age group who provided 0, 1, 2, or 3 explanations for the discrepant accounts in this

event-based interpretive task.

Figure 3



A one way ANOVA on the number of explanations provided, with age group as between subjects factor was significant, F (2, 109) = 4.38, $p < .05$, and posthoc pairwise comparisons using Dunnett's C test (that does not assume equal variances) specified that the youngest participants offered significantly fewer explanations (M = 1.06) than did the 9-$10^{1/2}$-year-olds (M = 1.5), all other differences being nonsignificant.

Indeed, only 9 (18.8%) of the youngest participants provided two explanations and none provided three explanations, 14 (29.2%) of the $7^{1/2}$-9-year-olds offered two

explanations and 2 (4.2%) of the same group suggested three explanations, while 50% of the oldest age group provided two explanations, indicating a developmental trend toward acknowledging multiple possible sources for interpretive diversity in this task. There were no significant differences by gender or condition in the number of explanations provided by participants.

With regard to the *types* of second justification proposed, participants' most common second suggestion was an *intentional explanation* (60%), while informational-source and subjectivist/relativist explanations accounted equally (20% each type) for the rest of children's second explanations. There were no significant differences by age-group, gender or condition in the distribution of types of second explanation for interpretive diversity regarding the event-based/intentional task.

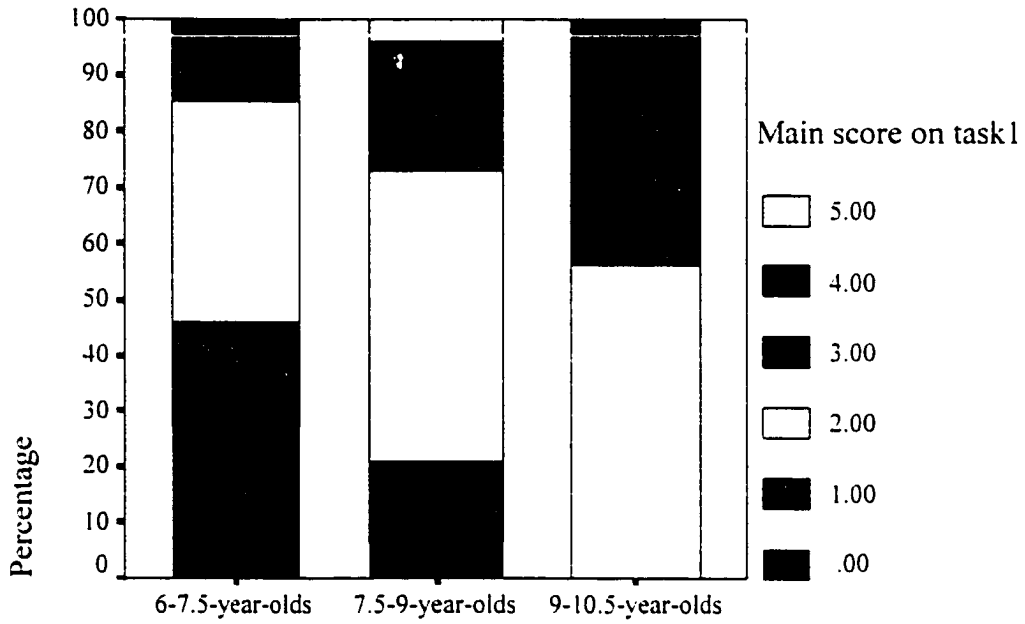
5. Main score for interpretive task 1. This measure represents the **range** of children's interpretive understanding, by taking into account all their explanations of sources of interpretive diversity. The main score for task 1 was obtained by adding the points awarded for each suggested justification. All 'don't know', 'uncertain' or irrelevant 'other' explanations were scored 0, the relativist/subjectivist explanations, considered partial, incomplete justifications for interpretive differences were awarded 1 point, while the other types of explanation (informational-source and intentional) were awarded 2 points each. Thus, when children provided more than one justification for interpretive diversity, the points for each explanation were added, resulting in the participant's main score for this task. Figure 4 illustrates the percentages of participants in each age group obtaining each score on task 1 (See Table 5 for mean scores by age group

for this measure).

Figure 4

Percentages of Participants in Each Age Group,

by Main Score Obtained for Task 1



Sixteen participants (14.3%), of whom 13 were in the youngest age group failed to obtain any points for this measure. Responses based exclusively on relativist/subjectivist judgements were given by 9 of the 6-7-year-olds (18.8% of the respective age group) and by 7 of the 8-9-year-olds (14.6% of the age-group). All of the oldest participants obtained at least 2 points on this measure. The prevalent score in the entire sample was 2, obtained by 53 participants (47.3%), indicating children's ability to provide at least one explanation for interpretive diversity that takes into account either the informational access or the intentionality of the protagonists in the event presented. The prevalence of

only one type of explanation reflects, however, an incomplete understanding of the different potential sources for interpretive diversity in the context of this task. But the change in distribution of scores by age group indicates a clear developmental trend toward a growing ability to recognize more than one possibility for justifying discrepant interpretations.

Thus, a Kruskal -Wallis ANOVA indicated significant age-group differences for the main score on this task, X^2 (2, N =112) = 15.02, p < .001. Follow up Mann-Whitney U tests to evaluate pair-wise differences among the three age groups indicated a significant difference between the youngest group and the 8-9-year-olds. z = - 2.79, p < .005, as well as between the youngest and the oldest group, z = - 3.38, p < .001. Children's main scores on task 1 did not differ significantly by gender or by the condition they participated in[14].

6. Categories of outcome for the scenario. Although the question was unrelated to children's understanding of sources of interpretive diversity, at the end of this task they were asked to imagine a possible outcome for the event, more specifically, to predict the 2nd protagonist's next action. Ten participants (of whom 8 were in the youngest age group and two were among the 8-9-year-olds) insisted they didn't know/couldn't tell what

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[14] However, when considering school-type (with three levels: higher, middle, lower educational /SES level-schools) as between subjects factor in a Kruskal-Wallis ANOVA, significant differences for this measure emerged [X^2 (2, N = 112) = 6.95, p < .05], with children from the higher educational/SES level schools obtaining on average significantly higher scores (Mean rank = 40) than those from lower educational/SES level schools (Mean rank = 28) as indicated by Mann Whitney U test, z = -2.34, p < .02, but no other comparisons were significant.

would happen next, while 94 children (90.4%) attempted at least one prediction, when asked to infer P2's next action/behavior and the possible outcome of the scenario[15]. An examination of children's first suggestion revealed that, in all age groups, participants proposed a variety of types of outcome (see Table 6).

Table 6.

Proportions of Outcome of Event Categories, by Age Group

Categories of outcome/ P2's inferred behavior	Age group			
	6-7 1/2-year-olds	7 1/2-9-year-olds	9-10 1/2-year-olds	Total
Don't know	17.8	4.3	0	9.6
Hiding/revenge	22.2	34.8	23.1	27.9
Sharing with sibling	26.7	13	7.7	18.3
Emotions	15.6	6.5	23.1	12.5
External resolve/tell mom	0	6.5	7.7	3.8
Discussion/negotiation	17.8	34.8	38.5	27.9

Note: Percentages within age-groups are presented. For totals, percentages for categories of response.

Although no statistically significant differences by age group, gender or condition were found for the types of prediction/outcomes suggested, several trends emerged from an analysis of the distribution of categories of response as a function of age group. In the youngest age group, when considering only the children who attempted at least one prediction (37 participants), the prevalent outcomes were sharing the newly found cookie with sibling (32.4%), and keeping the cookie for self or hiding it to seek revenge (27%),

[15] Because of time constraints, eight children did not respond to this last question, which was not essential for the completion of this task, being unrelated to the research main goal, that of examining children's understanding of interpretive diversity. A total of 104 children responded to this last question.

while for the 8-9-year-olds the two prevalent response categories were negotiation, talking about the event to clarify intentions, and P2 eating the entire cookie or hiding it from sibling, each category proposed by 16 participants, respectively (36.4% of those who attempted at least one prediction). The increase in proportion of responses inferring negotiation, talk among the siblings for clarifying intentions, was even more pronounced in the oldest age group, with 38.5% of the older participants suggesting this outcome, followed by predictions of emotional reactions (e.g., getting mad at sibling, feeling sorry, etc. - 23%) and keeping the cookie for self/hiding for revenge (23%).

Of the ninety-four participants who offered suggestions for possible outcomes of the event, thirty-five (37.2%) proposed two or three outcomes, revealing an ability to imagine different ways in which P2 could behave in response to the sibling's action. A clear developmental trend appeared in the *number of different outcomes* predicted by children, as indicated by a Kruskal-Wallis ANOVA with age-group as between subjects factor, X^2 (2, $\underline{N}$ = 104) = 12.9, $\underline{p} < .01$, eta sq. = .13. Thus, significantly more older participants suggested two or more possibilities when predicting P2's behavior/outcomes of the scene, compared to the youngest age group: The corresponding proportions were 43.4% for the $7^{1/2}$-9-year-olds and 54% for the oldest group, compared to 17.8% in the youngest age group. Moreover, three participants aged over 8 years suggested three possible outcomes, while none of the youngest children did so. The most common second prediction of P2's behavior across the three age groups was sharing the cookie with sibling (16%) and conversation between the siblings to clarify intentions involved in the cookie incident (11.7%).

Overall, these results indicated a tendency toward appreciating more with age, the importance of conversation and of negotiating the meaning of behaviors to clarify intentions and to guide further action. At the same time, these age-related changes in the types and number of outcomes suggested revealed an increasing ability to conceive of multiple possibilities for people to behave in response to a certain situation, and an emerging understanding that such possibilities may depend on a variety of factors, from purely subjective aspects related to individual differences, to specific aspects of the interaction between protagonists, to the larger sphere of social-cultural norms. For instance, the fact that proportionally more of the youngest children in both conditions predicted than P2 would share the cookie with his/her sibling, may reflect a positive bias toward the 'socially desirable behavior' projected onto this protagonist, which is endowed with the best intentions, regardless of the other protagonist's true intentions, or children's willingness to readily apply the social norm of sharing in a situation involving siblings. The fact that more of the older children predicted that P2 would keep, eat, or in turn, hide the cookie from his/her sibling may indicate a more astute and pragmatic understanding of human nature, as reflected in the attributed psychological reaction to a protagonist who believes s/he has been tricked or deceived by a sibling, despite the well-known 'sharing' norm. Finally, the increasing proportion of participants in the older age groups predicting a conversation for clarifying intentions between the siblings as outcome, suggests an emerging understanding of the importance of meaning negotiation to help people deal with the referential opacity of others' intentions and the underlying psychological complexity of human interaction which is not transparent in behavior. Conversational

exchanges could be considered, in this sense, 'a royal road' to others' mental world and an important tool for making sense of their behavior.

II. Perceptual interpretive task: Ambiguous/double-meaning visual figure

1. Man-mouse reversible figure recognition score. Only fourteen participants (12.5%), of whom 13 were in the youngest age group and one in the $7^{1/2}$-9-year-olds group, failed to recognize that both puppets' interpretations of the man-mouse line-drawing made sense. Except for the youngest children, of whom 73% passed, participants' responses for this question were virtually at ceiling.

2. Explanation question. When asked to justify the legitimacy of the two different interpretations endorsed by the puppets, despite their good performance on the first question, the younger children's answers to the explanation question revealed an incomplete and volatile understanding of interpretive diversity. Table 7 shows the distribution of explanation-types by age group for the perception-based interpretive task.

As expected, only in the youngest age group a substantial number of children (31.3%) failed to provide any explanation. Four other participants (from the two younger age-groups) became unsure about their previous (correct) answer, suggesting that one interpretation was more likely 'correct' than the other, by pointing to certain features of the drawing or of the looking process as justification, after admitting that people could, at first, see different things, but that one of these views *had to be wrong* (they received a score of 0.5). Across age-groups the majority of justifications was divided between *relativist/subjectivist* explanations (receiving 1 point) based on invoking only individual

differences as source of interpretive diversity (e.g., 'they think different', 'they are different people'), with no reference to the ambiguous nature of the stimulus (justifications provided by 39 participants), and stimulus-based explanations, which pointed out the reversible, *double-meaning nature of the drawing* as justification (scored 2, provided by 47 participants - see Table 7). Only six children (5.4%) offered *complete explanations*, based on pointing out both the subjectivity or individual differences of the observers, and the double-meaning nature of the stimulus as justifications (scored 3).

Table 7.

Proportions of Different Types of Explanation for Interpretive Diversity on Task 2, by Age Group

	Categories of explanation type				
Age group	0	.5	1	2	3
6 - 7½-year-olds	31.3	4.2	35.4	29.2	0
7½ - 9-year-olds	2.1	4.2	41.7	43.8	8.3
9 - 10½-year-olds	0	0	12.5	75	12.5
Total	14.3	3.6	34.8	42	5.4

Note: Percentages within age group are presented. Category codes: 1 = no justification, 0.5 = uncertain, bias toward one interpretation, 1 = subjectivist/relativist, 2 = double-meaning nature of stimulus drawing, 3 = complete (nature of stimulus + subjectivity of observers).

There was a significant association between age group and type of justification used for explaining interpretive diversity in task 2, as indicated by a Kruskal-Wallis ANOVA with age group as between subjects factor, $X^2(2, N = 112) = 23.6$, $p < .001$, and

by the fairly large effect size (eta square = .213, showing that 21.3% of the variability in the children's explanation scores for this perceptual interpretive task was accounted for by age group). Follow-up post hoc comparisons indicated significant differences in participants' justification responses between each of the three age groups (mean ranks by age group: 41.8, 63.1 and 80.9, from youngest to oldest, respectively), and a trend toward providing more stimulus-grounded and complete explanations with increasing age.

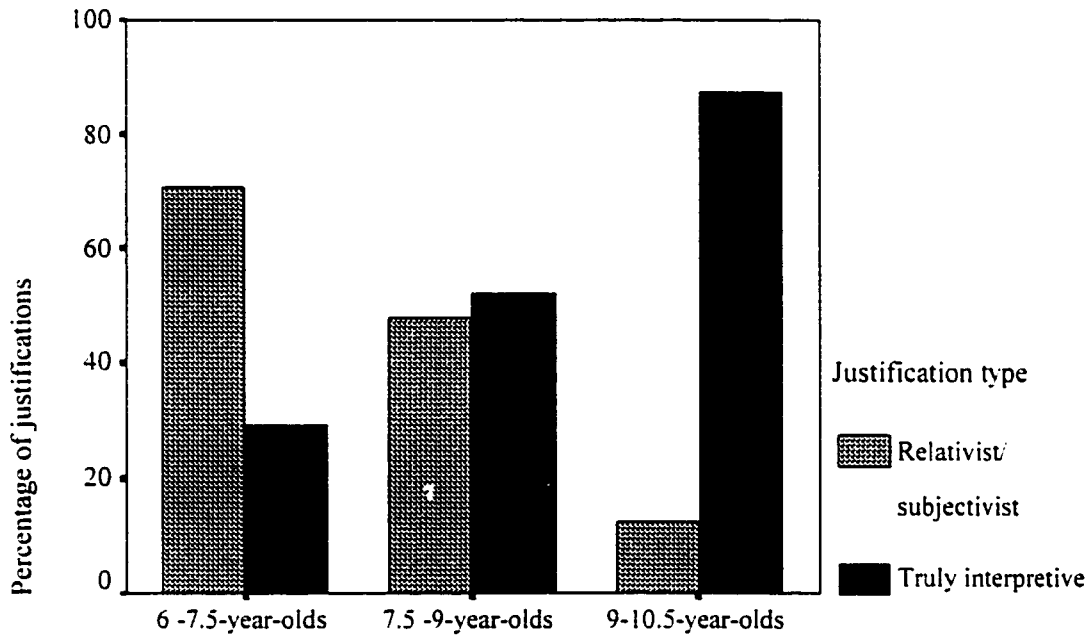
This developmental trend appears more clearly when further reclassifying children's justifications into *truly interpretive* explanations – which take into account the ambiguous nature of the pictorial stimulus presented (scores 2 - 3) – and *incomplete or relativist/subjectivist* justifications (scores 0.5 - 1): in this analysis significant differences in the distribution of responses emerged between the two younger age-groups and the oldest participants (I and II vs. III), but not between the two younger age groups.

When considering only the "pass" responses for the justification question (96 participants), the association between age and distribution of type of justification (relativist/subjectivist vs. truly interpretive and complete) remained significant, X^2 (2, N = 96) = 9, $p < .05$, although with a moderate effect size (eta sq = .09). Follow up comparisons by age group showed that both younger age-groups proposed significantly more relativist/subjectivist responses than did the oldest age group, (by Mann-Whitney U test with corrected error level $p = .016$, $z = -2.96$, $p < .003$ and $z = -2.41$, $p < .01$, respectively). Thus, the 8-9-year-olds in this sample appear not to have consolidated their understanding of the possible sources and validity of interpretive differences in the context of this perceptual interpretive task, relying on justifications based exclusively on

the subjectivity of the observers just as much (in fact slightly more) than the youngest children. In contrast, among the oldest participants in this sample there was a decline in relativist/subjectivist explanations in favor of justifications which take into account the nature of the visual stimulus presented. More specifically, 19 of the 6-7-year-olds (39.6% of the group, or 57.6% of those who provided at least one explanation) and 45.8% of the 8-9-year-olds suggested exclusively relativist/subjectivist justifications, compared to 12.5% of the oldest group, while 87.5% of the oldest group proposed truly interpretive explanations for this task (see Figure 5).

Figure 5

Proportions of Truly Interpretive vs. Relativist/subjectivist Justifications on Task 2, by Age Group



There were no significant gender differences in children's justifications for task 2.

3. Prediction question. Understanding the uncertainty of predicting another person's first interpretation of an ambiguous, double-meaning figure appeared to be slightly more dificult for each age group than acknowledging and justifying the possibility of two different valid interpretations of the reversible man-mouse figure, as endorsed by the two puppets. Table 8 shows the numbers (and percentages) of children who passed/failed the prediction question, compared to the number of participants who provided at least one relevant explanation for interpretive differences in this task versus those who failed to provide any justification, respectively, by age group. There were no significant gender differences in responses to the prediction question for this task.

Table 8.

Comparison of Numbers of Participants Who Passed/Failed the Prediction and the Explanation Questions for Interpretive Diversity in Task 2 (Perception-based Task)

	Prediction of another's interpretation		Justification for the two different interpretations	
Age group	Pass	Fail	Pass	Fail
6 - 7 1/2	23 (47.9)	25 (52.1)	31 (64.6)	17 (35.4)
7 1/2 - 9	43 (89.6)	5 (10.4)	45 (93.7)	3 (6.3)
9 - 10 1/2	15 (93.8)	1 (6.2)	16 (100)	0
Total	81 (73)	31 (27)	92 (82.2)	20 (17.8)

Note: Percentages within age groups in parentheses.

For the prediction scores alone, comparisons by age group showed significant differences, X^2 (2, N = 112) = 25.52, $p < .001$, (by Kruskal-Wallis ANOVA) and follow-

up post-hoc tests specified that the performance of the youngest children was significantly poorer than the performance of children in each of the other two age groups (8-9- and 9-10-year-olds), as indicated by Mann-Whitney U tests with corrected error level $p = .016$, $z = -4.38$, $p < .001$ and $z = -3.23$, $p < .001$, respectively. The two older age groups did not differ significantly in performance for this measure, as about 90% of participants in each of these age groups responded correctly that they couldn't predict with certainty what another person would first think the drawing was.

When comparing the *explanation* and *prediction* questions, in the youngest age group 11 children who gave a relevant justification for interpretive diversity on task 2 failed the prediction question, while only 3 cases showed the reverse pattern, $p < .001$, by Sign test. For the 8-9-year-olds the difference was again in favor of justifications, with 4 participants who passed the explanation question failing the prediction question, while only two showed the reverse pattern. In the oldest age group only one participant 'failed' the prediction question by insisting on knowing what another child would say, but trying to justify that opinion by invoking a comparison with his own thinking process.

A closer look at the *types of justification* proposed compared to their prediction answers revealed an interesting developmental pattern or trend. As presented previously, children's justifications were further categorized into *transitional* (relativist/subjectivist explanations) and *truly interpretive* (stimulus-grounded explanations). When comparing *prediction* scores to the *presence/absence of truly interpretive justifications*, the pattern of responses changed for the 6-7-year-olds and for the 8-9-year-olds, in favor of prediction responses over truly interpretive responses, $z = -5.4$, $p < .001$, by Sign test. Thus, of the

17 participants in the youngest age group who gave relativist/subjectivist justifications, 9 (53%) passed the prediction question, and among the 8-9-year-olds, 19 of the 20 children who gave relativist/subjectivist explanations responded correctly on the prediction question, while in the oldest age-group the two participants offering relativist/subjectivist explanations both passed the prediction question. These results suggest that a subjectivist/relativist concept of interpretive diversity, based on acknowledging exclusively individual differences between observers as sources of interpretive diversity, may be sufficient for concluding that people cannot predict with certainty another person's interpretation of an ambiguous figure. Taken together, these results point to the multifaceted prerequisites of developing a truly interpretive conception of mind, which presupposes an ability *to relate* the subjectivity of individual observers/protagonists to the objective characteristics of the world (from specific stimuli to events and situations), ability which appears to develop gradually over the years of middle childhood.

4. Evaluation of deviant interpretation for the man-mouse figure. When asked whether an unlikely interpretation of the drawing (i.e., giraffe) endorsed by a third puppet made sense, 36 participants (32.1%) considered that the deviant interpretation made sense, justifying their answer by invoking the subjectivity of people's opinions, perceptions, even imagination, without any reference to the characteristics of the stimulus-drawing (scored 0.5), while (58%) considered that the deviant interpretation didn't make sense and justified their answer by pointing out the characteristics of the stimulus-drawing, which afforded only two different interpretations (scored 1).

Table 9 shows the proportion of different response categories for the deviant

interpretation question, by age group. Although children's performance on this question improved with age, the association between age group and scores for this measure was not significant, X^2 (2, N =112) = 1.92, ns.

Table 9.

Distribution of Response Categories for the Deviant Interpretation Question, by Age Group.

	Judgements regarding deviant interpretation		
Age group	Don't know	Relativist/Subjectivist	Correct/Complete
6 - 7½-year-olds	12.5	29.2	58.3
7½ - 9-year-olds	8.3	37.5	54.2
9 - 10½-year-olds	6.3	25	68.8
Total	9.8	32.1	58

Note: Percentages within age groups are presented. For total, percentages for categories of response.

As shown in Table 9, a substantial number of participants from all age groups gave relativist/subjectivist answers regarding the deviant interpretation, with the highest proportion of such answers among the 8-9-year-olds (37.5%). These children would declare with a great deal of conviction that it made sense for an observer of the reversible man-mouse drawing to think it represents a giraffe, and that such interpretations are warranted by the fact that 'people are different', 'see things differently' or even 'have different imaginations'. Thus, it appeared that especially among 8-9-year-olds, there was a readiness to overextend the concept of interpretive diversity associated with people's subjectivity, to judging almost indiscriminately various aspects of reality as relative to the

psychological perspectives of the observers/perceivers, or at least to evaluate people's subjective perspectives as more significant than 'objective' features of the world. This tendency may reflect a transitional stage toward a more complex understanding of the interpretive aspects of mental activity, toward a mature interpretive understanding which requires an ability to construe different *relationships* between subjective/individual differences and objective reality, between mind and world.

A comparison of participants' responses to the deviant interpretation question with their performance on the man-mouse explanation and prediction subtasks, revealed a certain consistency in children's tendency to appeal to nonspecific, individual differences and subjectivity to justify any differences in interpretations as equally valid, especially among the 8-9-year-olds. This conclusion was supported by the association found between the type of explanation proposed for justifying the validity of the two interpretations of the man-mouse figure endorsed by the first two puppets, and children's evaluation of the third puppet's (implausible, deviant) interpretation of the same stimulus drawing, X^2 (6, $\underline{N}$ = 112) = 25.34, $p < .001$. Thus, of the 36 participants who declared that the deviant interpretation of the reversible figure made sense, based on the subjectivity of perceivers, 23 (64%) also invoked only individual differences in explaining why the first two puppets offered different interpretations of the double-meaning drawing. The association was particularly strong for the 8-9-year-olds, as in this age group 72.2% of the children classified as 'relativists' on the deviant interpretation question also proposed subjectivist/relativist explanations for the man-mouse reversible figure interpretations (13 out of 18 participants). In the youngest age group 8 (57%) of the

14 participants who gave relativist answers on the deviant interpretation question were classified as subjectivist/relativists for the explanation question on task 2, while for the oldest age group the corresponding proportion was two of the four participants who gave relativist answers on the deviant question. However, the majority of children classified as relativists on this last measure obtained passing scores for the man-mouse interpretation question (95.5%) (with the exception of three children from the youngest age group), as well as for the prediction question (83.3%) (with the exception of 5 children from the youngest age group and one from the 8-9-year-olds group). There were no significant gender differences for this measure.

These results lend further support to the argument that a mature conception of the interpretive mind develops gradually, possibly through a series of processes and phases marked by different 'styles of thinking', during which children's focus shifts from objective to subjective and, finally, to the relationship between the two, between mind and world in making sense of reality.

5. Overall score for interpretive task 2. Children's responses to the different questions asked about another's interpretation of the man-mouse double-meaning figure provided convincing evidence for the multifaceted and non-unitary character of their evolving understanding of the interpretive aspect of mind. Nevertheless, for a more comprehensive measure of their understanding of interpretive diversity in the context of this perceptual task, each child's *explanation, prediction* and *evaluation of deviant interpretation* scores were combined into an overall score for task 2, ranging from 0 to 5. Table 10 shows the means and standard deviations by age group for each of the questions (subtasks) and for the overall score on this perceptual interpretive task

Table 10.

Means and Standard Deviations for Each Subtask of Task 2, and for the Overall Score for Task 2

	6-7½-year-olds		7½-9-year-olds		9-10½-year-olds		
Question type	M	SD	M	SD	M	SD	Range
Man/mouse double figure	.75	.44	.98	.14	1.0	.00	0 - 1*
Explanation for task 2	.97	.78	1.56	.70	2.0	.52	0 - 3
Presence/absence of truly interpretive explanations	.29	.46	.52	.50	.88	.34	0 - 1*
Prediction of another's interpretation	.59	.43	.93	.23	.97	.13	0 - 1
Evaluation of deviant interpret.	.73	.36	.73	.33	.81	.31	0 - 1
Overall score for task 2	2.29	1.14	3.22	.93	3.78	.71	0 - 5

* Scores not included in the overall score for task 2, as these categories are either redundant with, or represent a recoding of the explanation subtask score.

As expected, the association between age group and the overall score for task 2 was significant, X^2 (2, N = 112) = 30.71, $p < .001$ as indicated by a Kruskal-Wallis analysis of variance, and by the fairly large size effect obtained (eta square = .276, indicating that 27.6% of the variability in the children's overall scores for this perceptual interpretive task was accounted for by age group). Follow up pairwise comparisons (using

Mann-Whitney U test with corrected error level p = .016), indicated that the youngest participants' overall scores on task 2 were significantly lower than the scores of the 8-9-year-olds , z = - 4.31, p < .001 or the scores of oldest age group, z = - 4.43, p< .001, respectively. Boys and girls did not differ significantly in their scores for this measure, but there was a moderate association found between school type and the overall scores on the 2nd interpretive task.[16]

III. Narrative production task

Children's narratives elicited on the basis of the picture book "Frog, where are you?" were coded for: a) *story structure* (range 0 - 6) ; b) *narrative length* (i.e., total **number of propositions**), and c) number of occurrences for certain types of content elements, such as *intentional terms, socio-cognitive elements* (causal statements, inferences, negations), and *affective enhancers* (emotion terms, character voice, sound effects, intensifiers).

Boys and girls did not differ significantly in their narrative production scores on any of these measures, but significant age-related differences emerged. Table 11 shows the means and standard deviations for the narrative competence measures, as a function of age group.

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Differences by school type in children's overall scores for the perception-based interpretive task were significant, as suggested by a Kruskal-Wallis ANOVA, X^2 (2, N = 112) = 30.71, p < .001, and by follow-up Mann-Whitney U tests, indicating that children from the higher educational/SES level schools obtained on average higher overall scores than children from the lower educational/SES level schools, z = - 2.31, p < .02, (Mean ranks = 40.1 vs. 27.8).

Table 11.

Means and Standard Deviations for Narrative Competence Scores, by Age Group

	Age group						
	6-7½-year-olds		7½- 9-year-olds		9-10½-year-olds		
Variable	M	SD	M	SD	M	SD	Range
Narrative structure	4.44	0.99	5.15	0.58	5.31	0.60	0 - 6
Length of narrative	41.54	13.60	52.12	14.60	51.56	16.20	15 - 93
Intentional terms	1.06	1.40	2.08	1.70	2.69	1.80	0 - 7
Socio-cognitive elements	4.35	2.50	6.00	2.90	6.06	4.00	0 - 20
1. Causal	0.48	0.77	1.10	1.40	1.50	2.40	0 - 10
2. Inferences	2.60	1.60	3.44	1.60	3.81	1.70	0 - 9
3. Negations	1.27	1.30	1.46	1.20	0.75	0.93	0 - 6
Affective enhancers	6.52	4.40	9.73	5.80	9.31	4.70	0 - 29
1. Emotion	1.00	2.10	1.79	1.40	1.81	1.90	0 - 7
2. Voice	1.85	2.10	2.04	2.60	1.63	1.60	0 - 15
3. Intensifiers	0.50	1.10	0.71	1.20	0.50	0.99	0 - 6

The majority of participants (76.8%) obtained high scores (5 or 6) for the narrative structure measure, rendering the distribution of this variable negatively skewed, which is why nonparametric methods were used in most statistical analyses related to this variable. However, normalizing transformations were used on this variable to improve normality before entering it in multivariate analyses, presented in the second section of this chapter.

Age group differences were first examined for the narrative structure scores, using a Kruskal Wallis ANOVA, which was significant, X^2 (2, $\underline{N}$ =112) = 22.65, $\underline{p} < .001$, (eta

squared = .20). Follow up Mann-Whiney U tests to evaluate pairwise differences among the three age groups indicated that the youngest participants had significantly lower narrative structure scores than the other two age groups, groups which did not differ significantly from each other ($z = -4.19$, $p < .001$ for age group I versus II, and $z = -3.39$, $p < .001$ for groups I versus III).

As expected, children's narratives also differed significantly in their length as a function of age group, as indicated by a one way ANOVA, $F(1, 109) = 7.19$, $p < .001$. Post hoc pairwise comparisons (using the Scheffe procedure) revealed that only the youngest participants produced, on average, significantly shorter narratives than children in the other two age groups (M's = 41.54 for the 6-7-year-olds compared to 52.12 and 51.56, for the 8-9- and 9-10-year-olds, respectively). Given the significant differences in narrative length by age group, the number of each type of content elements per narrative was divided by the number of propositions, to control for story length. These proportions were then entered into one way ANOVAs with age group as between subjects factor, after applying arcsin transformations to improve normality of distribution. .

Among the different types of content elements coded in children's "Frog story"-narratives, significant age related differences were found for the *proportion of intentional terms* used, $F(2, 109) = 9.93$, $p < .001$, for the *proportion of emotion terms*, $F(2, 109) = =3.92$, $p < .05$ (although not for the proportion of all types of affective enhancers), and for the *proportion of causal connectors*, $F(2, 109) = 3.42$, $p < .05$ (although not for the proportion of all types of socio-cognitive elements). However, post-hoc pairwise comparisons using Dunnett's C procedure (which doesn't require homogeneity of

variance), revealed significant differences, at the corrected alpha level .016, only for the mean proportion of *intentional terms* used in their narratives by the youngest participants compared to the other two age groups (M's = .22 for the 6-7-year-olds vs. .35 and .43, respectively, for the 8-9-year-olds and the 9-10-year-olds). Although the pairwise differences did not reach statistical significance, the 6-7-year-olds used proportionally fewer emotion terms than the 8-9-year-olds in their narratives (M's = .19 vs. .31) and used fewer causal connectors than did the 9-10½-year-olds (M's = .12 vs. .25). No other comparisons indicated age related trends or significant differences for the content elements used in this narrative task

IV. Assessment of language competence using the CELF-R

Children's standard scores on the two subtests of the CELF-R administered were within the normal range for the respective age groups, although variability indicated important individual differences (see Table 12 for means and standard deviations for standard expressive and receptive language scores by age group).

Table 12.

Means and Standard Deviations for Expressive and for Receptive Language Standardized Scores, by Age Group

	6-7½-year-olds		7½-9-year-olds		9-10½-year-olds		
	M	SD	M	SD	M	SD	Range
Expressive language	10.9	2.3	11.3	2.6	12.2	2.7	5 - 17
Receptive language	11.4	2.9	12.1	3.0	12.4	2.1	3 - 17

Section II. - Multivariate analyses

1. **Correlational analyses**

The goal of these analyses is twofold: First, to examine whether the relationships already well established in the "theory of mind" research field between language skills and mentalizing competence for preschool children hold at a later point in development, and with respect to a more sophisticated measure of theory of mind abilities than false-belief – namely, understanding the interpretive aspect of mental activities. Second, to explore which aspects of children's language and/or narrative competence and interpretive understanding performance remain significantly correlated after age is controlled for, and finally, after both age and general language ability measures are controlled for. The pattern of correlations obtained then guided the choice of measures to be entered into further multiple regression analyses as potential predictors of children's interpretive understanding performance.

Children's understanding of interpretive diversity in the behavioral/intentional and the perceptual domains was clearly related to their language skills, narrative abilities and age, as indicated by the correlational analyses (non-parametric Spearman's r_s)[17] summarized in the following tables. Table 13 presents correlations between measures of interpretive understanding – scores on the two interpretive tasks –, chronological age, expressive and receptive language scores, narrative scores related to children's retelling

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Due to differences in measurement scale between the variables to be correlated (from continuous measures to ordinal and relatively discrete variables) non-parametric procedures were used to examine the relationships between these variables, e.g., Spearman's r_s, two tailed.

of the video scenario, and several scores related to the story-production task. The table includes selectively only variables which correlated significantly with children's scores on at least one of the two interpretive understanding tasks.

However, almost all the narrative measures resulting from children's story production task based on the picture book 'Frog, where are you?' correlated positively and significantly, albeit modestly, with children's scores on the event-based interpretive task (Task 1), with the exception of only two types of content elements, with low overall occurrence in children's narratives: *negative constructions* (marking violations of expectations and considered here as belonging in the category of socio-cognitive content elements) and use of *character voice* (considered as belonging in the group of affective enhancers). As all the content elements coded in the 'Frog story' narratives were grouped into 'intentional terms', 'socio-cognitive elements' and 'affective enhancers', the proportions for these three categories of content elements were used in calculating the correlations included in the table below (Table 13).

Table 13

Correlations between Interpretive Understanding Measures, Age, Language and Narrative Abilities (Spearman r)

Measure	1	2	3	4	5	6	7	8	9	10	11	12
1. Main score - interpret. Task 1	----											
2. Overall score - interpret. Task 2	.47***	----										
3. Chronological age	.41***	.47***	----									
4. Language - expressive	.40***	.33***	.16	----								
5. Language - receptive	.25**	.16	.11	.44***	----							
6. Child's narrative type - Task 1	.43***	.33***	.42***	.30***	.15	----						
7. Mental state terms-own narrative	.34***	.18	.20*	.08	.07	.56***	----					
8. Narrative structure - Task 3	.33***	.36***	.48***	.43***	.17	.50***	.23**	----				
9. Length of narrative - Task 3	.23**	.21*	.40***	.19*	.06	.34***	.17	.57***	----			
10. Intentional terms - Task 3	.32***	.35***	.38***	.13	-.05	.42***	.19*	.41***	.33***	----		
11. Socio-cognitive - Task 3	.27**	.12	.11	.31**	.05	.33***	.14	.23*	.12	.31***	----	
12. Affective enhancers - Task 3	.27**	.06	.14	-.01	-.04	.16	.13	.21*	.21*	.08	-.004	----

* $p < .05$, ** $p < .01$, *** $p < .001$.

Interpretive understanding scores from both tasks, event-based and perceptual, correlated significantly with participants' age, supporting the view that theory of mind abilities continue to develop over time, even after children's consolidated understanding of false belief is well in place. Thus, practically all participants, in their initial account of the video scenario, showed clear evidence of having understood that protagonist 2 (P2) acted on the basis of a false belief, yet many of the younger children were unable to justify the possibility that the two protagonists could arrive at different interpretations of the same behavior, and children's explanations for the possibility of interpretive diversity on both tasks increased in complexity with age.

In agreement with the results of several recent studies which showed a strong link between language abilities and theory of mind understanding in preschool children (Astington & Jenkins, 1999; Cutting & Dunn, 1999; Happe, 1995; Jenkins & Astington, 1996), significant positive correlations were found between language scores and scores on the two interpretive tasks in the present sample of 6 to 11-year-olds. Most previous studies which investigated relationships between theory of mind understanding and language have used either general measures of language ability, such as scores on standardized language development tests (e.g., TELD, PPVT, BPVS, etc.; see Cutting & Dunn, 1999; Jenkins & Astington, 1996), or have examined specific aspects of linguistic competence, such as **semantic development** (e.g., comprehension of mental terms, modal expressions, contrastives, metacognitive vocabulary - see Bartsch & Wellman, 1995; Feldman, 1988; Johnson & Wellman, 1980; Moore, Pure, & Furrow, 1990; Nelson, 1996; Olson, 1988; Schwanenflugel, Fabricius, & Noyes, 1996; Shatz et al, 1983), **syntactic**

knowledge (e.g., mastery of embedded sentence constructions, especially of sentential complements with mental/communication verbs – see de Villiers, 2000; de Villiers & Pyers, 1997; Tager-Flusberg, 1993, 2000), or **pragmatic skills** which enable successful social communication (Eisenmajer & Prior, 1991; Hughes & Dunn, 1997).

In the present study the language scores obtained by administering the two subtests of the CELF- R reflect two aspects of general linguistic ability - expressive language and receptive language skills. Both types of language scores correlated significantly with children's scores on the event-based interpretive task, but for the perceptual interpretive task only the correlations with expressive language scores reached statistical significance. These correlations between interpretive measures and language scores remained significant after controlling for age (see Table 14 of partial correlations).

Significant positive correlations were also found with a variety of narrative competence measures, especially for the event-based interpretive task performance (see Table 13). Moreover, scores on the perceptual interpretive task also correlated positively and significantly with the narrative measures, with the exception of two types of content elements used in the story production task (proportion of socio-cognitive elements and of affective enhancers) and of number of mental state-words used in the child's retelling of the video-scenario. These latter measures did correlate significantly, albeit modestly, with scores on the event-based interpretive task (see Table 13).

Even after controlling for age, the correlations presented above between narrative and interpretive measures remained marginally significant (see Table 14), as did the correlations between the prediction scores for the perceptual interpretive task and the

'Frog story' narrative structure ($r = .36$, $p < .001$) and narrative length ($r = .24$, $p < .05$) measures.

As will be further discussed, the findings of the present research also suggest that individual differences in certain aspects of narrative competence are related to individual differences in theory of mind abilities in middle childhood, beyond what is accounted for *by age and general language competence*. For instance, the narrative competence measures used in coding children's own retelling of the video-scenario, all remained significantly, albeit modestly, correlated with scores on the even-based interpretive task after controlling for both age and language scores (i.e., $r = .26$, $p < .01$ for both the narrative type of child's account, and for the number of mental state words used in the child's own narrative account of the event - see Table 15), but did no longer correlate significantly with scores on the perceptual interpretive task after partialling out both age and language scores. Further research is needed to investigate the specific ways in which certain abilities involved in becoming a competent story-teller relate to various aspects of theory of mind understanding at different developmental moments, but the results of this study clearly support the hypothesis of a such a relationship (see Tables 14 and 15 for partial correlations).

Table 14

Partial Correlations between Interpretive Understanding Measures, Language and Narrative Abilities (with Age Partialled Out)

Measure	1	2	3	4	5	6	7	8	9	10
1. Main score - task 1	—									
2. Overall score - task 2	.30***	—								
3. Language - expressive	.35***	.24*	—							
4. Language - receptive	.24*	.14	.44***	—						
5. Child's narrative type - task1	.32***	.20*	.26**	.12	—					
6. Mental state terms own narrative	.28**	.04	.11	.11	.49***	—				
7. Narrative structure - task 3	.21*	.22*	.36***	.11	.43***	.12	—			
8. Intentional terms - task3	.17	.22*	.07	-.08	.33***	.15	.28**	—		
9. Socio-cognitive - task3	.22*	.10	.25*	.09	.29**	.09	.21*	.37***	—	
10. Affective enhancers - task 3	.21*	-.05	-.01	-.03	.11	.06	.16	-.004	.004	—

*p< .05. **p < .01. ***p < 001.

Table 15

Partial Correlations between Interpretive Understanding Measures and Narrative Abilities, with Age and Language Scores Partialled Out

Measure	1	2	3	4	5	6	7	8	9
1. Main score - interpret. task 1	—								
2. Overall score - interpret. task 2	.24*	—							
3. Child's narrative type - task1	.26**	.15	—						
4. Mental state terms own narrative	.26**	.01	.48***	—					
5. Narrative structure - task 3	.10	.16	.38***	.09	—				
6. Length narrative- task 3	.12	.04	.22*	.11	.49***	—			
7. Intentional terms - task3	.17	.19*	.32**	.15	.27**	.21*	—		
8. Socio-cognitive - task3	.16	.05	.24*	.06	.13	.04	.36***	—	
9. Affective enhancers - task 3	.23*	-.05	.11	.06	.17	.11	-.01	.01	—

*p< .05. **p < .01. ***p < 001.

Theoretical arguments for a strong link between *narrative competence* and theory of mind abilities have been developed and partly supported by empirical research (Astington, 1990; Lewis et al, 1994). This research reflects a variety of approaches to narrative and theory of mind, such as focusing on the importance of comprehending the narrative structure of false belief tasks for young children's performance on such tests (Lewis, 1994; Lewis, Freeman, Hagestadt, & Douglas, 1994), or focusing on children's use of metacognitive language in retelling stories (Astington, 1990), or on their ability to "tune in" to the story characters' inner worlds, to the story's "landscape of consciousness" (Fox, 1991; Pelletier, 1997; Charman, & Shmueli-Goetz, 1998).

However, far fewer studies have directly examined the relationships between narrative discourse production, general language ability and theory of mind understanding in normally developing children, although this topic was investigated more thoroughly with atypical populations, in particular children with autism (Baron-Cohen, Leslie, & Frith, 1986; Loveland, McEnvoy, Tunali, & Kelly, 1990; Loveland & Tunali, 1993; Tager-Flusberg, 1995; Tager-Flusberg & Sullivan, 1995). One study (Charman & Shmueli-Goetz, 1998) which directly compared normal 7-8-year-old children's performance on theory of mind tasks with measures of their narrative production based on a picture book, did not find several of the predicted correlations between certain narrative measures, language scores and theory of mind performance, with the exception of a "modest but significant correlation, ($r = .29$, $p < .05$) between referential strategy when introducing a new story character and performance on the theory of mind tasks" (p. 260). In contrast to these results, the majority of the narrative measures used in the present

study correlated significantly with children's scores on the event-based interpretive task, with the exception of two types of content elements already mentioned: use of negative constructions and use of character voice. There are several possible explanations for this discrepancy in the results of the two studies. First, as mentioned in a note in the method section, the different coding procedures used to define measures of narrative structure may have tapped into different aspects of children's ability to organize and integrate story information (events, theme, motives, outcome) into a coherent narrative, and it is possible that children's use of conventional story-telling devices such as formal opening or ending (which was emphasized in the coding schema used by Charman and Shmueli-Goetz) is more or less part of acquired **conventional** knowledge, not necessarily related to children's developing ability to construct meaningful narratives or to take a mentalistic stance. But, even more importantly, a direct comparison is not possible between the different measures used to assess mentalizing competence in the two studies, respectively, between interpretive understanding tasks, used in the present research, and second-order false-belief tasks or belief-desire reasoning tasks - which were the 'theory of mind' measures used in the study above mentioned. Such patterns of results serve as a warning against treating narrative competence or theory of mind understanding as 'global' or 'unitary' competencies, and point out the need to adopt a more refined and differentiating approach to the complex set of skills involved in meaning-making in the context of telling a story, and to their relationships with an equally complex set of mentalizing abilities which appear to develop gradually over the years of early and middle childhood.

As for the relationship between the two representational domains with respect to which children's understanding of interpretive diversity was tested in this study, the correlation between the two interpretive tasks ($r = .47$, $p < .001$) suggests that children's reasoning about matters of interpretation appears to show some consistency across different types of situations involving people's discrepant representations. Moreover, Table 17 shows that, even with age and language scores controlled for, correlations remain significant, albeit modest, between children's scores on the two interpretive tasks, intentional and perceptual ($r = .23$, $p < .05$). Similarly, when controlling for both age and language scores, children's scores for their first explanations on each of the two interpretive tasks remain modestly correlated ($r = .21$, $p < .05$). One possible interpretation of these results could be that understanding interpretive diversity is not closely tied to particular representational domains, (as a modular 'theory of mind' explanation would assume), but reflects an epistemological position based on the understanding that human minds are endowed with subjectivity and thus may arrive at different interpretations of the same stimuli in a variety of situations, whether confronted with ambiguous visual displays or with people's behavior or communication. Given the significant correlations between performance on the two interpretive tasks independent of the effects of age and language competence, it appeared appropriate to construct a composite interpretive measure as an aggregate score, collapsed across the two tasks (main score for task 1 and overall score for task 2, the internal consistency of the new measure, Cronbach's alpha, being .61), with the range 0 - 8. Table 16 lists correlations between composite interpretive scores and age, language and narrative skills measures.

The second part of the table includes partial correlations between the same measures after controlling for age (a) and for age and language scores (b).

Table 16

Spearman Correlations with Composite Interpretive Score

	Age	Language expressive	Language receptive	Child's narrative type-task1	Mental states- own narrative	Narrative structure - task 3	Length narrative - task 3	Intentional terms - task3	Socio-cognitive - task3	Affective enhancers - task 3
Composite interpretive	.53***	.44***	.23*	.45***	.33***	.41***	.28**	.40***	.21*	.21*
a.	---	.37***	.23*	.33***	.21*	.26**	.15	.24*	.21*	.11
b.		---	---	.26**	.18	.16	.11	.24*	.13	.12

***p < .001, ** p< .01, * p< .05

a. Partial correlations with age controlled for.

b. Partial correlations with age and language scores controlled for.

2. Regression analyses

To further examine specific predictive relationships between interpretive understanding measures, age, language, and several measures of narrative competence, I conducted a series of multiple regression analyses with each of the interpretive scores (for the event based task and for the perceptual task) as dependent variables. All the measures considered for regression analyses were first inspected for univariate and multivariate outliers and for their distributions, and one categorical variable (i.e., 'type of child's own narrative account of the event') was dummy coded (i.e., into action-only narratives and intentional narratives) before being entered into analyses as predictor. Another variable - 'narrative structure score for the Frog-story task' - which showed a skewed distribution was normalized[18], and arcsine transformations were applied to the narrative content elements which were expressed as proportions. Although several of the variables which could be considered predictors for interpretive understanding performance correlated with each other, none of the correlations were higher than $r = .50$, ruling out potential data analyses problems due to multicollinearity.

a) **Intentional/event-based interpretive task scores**

On the basis of the correlational analyses results, the measures first entered simultaneously into a multiple regression as predictors were: age, expressive and receptive language scores, narrative type of the child's own account of the event (dummy coded), and narrative structure score (normalized) for the 'Frog story' task, which

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[18] All regression analyses were also conducted with the untransformed variables and very similar results were obtained.

together accounted for 32% of the variance in the scores for the event-based interpretive task, $R^2 = .320$, $F(6, 105) = 8.23$, $p < .001$. To test their relative importance to predicting variability in interpretive understanding performance, these variables were next entered into a stepwise multiple regression, with the scores for the event-based interpretive task as criterion; only three of the measures were retained as predictors: age, expressive language score, and intentional narrative-type of child's own account of the event, which together accounted for 30.7% of the variance in interpretive scores on task 1. Table 17 presents the results of this analysis, showing that, after controlling for age (which was a significant predictor, accounting for 15.9% of the variance), entering expressive language score at Step 2 resulted in a significant R^2 incremental change, as did the addition of the intentional narrative-type of the child's own account, which further improved modestly, but significantly, the explained variance in interpretive performance for this task (after the effects of age and expressive language were taken into account).

Table 17.

Summary Table for the Stepwise Multiple Regression Analysis Predicting Performance on the Event-based Interpretive Task (Significant Predictors)

Step	Variable added	Change Statistics				Partial
		R^2 Change	F Change	beta	t	Correlations
1	Chronological age	.159**	20.77**	.284	3.38**	.309
2	CELF score for expressive language	.104**	15.38**	.319	3.91**	.352
3	Intentional narrative-type of child's own account	.044*	6.93*	.218	2.63*	.246

Note: Dependent variable = main score for interpretive task 1 (event-based task)
**p< .001; *p < .01

Based on these results, variance in expressive language scores appears to have most unique contribution to variance in interpretive scores for the event-based task, a conclusion also supported by the strength of the partial correlation between expressive language and interpretive performance on task 1, after partialling out the effects of the other two predictors (.35, $p < .001$), but with age and intentional narrative-type of child's own account of the event as significant contributors as well.

A second multiple regression analysis with the interpretive understanding scores for task 1 as dependent variable was conducted, to examine whether any of the *narrative content elements* coded in the story production task would further contribute to explaining variance in children's event-based interpretive scores, over and above what was already accounted for by age, expressive language and use of intentional narrative in their account of the event, predictors now entered as a block on the first step of a hierarchical regression analysis. On the second step, the narrative content elements '*proportion of intentional terms*', '*proportion of affective enhancers*' and '*proportion of socio-cognitive terms*' used in the 'Frog story' narratives, were entered as independent variables, and produced an increase in R^2 of 6.1%, which was significant, ($F_{inc}(3, 105) = 3.40$, $p < .05$). Among these content elements, the proportion of *affective enhancers* was most strongly related to interpretive performance for task 1, as indicated by the only significant beta weight among the 3 types of content elements (beta = .211, $t = 2.67$, $p < .01$) and by the significant partial correlation (.25, $p < .01$), when controlling for all the other predictors[19].

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[19] These results were also confirmed by a stepwise regression analysis in which the same four independent variables were retained as predictors: age, expressive language, use of

When the *perceptual interpretive task* (task 2) score was added to the list of independent variables as potential predictor, this measure was also retained in the stepwise multiple regression on scores for the event-based interpretive task, and it accounted for 19.1% of the explained variance (R^2 = .191, F (1, 110) = 26.05, p < .001), when entered first. All the other measures retained in the previous regression remained significant contributors, with the exception of age, which fell short of statistical significance (beta = .172, t = 1.94, p = .055) in the prediction of performance for the event-based interpretive task, independently of the linguistic and narrative measures. Table 18 presents the regression coefficients for the variables retained as predictors.

Table 18.

Last Step Coefficients in Stepwise Regression Analysis Including Scores for the Perceptual Interpretive Task among Predictors for the Event-based Interpretive Task

Variable	B	SE B	beta	t	Sig.	Partial Correlations
Score for task 2	.315	.087	.298	3.60	.000	.329
Expressive language	.137	.040	.283	3.51	.001	.322
Proportion of affective enhancers -task3	1.02	.348	.228	2.93	.004	.272
Intentional narrative-type of child's own account	.522	.219	.191	2.38	.019	.224

intentional narrative-type for the child's account of the event, and proportion of affective enhancers in the 'Frog story' narratives. However, Cohen & Cohen (1983) discourage the use of the stepwise regression procedure unless 'n' is very large, so that the ratio of independent variables to cases is around 1 to 40, or cross-validation of the analysis in a new sample is undertaken. For purpose of cross-validation in this study, the sample was randomly divided in half and the regression analyses were conducted on the two half samples. With the exception of age, which was not retained as predictor for one of the half samples, all the other significant findings withstood cross validation.

In order to test whether the scores on the perceptual interpretive task have predictive value over and above the contribution of age, language ability, use of narrative affective enhancers and child's own type of narrative account of the event, this measure was entered separately on Step 2 of a hierarchical multiple regression, after the factors listed above had been entered on Step 1. The addition of interpretive scores from the perceptual task on a second step, after taking into account the effects of the other predictors above, modestly, but significantly, improved $\underline{R}^2$ (R^2_{change} = .036, F_{inc} (1, 106) = 6.25, $\underline{p} < .05$, beta = .225, $\underline{t}$ = 2.5, $\underline{p} < .05$), and the combination of all predictor-variables in the final equation accounted for 38.6 % of the variance in the interpretive scores for the event-based task, $\underline{F}$ (5, 106) = 13.34, $\underline{p} < .001$.

To summarize, children's interpretive understanding performance on the event-based interpretive task was positively related to their performance on the perceptual interpretive task, and differences in interpretive understanding appeared to be best explained by a combination of linguistic and narrative skills, beyond what could be accounted for by age differences. Thus, higher scores on the event-based interpretive task tended to be associated with higher expressive language skills, with the use of an intentional narrative type of account rather than an action-only type of narrative in recounting the event seen in the video, and with the use of a higher proportion of affective enhancers in constructing the 'Frog story' narrative .[20]

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The same analyses were then rerun after converting all scores to standard z scores, to correct for differences in measured variance. Exactly the same pattern of results emerged for explaining variance in performance on the even-based interpretive task

Although performance on the two types of interpretive tasks was correlated, it was necessary to test whether the same combination of measures would best predict variability in performance on the perceptual interpretive task, which is the next analytic step presented below.

b) Perceptual/double meaning figure interpretive task scores

A similar series of multiple regression analyses was conducted to identify the best predictors for performance on the perceptual interpretive task. First, age, expressive and receptive language scores, narrative type of the child's own account of the event (dummy coded as presented above), and narrative structure score (normalized) for the 'Frog story' task, were entered simultaneously into a multiple regression as independent variables, and together accounted for 29.6% of the variance in the scores for the perceptual interpretive task, $R^2 = .296$, $F(6,105) = 7.35$, $p < .001$. When these variables were entered into a stepwise multiple regression with the scores for the perceptual interpretive task as criterion, the measures retained as predictors were age and expressive language scores, which together accounted for 27% of the variance in interpretive scores on task 2.

Table 19.

Summary Table for Stepwise Multiple Regression Analysis Predicting Perceptual Interpretive Task Performance

Variable entered on step:	B	SE B	beta	t	sig
1. Child's age	.037	.007	.439	5.27	.000
2. Expressive language	.096	.038	.210	2.52	.013

Dependent Variable: Overall score for task 2

With respect to the relationships between performance on the perceptual interpretive task and children's use of different narrative *content elements* in the story production task ('Frog story'), only the bivariate correlation with the proportion of intentional terms was significant($r = .35$, $p < .001$), so this measure was added to the list of independent variables as potential predictor of performance on the 2nd interpretive task To determine whether the proportion of intentional terms used in the 'Frog-story' narrative would make an independent contribution to the explained variance in performance on the perceptual interpretive task over and above the effects of age and language scores – which accounted for 27% of the variance, $R^2 = .270$, $F(2,109) = 20.2$, $p < .001$–, a hierarchical regression analysis was conducted, entering age and expressive language scores as a block on the first step, and proportion of intentional terms on the second step of the analysis. The addition of the latter variable at step 2 produced a modest incremental R^2 change of 2.6%, which was, nevertheless, significant, $F(1,108) = 3.95$, beta = .18, $t = 1.99$, $p < .05$, suggesting that differences in use of intentional vocabulary in the context of this narrative task are related to variability in interpretive understanding in the context of a perceptual task, independently of what could be accounted for by age and language differences.

However, when the scores for the event-based interpretive task were entered as an independent variable into a stepwise multiple regression together with the measures already established as predictors, only age and scores on the event-based interpretive task remained significantly predictive of performance on the perceptual interpretive task, and accounted for 30% of the variance. Age was entered first, which accounted for 22.8% of

the explained variance in scores for the perceptual interpretive task, F (1, 110) = 32.45, $p < .001$, after which only the score for the event-based interpretive task was retained, which further contributed to a reliable improvement in R^2 ($R^2_{change} = .073$, F_{inc} (1, 109) = 11.33, $p < .001$). No other measures were retained as predictors. This result was not surprising, in the light of the (relatively strong) bivariate correlation between the two measures of interpretive understanding ($r = .47$, $p < .001$). However, the more interesting finding was related to the relative contribution of the other predictors to variance in performance on each of the two interpretive tasks, when examined separately. Thus, the best predictor for performance on the perceptual interpretive task appeared to be age (see Table 20), while 'expressive language' and 'proportion of intentional terms' used in the narrative production task did not remain significantly predictive after taking into account performance on the event-based task[21].

Table 20.

Last Step Coefficients in Stepwise Regression Analysis Including Event-based Interpretive Task Performance among Predictors for Perceptual Interpretive Task Scores

Variable	B	SE B	beta	t	sig.	Partial Correlations
Child's age	.031	.007	.360	4.12	.000	.367
Score task 1	.279	.083	.294	3.37	.001	.307

Note: Dependent variable: Overall score for task 2 (perception-based interpretive task).

These findings indicate that, when examined independently of each other,

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[21] The same analyses were then rerun after converting all scores to normal scores - to standard z scores -, to correct for differences in measured variance, and the same pattern of results emerged for explaining variance in performance on the perceptual interpretive task.

interpretive understanding performances in each of the two contexts (the event-based task and the perceptual task) appear to be related to a similar set of competencies, based on linguistic and narrative skills, which are not entirely accounted for by age differences. Thus, for both interpretive tasks, expressive language scores contributed to explaining variability in performance after controlling for the effects of age, as did the use of narrative devices which reflect a mentalistic stance: in particular, predictors appeared to be those narrative devices which reflect an awareness of the characters' psychological (cognitive and affective) states, as expressed in children's use of intentional narrative-accounts in retelling the video-scenario, and the use of affective enhancers and intentional terms in producing narratives based on the 'Frog-story' picture book.

However, differences in the relative importance of the set of predictors for explaining variability in interpretive understanding emerged, when performance on one type of interpretive task was included on the list of independent variables for explaining differences in performance on the other interpretive task. In this case, the best predictors for interpretive understanding in the *event-based task* remained expressive language, use of intentional narratives in recounting the video-scenario, and proportion of affective enhancers in the 'Frog story' task, besides the scores for the perceptual interpretive task. But for interpretive understanding in the *perceptual task*, only age emerged as best predictor, after partialling out the other interpretive measure scores (for the event-based task), which accounted for 19% of the variance. Nevertheless, judgements about the relative importance of these predictors are difficult because of their correlations, especially between the two types of interpretive understanding performance, which is why

I turn next to the analysis of the composite score for interpretive understanding.

c) Interpretive understanding composite score

A multiple regression analysis was conducted first with age, expressive and receptive language scores, type of child's own narrative account of the event (dummy coded) and narrative structure scores for the 'Frog-story' task entered simultaneously as independent variables, with the interpretive understanding composite score as dependent variable. This combination of independent variables accounted for 41.5% of the variance in the interpretive understanding composite measure, F (6, 105) = 12.41, $p < .001$, but only *age* (beta = .36, $p < .001$), *expressive language* (beta = .23, $p < .01$) and *intentional narrative type of child's own account* of the event (beta = .24, $p < .05$) emerged as significant predictors.

Next, a stepwise regression analysis was conducted with the narrative content elements (proportion of intentional terms, of affective enhancers and of socio-cognitive elements in the 'Frog-story' narratives) included in the list of potential predictors, besides the three measures established as contributors in the previous analysis. Again, age was entered first, accounting for 26% of the variance, R^2 =.260, F (1, 110) = 38.65, $p < .001$, followed by expressive language, which produced an incremental R^2 change of 10%, which was significant, $F_{inc}(1,109) = 65.76$, $p < .001$, and by the intentional narrative type of child's account of the event, which further contributed to an incremental R^2 of 4.2%, F_{inc} (1, 108) = 7.56, $p < .01$. However, none of the narrative content elements was retained as an additional predictor (although the beta weight for the proportion of intentional

terms used in the narrative production task approached significance, beta = .16, p = .06)[22]. Table 21 presents the regression coefficients for the variables retained as predictors in the stepwise regression analysis on the interpretive understanding composite score.

Table 21.

Summary Table for Stepwise Multiple Regression Analysis Predicting the Interpretive Understanding Composite Score (Last Step Coefficients)

Variable	B	SE B	beta	t	sig.	Partial correlations
Child's age	.059	.012	.399	5.10	.000	.441
Language - expressive	.251	.061	.310	4.09	.000	.366
Intentional narrative-type of child's own account	.971	.353	.212	2.75	.007	.256

Note: Dependent variable: Interpretive understanding composite score

In accord with the previous findings based on regression analyses conducted separately for the two interpretive tasks (event-based and perceptual), these results regarding the interpretive understanding composite score, reaffirm the importance of a set of distinct competencies - in particular linguistic and narrative skills -, for explaining differences in interpretive understanding performance, over and above the effects of age

[22] These results were confirmed by a hierarchical multiple regression analysis in which age, expressive language and intentional narrative type of child's own account of the event were entered on the first step and together accounted for 40% of the explained variance, while the narrative content elements, entered on step two, accounted for an additional 3.3%, which was not a significant contribution independently of the effects of the other three predictors, $F_{change}(3, 105) = 2.05$, $p = .112$. Also, the same findings withstood cross-validation when the analyses were repeated for the two halves, randomly selected, of the original sample.

differences. It could be concluded that, across domains, there is a strong association between general expressive language ability, age and interpretive understanding, and that higher scores on the interpretive understanding composite measure are related to children's tendency to focus on the characters' intentional states rather than give a simple description of actions in recounting an event. However, other narrative measures that emerged as predictors separately for each of the two interpretive tasks - such as the content elements 'intentional terms' and 'affective enhancers' used in the 'Frog-story' narrative production task - did not add a significant contribution to explaining variance in the interpretive understanding composite measure, independently of the effects of age, expressive language and use of intentional narrative type of account in retelling the event.

All the regression analyses presented above explored the contribution of various factors to explaining variability in the *range* of children's interpretive understanding, reflected in their main score for the event based interpretive task, their overall score for the perceptual interpretive task and their composite interpretive score across the two tasks. Another way of exploring children's understanding of sources of interpretive diversity is to take into account the *qualitative distinctions between the types of justifications* first used to explain the possibility of interpretive differences in judging intentions underlying a behavior or in evaluating different representations of the same ambiguous visual stimulus. Thus, the previous analyses focused on measures devised to capture the range of children's interpretive understanding skills by taking into consideration *all the justifications* offered by each child, and adding the scores for each

explanation (first within task and then across tasks for each participant).

The new approach proposed in the following analyses in a sense adopts the reverse strategy of 'dissecting' children's reasoning about the possibility and sources of interpretive differences by taking into consideration *only the first justification* coming into the child's mind when trying to make sense of discrepant interpretations in each of the two situations (task 1 and task 2). More specifically, this approach asks what factors best *differentiate* between children's choices of subjectivist/relativist, informational source or intentional justifications for interpretive differences in the case of the event based interpretive task, or between their choices of subjectivist/relativist and stimulus based/complete justifications in the case of the perceptual interpretive task? The discriminant function and logistic regression analyses reported next address this issue.

3. **Discriminant function and logistic regression analyses.**

Of particular interest in this study are children's types of explanation for the possibility of interpretive diversity in the two domains - intentional and perceptual - , in particular their *first explanation*, which is indicative of their line of reasoning when confronted with discrepant perspectival information: do children first look for objective, situation-based justifications for the different interpretations presented by the characters, do they invoke nonspecific, general human differences, or do they first acknowledge the psychological, subjective perspective of the protagonists in the given situation as source of interpretive diversity? Identifying the variable or set of variables which would best discriminate between these categories of response, and implicitly between participants

whose first justifications fall into these categories was the objective of the next set of statistical analyses.

An association between justification-type and age-group for each of the two interpretive tasks has already been shown using chi square tests, but discriminant function analyses permit to take into consideration *a series of different measures* in order to find the classification function that best predicts group membership, or discriminates between groups as defined by the categories of response (i.e., justification-type).

a) <u>First type of explanation for the event-based interpretive task</u>

Children's first explanations of interpretive diversity for the event-based interpretive task were categorized into 'no response or irrelevant', 'subjectivist/relativist', 'informational source explanations' and ' intentional or personality related explanations'. To examine what factors best differentiated these categories, age, expressive language scores, receptive language scores, the child's type of narrative account of the event (dummy coded into action-only narratives and intentional narratives), and (normalized) narrative structure scores for the 'Frog-story' task were entered as predictors in a direct discriminant function analysis. To check for the homogeneity of covariance matrices assumption, Box's M test was used, which was not significant, $\underline{F}$ (63, 11370) = 1.18, $\underline{p}$ = .15, ns, indicating that it was appropriate to proceed with the analysis. The set of predictors reliably differentiated between the categories of response for the first type of explanation for the event-based interpretive task, as indicated by the significant overall Wilks' lambda, $\Lambda = .68$, X^2 (18, $\underline{N}$ =112) = 41.72, $\underline{p} < .001$, for the three discriminant functions calculated. However, after removing the effect of the 1st discriminant function,

the residual lambda was no longer significant, indicating that only the 1st function should be interpreted. which accounted for 76.8% of the between-groups variation (eigenvalue = .34) in discriminating among explanation-types for task 1. Table 22 presents the within-group correlations between predictors and the 1st discriminant function.

Table 22.

Correlations of Predictor Variables with 1st Standardized Canonical Discriminant Function for Types of Explanation for the Event-based Interpretive Task

Variable/predictor	Function 1	Stand. coeff.
Narrative structure-'Frog story' task (Z score)	.697*	.346
Expressive language score	.578*	.249
Child's age	.631	.399
Intentional narrative account of event	.446	.361
Action-only narrative account of event	.058	.075
Receptive language score	.498	.398

* = Largest absolute correlation between each variable and any discriminant function

The loading matrix of correlations as seen in Table 22 indicates that narrative structure scores for the story-production task and expressive language scores have the strongest relationship with the discriminant function, although age, receptive language scores and intentional narrative account of the event have large loadings as well (the highest loading for age, .633 was with the 3rd discriminant function, which did not significantly contribute to further separation among groups after the 1st discriminant function was removed). This first function could be labeled 'narrative and expressive language competence'.

However, the first discriminant function reliably separates mainly the category of no/irrelevant explanations from the other types of justification, which are closely clustered together along the dimensions of the 1st discriminant function (see Appendix C for a graphic representation of the separation of groups defined by explanation-type for task 1, on discriminant functions). Examination of the group means for the predictor variables revealed that children who failed to give relevant explanations for interpretive differences in the event based interpretive task were younger and had lower narrative structure scores for the 'Frog-story' narrative production task and lower scores on the language test (Narrative structure: M = -.74, CELF expressive: M = 9.53) compared to those who offered subjectivist/relativist justifications (Narrative structure: M = -.14, CELF expressive: M = 11), informational source justifications (Narrative structure: M = .22, CELF expressive: M = 12) and intentional explanations (Narrative structure: M = .13, CELF expressive: M = 11.5).

This analysis however, considered only children's *first* explanation for interpretive differences in the event based interpretive task, disregarding their second or third explanations. Many children offered more than one justification, often combining informational-source and intentional explanations. The analysis of the **main score** for the event-based interpretive task (see results of the regression analyses presented earlier) took in consideration the full range of children's interpretive understanding. The goal of the present analysis was to examine whether any reliable differences, related to what appeared to children *as immediately salient* in explaining interpretive diversity, would emerge from their first justifications, but results pointed instead to similarities between

those who focused first of perceptual access aspects of the situation and those who focused first on the intentional premises involved in the event. A possible explanation of this finding is that both types of justification imply the ability to draw on aspects of the psychological perspectives of the characters involved in a particular event, while maintaining in focus and, implicitly trying to explain, the connection between belief and reality (unlike the case of the subjectivist/relativist justifications, where a relative disconnection between the two could be inferred, e.g., differences in representations are attributed exclusively to differences between people, regardless of the particulars of the real-world situation/stimulus involved).

Following up on this hypothesis, the informational source and the intentional explanations were recoded as 'truly interpretive' justifications (scored 1), and the subjectivist/relativist explanations were recoded as 'transitional' justifications (scored 0), resulting in a new dichotomous measure (labeled '*levels of interpretive understanding*'- consolidated vs. transitional), which was entered into a logistic regression as dependent variable, with age, mean language scores, narrative structure score for the "Frog-story" task, and type of child's own account of the event (dummy coded) as predictors. First, the no/irrelevant justifications were eliminated and the analysis was conducted on the remaining 95 cases of relevant justifications. This model with the initial five covariates failed to significantly predict level of interpretive performance, X^2 (6, $\underline{N}$ = 95) = 5.71, $\underline{p} < .34$, but a backward stepwise procedure retained as the only covariate in the model the *child's intentional narrative account of the event*, which emerged as a marginal predictor (the final model, X^2 (1, $\underline{N}$ = 95) = 4.17 , $\underline{p} < .04$, see Table 23).

Table 23.

Final Model in Stepwise Logistic Regression Predicting Level of Interpretive Understanding (i.e., Consolidated) for the Event-based Interpretive Task

Variable	beta	SE	Wald	Sig.	Odds ratio
Narrative- type account:					
Intentional	1.41	.79	3.18	.07	4.08

Thus, when controlling for all other predictors, only the child's own intentional account of the event was positively related to the odds of first giving a truly interpretive response for the event based interpretive task, or, more specifically, after adjusting for age, language and narrative structure performance, the estimated odds of giving a truly interpretive justification were about 4.08 times greater for those who used an intentional narrative account of the witnessed event than for those who produced action-only and disorganized accounts in their retelling of the video-scene.

In addition, an examination of the cross-classification table for type of narrative account used in retelling the event by level of interpretive understanding performance on the first interpretive task, shows that the ratios of 'truly interpretive' justifications versus 'transitional' justifications change significantly as a function of narrative account type, from 2 :1 for those who gave a disorganized or 'no narrative' account, to 3.5 :1 for those using action-only narrative accounts, to 13 :1 for children producing intentional narratives in their account of the event (see Table 24).

Table 24.

Frequencies and Percentages of Justifications at Two Levels of Interpretive Understanding for Task 1, by Narrative-type of Account

Narrative-type of child's account	Level of interpretive understanding		
	Transitional	Truly interpretive/ Consolidated	Total
No narrative	4 (30.8)	9 (69.2)	13
Action only narrative	12 (22.2)	42 (77.8)	54
Intentional narrative	2 (7.1)	26 (92.9)	28
Total	18 (18.9)	77 (81.1)	95

Note: Percentages for type of explanation within narrative-type are in parentheses.

These results suggest that, after excluding those who failed to give any relevant justifications, what best differentiates between children's explanations for the possibility that people may arrive at different interpretations of an action, based on assuming different intentional premises, is their propensity (or lack of) to interpret events in terms of possible underlying motives, desires, beliefs of the protagonists, as reflected in their focus on the characters' possible mental premises for action, when retelling the video-scenario, in contrast to focusing on action only. However, I would like to emphasize again that this analysis, unlike the analysis of children's main score for the event-based interpretive task, takes into consideration only their first justification, while over 30% of the participants offered more than one explanation, usually after a further probing question (often combining informational-source and intentional explanations).

An examination of the number of justifications provided by each participant in

relation to the type of narrative account produced, indicates that 44.8% (13 children) of those who produced intentional narratives in their retelling of the video-scenario offered a second explanation for interpretive diversity, of whom 9 children (31%) contributed an intentional/personality-based 2nd justification. By comparison, 29% (18 children) of those who produced action-only narratives offered a second justification, and only 14.5% of their 2nd justifications were intentional/personality based, (while among children whose account of the video-scenario was categorized as 'no-narrative', only three (14%) offered a second justification for interpretive diversity for the event-based task, of which one was informational source based and two intentional/personality based explanations).

To summarize, for the event based interpretive task, children's different categories of justification regarding the possibility of interpretive differences and their sources were best differentiated by one discriminant function, with high loadings on two measures of narrative competence (narrative structure score for the story-production task and use of intentional narrative in recounting the video-scene), expressive language, and age. The graphic representation of cases and discriminant function group means (see Appendix C) indicated that the first discriminant function maximally separates between the category of no/irrelevant justifications and the other three types of justification, which were relatively close to each other along these dimensions. When restricting the analysis to the relevant justifications, recoded into transitional (i.e., subjectivist/relativist) and truly interpretive/consolidated (i.e., informational source and intentional explanations), only the use of intentional narrative in the child's own recounting of the event emerged as a marginally significant predictor for truly interpretive explanations in a logistic regression

on the dichotomous outcome of levels of interpretive understanding (transitional vs. consolidated).

b) **First type of explanation for the perceptual interpretive task**

Similar analyses were performed for the perceptual interpretive task, taking the categories of participants' first explanation for interpretive diversity (i.e., none/irrelevant, subjectivist/relativist, stimulus-grounded and complete justifications) as the dependent measure (since only 6 participants offered justification that included both references to the double-meaning nature of the stimulus and to subjective differences between perceivers, those complete responses were considered together with the stimulus grounded explanations as one category in the discriminant analyses, thus eliminating the problem of outliers). A discriminant function analysis was conducted to identify the variable or set of variables which best differentiate between children's categories of response for their first explanation of interpretive diversity on the perceptual task. Age, expressive language scores, receptive language scores, narrative structure for the 'Frog-story' task and the child's type of narrative account of the event (dummy coded) were entered as predictors. Box's M test, used to check for the homogeneity of covariance matrices assumption, was not significant, F (42, 12217) = 1.26, p = .12, ns, indicating that it was appropriate to proceed with the analysis. A significant overall Wilks' Λ = .68, X^2 (12, N =112) = 40.5, p < .001, for functions 1 through 2 was obtained, establishing that the five predictors reliably differentiated between the categories of response for the first type of explanation for interpretive diversity on the perceptual interpretive task. However, the residual Wilks' lambda after controlling for the effects of the first

discriminant function was no longer significant, $\Lambda = .94$, $X^2 (5, \underline{N} = 112) = 8.05$, $p = .27$, ns, indicating that only the first function should be interpreted. The first discriminant function accounted for 85.8% of the variance between the groups defined by justification categories for the perceptual interpretive task (eigenvalue = .38). The within-groups correlations between discriminating variables and the standardized canonical discriminant function are presented in Table 25:

Table 25.

Correlations of Predictor Variables with the 1st Standardized Canonical Discriminant Function for Types of Explanation for the Perceptual Interpretive Task

Variable	Function 1	Stand. coeffic
Child's age	.797*	.651
Narrative structure for 'Frog story' task (Z score)	.639*	.212
Expressive language score	.519*	.302
Intentional narrative account	.399	.256
Receptive language score	.362	.237
Action-only narrative account	.049	.016

* = Largest absolute correlation between each variable and any discriminant function

As shown in Table 25, the predictors with the highest loadings and thus, the strongest relationship with the first discriminant function were age, narrative structure and expressive language scores, results similar to those of the analysis of categories of justification for the event-based interpretive task.

However, when eliminating the participants who failed to give a relevant

justification of interpretive diversity for the perceptual task, and entering the remaining 92 responses into a logistic regression with the new dichotomous measure of level of interpretive understanding (i.e. *transitional*, comprising the subjectivist/relativist justifications and *consolidated*, comprising the stimulus grounded/complete explanations) as criterion, only one variable was retained as significant predictor by a backward stepwise procedure: this was age (the final model, X^2 (1, N = 92) = 7.91, $p < .01$, odds ratio for 'age' = 1.79 Wald = 6.99, $p < .01$). Thus, when controlling for language, narrative structure performance, and type of narrative account in retelling the event, only the child's increase in age was significantly (and positively) related to the odds of first giving a consolidated interpretive response on the perceptual interpretive task.

The results of both discriminant function and logistic regression analyses for the categories of justification used in the two different interpretive tasks lend further support to some of the findings from the multiple regression analyses, which concerned the overall interpretive scores for the intentional and the perceptual interpretive tasks: thus, differences in children's justifications, as well as performance on the perceptual interpretive task seem to be best explained by age differences, while for justifications and performance on the event-based interpretive task, although age emerges as an important factor, certain aspects of narrative competence and linguistic ability play an important role, which cannot be entirely accounted for by age differences.

These findings reinforce the need for further explorations of individual differences, not only with respect to children's performance on various theory of mind tasks, but also within the complex set of factors which may influence or even define the

experiences by which children come to develop psychological understanding, from early conversational exchanges, play and shared activities with familiar others, to their school and literacy experiences.

CHAPTER IV

DISCUSSION

A complex interweaving of knowledge about people, mental orientations toward events and communication around them, language and narrative skills emerges from this study as essentially involved in the development of children's understanding of the interpretive aspect of mind. A central goal of this investigation was to arrive at a multifaceted characterization of this development, that would advance our understanding of *how* children's mentalizing abilities evolve, beyond documenting age-related differences in performance on tasks of interpretation. Thus, the research questions focused on several aspects of this development which have not been closely examined in previous investigations.

First, children's *reasoning* about the possibility and sources of interpretive diversity in two contexts was closely examined, by focusing on the types of justification used to make sense of the interpretive differences voiced by the protagonists in the event-based and the perception based tasks; this focus on the qualitative aspects of children's reasoning led to findings which both confirmed the expectations about age-related differences in interpretive understanding formulated at the onset of the study, and in addition, revealed unanticipated patterns of explanation-types used within age-groups by participants involved in this research.

Second, the focus of this study on the *relationships* between interpretive understanding abilities and certain aspects of children's language and narrative skills yielded findings which support an experiential, mediational account of children's

development of psychological understanding, in contrast to a theory account framed exclusively in cognitive terms of concept acquisition.

Summary of the findings

The descriptive analyses of age-related differences in performance on measures tapping children's interpretive understanding skills revealed substantial evidence that the child's "discovery of the mind" is far from being complete around the age of 4 years, when the ability to entertain the possibility of false belief has been shown to be solidly in place. The development of children's understanding of how minds work continues well into the years of middle childhood, undergoing reorganizations which are inextricably tied to the child's experience with, and competence in the use of linguistic and narrative modes of representation and communication.

Both the range of children's interpretive understanding and the complexity of their explanations for the possibility and sources of interpretive diversity were positively correlated with age, which also emerged as a significant predictor for interpretive performance in the two tasks. These findings suggest that appreciating the interpretive character of mental life constitutes a more or less gradual accomplishment of later childhood years, as has been proposed by investigators who argue for the recognition of qualitative distinctions in children's understanding of how minds work, during the years of childhood and even adolescence (e.g., Chandler & Carpendale, 1998; Chandler & Lalonde 1996; Pillow & Mash, 1999).

In line with the expectation of developmental differences in interpretive

understanding abilities, children's performance on both tasks (i.e., event-based and perception-based) was positively and strongly correlated, suggesting that an appreciation of the interpretive aspect of mind rests on similar reasoning processes in different representational domains. Nevertheless, the relative contribution of age to explaining variability in interpretive performance was stronger for the perception-based task than for the event-based task, the latter being best explained by expressive language performance and by the child's use of an intentional narrative account of the event witnessed.

A distinct and unexpected finding of this research was the important role of the child's own account of the event in predicting performance on interpretive tasks, over and above the contributions of age and language skills. This variable -- narrative type of child's own account of the event -- turned out to be significantly related to several measures devised to assess children's interpretive understanding, and remained the only significant predictor (independent of age and language competence) to differentiate between 'consolidated' and 'transitional' levels of interpretive understanding for the event-based task. Thus, the child's own initial mental orientation to the task – as reflected in the tendency to focus on the intentional landscape of the event watched, and to recount it in a narrative form based on inferences about the protagonists' mental states – was significantly predictive of a consolidated level of understanding interpretive diversity in the context of the event-based task. In contrast, children's initial focus on the description of the actions witnessed or on disparate moments of the skit, tended to be associated with transitional levels of understanding interpretive diversity. Most importantly, these differences in the ways in which children initially processed the event watched are not

entirely explained by age or language based differences, although such relations were found. This finding underscores the importance of a multi-measure approach to the problem of children's developing understanding of mental activities, and the need to take into account the child's own interpretation of the task – which in this study made a significant impact in explaining variability in children's performance in interpretive tasks.

The multivariate analyses were conducted in an attempt to take steps toward disentangling some of the factors which, from an experiential perspective on development (Nelson, 1996), are expected to constitute substantial contributors to interpretive understanding, within the complex system of skills and influences that are necessarily involved in almost any 'higher order' mental process. The findings support the view that changes in the reasoning processes by which children make sense of interpretive diversity in two contexts (intentional and perceptual) are best explained by examining an array of language and narrative-related competencies (in relationship to age), instead of postulating conceptual deficits which are overcome at certain ages by new conceptual acquisitions in representational capacities.

A meaningful discussion of the significance of these findings requires making explicit the ways in which the theoretical and methodological perspective adopted in this investigation differs from other current approaches to the study of children's developing understanding of mental life. Highlighting the differences between a 'standard' theory-of-mind approach and the mediational account proposed in this study constitutes a starting point for interpreting the results of this investigation in relationship to other findings from socio-cognitive developmental research.

Differences in theoretical and methodological approaches to children's understanding of mind

Going beyond carefully documenting age-related differences or settling controversies about the 'normal age' at which one or another type of competence or concept can be shown to have been acquired is of foremost importance in the study of children's conceptualizations of mental life, especially given the enormous expenditure of publications and creative research energies already invested in establishing just such unequivocal developmental junctures in young children's growing knowledge about minds. Reminding us that, "we have learned much about the nature of children's understanding of mental representation, and their grasp of the links between people's action and their representation of the world – which may be mistaken", Dunn (1999) argued for turning attention to "(...) how this understanding becomes apparent in children's social lives, and what social processes may be implicated in the development of this understanding, issues that have received much less attention" (p. 230).

Such change in focus carries several implications for the theoretical perspective underlying the design of studies investigating the development of mentalizing abilities: One implication is the need to reexamine the implicit assumptions which have been shaping the research field's 'object' of inquiry, usually defined as the child's conceptual acquisition of a system of interrelated concepts constituting the special knowledge domain of "mind". Thus, most 'theory of mind' research up to date, as summarized by Flavell and Miller (1998), focused "on the child's developing knowledge of the entire structure and content of the mind", by framing research questions in terms of "When and

in what order does the child gain some understanding of all the major mental entities (beliefs, desires, etc.) and their causal interrelationships with one another, with the perceived environment, and with behavior" (p. 86). The implicit assumption underlying this approach is that the development of psychological understanding entails acquiring the main pieces of a coherent system of interconnected mental states (Wellman, 1990) - 'folk psychology'- , defined by their causal relations to each other and by their representational relations to reality. This assumption, in turn, leads to testing for the presence or absence of specific mental concepts at certain ages to be used as a preferred methodological paradigm. The proportion of 'pass-fail' responses on tasks specifically designed to demonstrate whether children *have* an understanding of the concept of 'false belief', 'intention', 'deception', 'desire', 'pretend' and so on., is taken as marker for establishing the 'normal age' at which the acquisition of the respective concepts is considered to be in place.

In contrast, an alternative view of the field's research problems emerges from considering children's understanding of mental activities as an intrinsic and inseparable aspect of their dynamic knowledge system grounded in their real-life experiences, mediated by a complex socio-linguistic and cultural support-system, which not only assists the child in 'discovering' mental state concepts, but guides and shapes the very processes by which children construct their understandings about how minds work. As Nelson (1996) points out, "This is not a simple matter of enculturation " (...) for "[I]t depends on constructive processing" (p. 302), but cognitive constructions are seen as collaborative, not as isolated individual endeavors. The implication is that knowledge

construction is necessarily dependent on children's participation in social interactions and cultural activities, and is essentially transformed through their increasing access to, and command of the representational and communicative potential of language. In particular, understanding the internal perspectives of others, given the opaque nature of intentional states, may be "dependent upon representation in language" (ibid. 318), and may be achieved gradually through interactional experiences, in collaboration with adults and peers who engage children in the "language games" (Wittgenstein, 1956) which enable them to derive the meaning of mental state terms from their contexts of use. The research presented here was devised in the framework of this alternative approach to the study of children's understanding of mental activities.

Further implications of this approach for framing research questions and for methodological options could be considered: thus, questions about what children know about various mental states and at what age, appear to be less relevant than questions about the processes and experiences by which children become increasingly competent in using their understanding about intentional premises of people's actions to make sense of complex social situations, real or fictional (as well as of stories, and to interpret all sorts of human affairs and dramas). In this perspective, for instance, exploring the potential role(s) played by narrative reconstructions of experience, whether in conversation, play or even monologues (e.g. early childhood bedtime monologues) in developing psychological understanding, may provide substantially more information (or more meaningful insights) about the processes conducive to this development than experimental tests of the presence or absence of the child's understanding of a particular mental state concept.

The methodological options available for this framing of the research interests are, nevertheless, not restricted, as it would first appear, to naturalistic observational studies (as the 'only' kind that would capture children's understandings 'in action', in their real-life context of display). If children develop their understanding of mental life through increasing "participation in the language games" of the mind, especially in the context of narratively structured experiences (stories, play, conversations about events which may help the child sort out and make meaningful and memorable aspects of shared experiences), then experimental tasks using such contexts are expected to provide the kind of support necessary for children to demonstrate their understanding, and give clues about how this is likely to be used in everyday situations.

A related methodological option is to explore the kinds of reasoning processes employed by children in making sense of task-situations which approximate real-life contexts, by closely examining their explanations and elaborations around the task questions, instead of testing for the presence or absence of a specific concept by sorting children into those who fail and those who pass the task.

Finally, another implication of this view is that, in any situation which is set-up to probe a certain understanding, the child-participant's interpretation of the experimental situation should be considered relevant for the investigator's purposes; thus the researcher needs to try to first uncover, or at least take into account children's interpretive assumptions related to the entire discourse context surrounding the experiment. As Nelson (1996, p. 350) points out, "Only by situating our inquiry within the child's frame of reference can we begin to make sense of how the child makes sense".

Considering the implications discussed above in relation to the findings of the present investigation, I will first relate children's own interpretations of the video-scenario to their answers regarding the characters' discrepant interpretations of the event, to their interpretive understanding scores based on their explanation of sources of interpretive diversity in the same situation. Next I will assess the role of children's own interpretation of the scene within the set of factors contributing to differences in levels of interpretive understanding, as evaluated in the context of the two tasks.

Telling the story of a witnessed event: Children's own interpretations

As mentioned in the summary of the findings, the ways in which children processed the video narrative turned out to be significantly related to children's performance in the event-based interpretive task. Examining the relationship between children's type of account produced in retelling the video-scene and their responses to the questions targeting their understanding of the possibility and sources of interpretive diversity was a priority of this study. In particular, I was interested in exploring whether beyond differences in memory for the details of the scenario, children themselves interpreted the event similarly, or whether any aspects of their retelling of the scene would reflect potentially deeper differences in their own 'baseline' understanding or approach to the event.

The analysis of their own narrative accounts of the scenario revealed qualitative differences in children's ways of making sense of what they watched – as reflected in their focus on either disparate, disconnected episodes ('no narratives'), or on the sequence of overt actions being seen ('action-only narratives') or on the intentional premises of the

actions, as inferred by children with respect to the protagonists' motivations, desires, beliefs and other mental states ('intentional narratives').

As expected, age-related differences were found in the use of the different types of narrative account, although in all three age groups more than half of the participants retold the video-scene in *action-only narratives*. However, the youngest children produced significantly more 'no narrative'- accounts (35. 4%) compared to children in the two older groups (8.3% and 0%, respectively), and fewer 'intentional narratives' (12.5%) compared to the 8-9-year-olds (37.5%) and the 9-10-year-olds (31.3%). Nevertheless, this finding does not reflect an *inability* of the younger children (or of those who retold the scenario as a sequence of actions) *to infer* the protagonists' mental states, because the analysis of the *number of mental state terms* used when taking into account children's answers to the probe questions – which specifically targeted their understanding of the protagonists' intentional states--, revealed no significant differences by age group or by any other between-subjects factors (gender, condition, school-type)[23]. But in their own spontaneous verbal reconstruction of the scene witnessed, children appeared to use different approaches to the information presented, to take different

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However, when spontaneously using intentional state terms in their own retellings of the event, most children referred to the characters' *desire* for the cookie, or to P2's *false belief* leading to search for the cookie at the previous location and *surprise* when not finding it there, with a small number of participants (8%) explicitly referring to the possible intention behind P1's action of moving the cookie. The point of the scene was to create some ambiguity about P1's intention, which affords two interpretations: hiding the cookie or putting it away for later sharing. Although very few children attempted a specific attribution of intention to P1, noticeable differences in orientation toward action or toward the intentional landscape underlying actions emerged from children's own accounts of the scene.

'mental orientations' toward those aspects which they took to be salient in making sense of the event. In a sense, the notion of 'mental orientation' to the scenario is meant to indicate that the same information could be organized in the child's 'mental space' either on a descriptive plane of action sequences, or be 'filtered' through the child's own interpretive hypotheses about the underlying intentional premises of the witnessed actions, and that these orientations are likely to be reflected linguistically in the narrative choices children make in retelling the scenario. One possible implication of this interpretation is that differences in the ways children process the video-scene do not necessarily map onto age-related conceptual differences in understanding mental states, but reflect different sense-making strategies, all available to children even younger than the participants in this study, but employed preferentially in different situations and at different ages.

Moreover, the type of child's own narrative account of the event was one of the very few measures for which significant differences in distribution by *school category* were found, although only for one age group (the 8-9-year-olds): significantly more participants from the high educational/SES level schools produced intentional narrative accounts (46.2% of their narratives) compared to the lower educational/SES level schools (14.3 % of their accounts). The likely implication of these results is that, although there is an increase with age in children's tendency to make sense of events involving people's actions by appealing to the protagonists' (presumed) intentional states, at the same time, this tendency may well be a function of experience with stories, conversation and other social exchanges of opinions, memories, interpretations, realized in various linguistic

formats, reflecting primarily experientially-based individual and socio-cultural differences in meaning-making strategies.

How does the child's own processing of the video-scenario -- as reflected in one's own narrative account of the event -- relate to her understanding of the possibility that other people's accounts of the same behavior could legitimately be different? Is there a relationship between one's own retelling of the scenario and one's judgements about the possible sources of interpretive diversity in people's interpretations of the intentional premises of actions? Before exploring these relationships, it would be useful to examine how children interpreted the interview questions presented in the 2nd part of the event-based task.

Other people's stories: Explaining sources of interpretive diversity

The second part of the event-based task examined children's understanding of the same scenario, after being exposed to the protagonists' discrepant accounts regarding the intention involved in moving the cookie. After answering specific questions about the protagonists' declaration and attribution of intention, children judged the possibility and legitimacy of the discrepant interpretations presented in the characters' verbal accounts.

Even though participants were distributed among four conditions – defined by the two combinations of discrepant accounts (I: *declared deceptive intent with attributed good intent* , and II: *declared good intent with attributed deceptive intent*) and crossed with the gender of the puppets playing the 2 roles in the scenario -- there were **no systematic differences by condition** in children's responses for any of the measures

used,[24] including their justifications of the protagonists' discordant interpretations. Thus, practically all children were able to interpret the key question of the interview in its *epistemic sense*, as a question about whether and how is it possible for people in general to arrive at different versions of intentions underlying a given behavior. In other words, for the participants who understood that the same action afforded two different representations of the intention behind it in the context of the event presented, the *specific combination* of the two discrepant interpretations of intention did not make any difference in their judgements about what explains the legitimacy of such interpretive differences; nor did the gender of the protagonists cast in the two roles, declaring and attributing different intentions.

Thus, even the 6-year-olds were able to generalize from the particular version of the event presented and to understand the question in terms of the *possibility* of interpretive diversity in a situation involving intentions, but 17 (15.2%) children (14 of which were in this age group) failed to understand the *legitimacy* of the two discordant interpretations (as a function of the psychological perspectives of the protagonists and the opacity of other people's mental states), declaring that 'someone must be lying', or offering irrelevant explanations unrelated to the intentional landscape of the scenario. Although around 7[1/2]-8-years of age the majority of children in our sample could

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[24] The only exception was a specific question about P1's intention behind moving the cookie: 93.8% of the sample agreed with P1's declaration of his/her intention (regardless of whether the declaration involved deceptive or good intention), but 7 children believed that P1 really intended to hide the cookie despite declaring the intention to save it for later sharing (thus agreeing with P2's attribution of intention). All 7 children participated in Condition II.

demonstrate a reliable understanding of the possibility of interpretive diversity in the context of a task involving intentions, the reasoning processes underlying this understanding, in particular children's judgements about possible sources of interpretive differences, suggest their reliance on a mixed pattern of inferences which continue to change over the years of middle childhood.

Overall participants suggested three major sources of interpretive differences consisting of: (i) nonspecific individual differences between people based exclusively on the subjectivity of the protagonists ('subjectivist/relativist'), (ii) 'objective' aspects of the situation such as lack of informational (perceptual) access to the change in reality ('informational source'), and (iii) intentional aspects of the protagonists' psychological perspectives or implied personality traits ('intentional explanations'). There was an increase, with age, in the proportion of intentional/personality related justifications at the expense of the other two forms of explanation, but more importantly, the older children tended to use **more than one** explanation-type to justify why the two protagonists could arrive at such different interpretations. This revealed the older children's ability to take into account simultaneously several factors, when trying to figure out which aspects of the situation contribute to a certain representation of it in the mind of another.

The multiple justifications provided by these participants indicate that children's approach to making sense of differences in interpretation is not modeled on a causal-explanatory structure that unequivocally links mental state contents (e.g., belief, intention, attributions of intention, etc.) to reality/action, but that children attempt different kinds of inferences, noting both the aspects that are 'necessary' from the perspective of a causal

link between a belief and its source in reality, and, at the same time, drawing on their own experience regarding social interactions and people's different psychological perspectives (e.g., motivations, desires, assumptions about others, likes and dislikes, etc.), which may provide further *possible* explanations for interpretive discrepancies within the given context, even though they are not implied in any of the 'objective' aspects of the situation at hand. For instance, in the scene viewed, it would not have made sense for P1 to intend to *hide* the cookie if P2 was present in the room and if P1 was aware of being seen. However, the presence of P2 would have made no difference if P1 had the intention *to put the cookie away to share it* later, but in this case, it would have not made sense for P2 to attribute deceptive intentions to P1, who made no attempt to hide his/her action from P2. On logical grounds therefore, without P2's absence from the room, the range of possible interpretations of the behavior is constrained, if we assume that both protagonists are rational in their actions and interpretations. In this sense, the 'informational source' justification of interpretive diversity appears to reflect a necessary condition for making the different attributions of intent meaningful. However, less than a third of the sample (28.6%) mentioned this justification first, while 40.2% first offered intentional explanations, although many children mentioned a combination of both justification-types, especially among the 9-10-year-olds.

Why wasn't the informational-source explanation the most salient for the majority of participants, in spite of being the necessary condition for making the discrepant accounts of the protagonists meaningful? One possible explanation is that the informational access aspect of interpreting the event doesn't provide any hints about the

kind of attributions of intention that are possible in that situation, it doesn't explain the "why" question at the psychological level, which may be more salient for children already familiar with the everyday dramas of sharing, hiding, deception or misunderstood intentions. Thus, they are more likely to provide intentional justifications when, in their attempt to understand why P2 assumed a different intention behind the behavior than the actor's declared intention, children draw on different resources, based on previous experience, knowledge about people, maybe simulation from their own experience in sibling relationships (e.g., "I know I would suspect my sister would probably hide it from me", as one 9-year-old participant answered), and so on.

This mixture of justification types parallels findings from a study (Nelson, Plesa, & Henseler, 1998) in which adults were asked to predict and explain the behavior of a protagonist who first put a desired object in one place, left the room and returned after the object, unbeknownst to him, had been moved to a different location (the well-known Maxi-task). Given only this very simple, straightforward action-based scenario (devised originally as a test of false-belief understanding), adults offered both logical/causal-predictive explanations based on false belief, and narrative/interpretive explanations involving further elaborations and speculations based on assumed motivations of the protagonists, providing social context, thus going beyond the scenario and the explicit requirements of the questions asked. It would be tempting to speculate that, similarly to adults, the children in this study who gave informational source explanations for interpretive differences tend to employ a **paradigmatic mode of thinking** (Bruner, 1986), while those who proposed intentional explanations and further elaborated on

psycho-social aspects of the situation (personality traits, sibling interaction characteristics, etc.) to justify interpretive differences, use primarily a **narrative mode of thinking**. However, when using discriminant function analyses to investigate the potential factors which best discriminate between the different types of explanation for interpretive diversity, the groups defined by the 'informational source justifications' and by 'intentional justifications' appeared closely clustered together on the dimension of the first discriminant function, thus impossible to separate on the bases of children's age, language scores (expressive, receptive) or narrative structure scores obtained in a story production task. Both these groups appeared to be separated from those who offered irrelevant explanations and subjectivist/relativist explanations based on the predictors listed above. This finding underscores the need to examine other aspects of children's personal socialization experiences, more specific socio-cultural circumstances in children's lives – which were not tapped by the variables used in this analysis – in order to uncover potential factors and formative influences which may begin to indicate why some people use predominantly one or the other mode of thinking, or what may lead to the prevalent use of one or the other mode of thinking in various contexts.

Developmental changes in interpretive understanding processes

Only among the 6-7-year-olds a substantial number of children (29.2% of this age group) showed, by failing to provide relevant justifications, an inability to appreciate the interpretive aspect of mind in the context of this task. However, the interpretive understanding abilities of the children over $7^{1/2}$-years could not be characterized as

consistent or consolidated either, given the variety of *partially* relevant explanations they proposed. Thus, 14.6% of the 6-7-year-olds and 20.8% of the 8-9-year-olds first suggested subjectivist/relativist explanations, invoking nonspecific human differences ('people are different' or 'think differently') as source of interpretive diversity for this task, with no consideration for any other aspects of the situation which might influence the type or range of interpretive options in the given context (in spite of further probing questions).

The different kinds of reasoning processes or inferences employed by children in making sense of interpretive diversity in the context of this task, with their different degrees of relevance for justifying the possibility and legitimacy of interpretive discrepancies in the given situation, and with their different distribution by age group, point to the **gradual** character of changes in children's understanding of why different representational relationships may be established between a behavior and its possible intentional premises. This gradually emerging understanding that observed realities are subject to interpretation, that knowledge is inherently constructed, appears to be related to children's changing focus regarding what is salient in a given context, between the subjective and the objective 'poles' or aspects of the situation. What accounts for such changes in 'mental orientations', leading to an increasingly complex view of the interpretive character of mental activities remains a challenge for researchers, which have been preoccupied mostly with establishing the normative ages at which children can reliably demonstrate certain types of understanding of mental concepts. Capturing the graduality of this process may be a byproduct of the open ended questions used in the

present research, in contrast to scoring answers into pass/fail categories, to test for the acquisition of a 'concept of interpretation'.

Further clues about the different profiles of those in the grip of a truly interpretive understanding of how minds work could be found in analyzing the relationship between children's own type of narrative account produced in retelling the video-scene and their justifications of interpretive diversity for the event-based task. Although, as expected, children who didn't construct a coherent narrative when retelling the video-scenario were more likely to give no explanation or irrelevant explanations for interpretive diversity for the event-based task than all other children, (38.1% vs 12.9% for those who produced action-only narratives and only 3.4% for those who produced intentional narratives), there were proportionally almost no differences between those who produced 'no narratives' and those who produced 'action-only narratives' with respect to their choice of *relativist/subjectivist explanations* for interpretive diversity (19% and 19.4%, respectively, across the three age groups). Considering the distribution by age group, among the participants who retold the event primarily in **action terms**, 16% of the 6-7-year-olds offered relativist justifications, 27% did so among the 8-9-year-olds, and 9% did so in the oldest age group. In contrast, 93% of those who produced **intentional narrative accounts** of the video-scenario first mentioned either *informational source explanations* **or** *intentional, personality based explanations* for why the two protagonists disagreed in their accounts of the event. Thus, children who focused on the underlying intentional premises of the protagonists' actions when first watching the video-scene (and produced intentional narratives in their account of the event) were more likely to be able

to explain the possibility of discrepancy in the protagonists' two interpretations by invoking aspects of the psychological perspectives of the characters involved, such as lack of informational access to all the relevant moments of the event, and intentional factors, such as the opacity of other people's mental states, or personal biases in ascribing intentions to others, rooted in personality characteristics, in characteristics of sibling relationships, and so on. On the other hand, relativist/subjectivist explanations for interpretive diversity for the event based task were associated mostly with the use of action-only narratives in recounting the video-scene and with the age-group of $7^{1/2}$ to 9-year-olds.

Transitional versus consolidated levels of understanding interpretive diversity

Placing the source of interpretive differences exclusively in people's subjectivity, broadly conceived as 'differences in thinking', was considered in this research as reflecting a partial, incomplete understanding of the possibility and sources of interpretive diversity, and was labeled 'transitional' level of interpretive understanding. In contrast, the informational source and intentional explanations, were considered to indicate a 'consolidated' level of interpretive understanding, reflecting an ability to take into account the specifics of the given situation besides subjective differences in people's representations. Although age-related differences emerged, as mentioned above, in the distribution of types of justification for interpretive diversity, after eliminating all the 'don't know'/irrelevant responses and considering the remaining 95 relevant justifications, the only variable retained as significant predictor for the consolidated level of interpretive understanding in a logistic regression was the child's use of **intentional**

account of the event in retelling the video-scene. Thus, when controlling for age, language scores and narrative structure scores, only the child's own intentional account of the event was positively related to the odds of giving a truly interpretive response on this event-based interpretive task.

This pattern of results points to a possible developmental model for interpretive understanding, where age-related differences in children's choices of justifications for interpretive diversity in a situation involving people interacting seem to be mediated by their individual orientation toward and focusing attention on overt actions, or in contrast, wondering about the intentional premises of the actions witnessed. Clearly in this sample children between $7^{1/2}$ and 9 years of age who produced action-only narrative accounts of the event tended to invoke unspecified individual differences between people as sources of interpretive differences more than did children in the other age groups, although they didn't produce, overall, more action-only accounts than the other age-groups. Moreover, only in the 8-9-year-olds group, two children among those who produced intentional narrative accounts, also offered subjectivist/relativist explanations for interpretive diversity, while in both other age groups, intentional accounts were associated (only) with truly interpretive explanations.

These results suggest several developmental transitions in children's growing understanding of the interpretive aspect of mental activities during the years of middle childhood. If many of the 6-7 year-olds still have difficulties understanding the *possibility* of arriving at different interpretations of the same behavior, as reflected in their almost 30% failure on the justification question, the $7^{1/2}$-9-year-olds seem to have a good grasp

of this possibility. However, the transitional character of these children's understanding is revealed in their mostly *subjective orientation* toward identifying *sources* of interpretive diversity, indicated by their tendency to focus on individuals' subjectivity, in relative disconnection from the objective aspects of a particular situation, aspects which can often give clues to deciphering the relationships between one's action and others' interpretation of its underlying mental premises, and thus constrain the range of plausible interpretations.

Additional support for suggesting a transitional phase in children's understanding of sources of interpretive diversity, during which a subjective orientation seems to prevail, comes from examining their justification responses concerning the three different interpretations of the double meaning, reversible figure (the man-mouse drawing), voiced by three puppets.

In this task, based on perception of a visual stimulus, the relation between possible representations and the reality of the stimulus is even more constrained than in the case of interpreting intentional premises of action, because the image, although ambiguous in the sense that it affords two interpretations, overtly represents two and only two 'objects', familiar to any child: a mouse and the head of a man. The complete justification for why it makes sense for one puppet to think it's a mouse and for another to think it's a man necessarily implies referring to the double-meaning nature of the stimulus, besides the perceivers' subjectivity. However, 34.8% of the participants (half of whom were in the $7^{1/2}$-9-year-olds group) justified the puppets' different interpretations of the image exclusively in terms of subjective differences between people (e.g., "because

they are different people"), although they themselves saw **both** the man and the mouse in the same image!

Moreover, when another puppet offered a third, very unlikely or 'deviant interpretation' of the drawing, (i.e., giraffe), a substantial proportion of the 8-9-year-olds (37.5%, compared to 29.2% of the youngest and 25% of the oldest participants) considered this deviant interpretation perfectly plausible, invoking the different ways in which people 'see' things as justification, although nothing in the drawing suggests or resembles such an animal. After all, the double-meaning line drawing has none of the qualities characteristic of projective images (e.g., Rorschach inkblots), which invite almost any personal, subjective interpretations; also, the experimenter's question required children to judge whether the puppets made plausible identifications of what the drawing 'represents', as opposed to 'suggests', or 'may mean to them/you'[25].

Not surprisingly, for the same age group, 72.2% of the children who judged the deviant interpretation as legitimate based on perceivers' subjectivity, also proposed subjectivist/relativist justifications regarding the legitimacy of the two (plausible) interpretations of the reversible image, initially voiced by the first two puppets (the

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[25] Even if some of the children may have understood the question as referring to whether it was possible or 'allowed' for people to arrive at completely different interpretations of the same stimulus, which would imply blurring the distinction between perceptual representation and imagination, (and in fact one child justified the puppet's deviant interpretation as meaningful "because people have different imaginations"), it remains puzzling why didn't more of the older or the younger children interpret the experimenter's question in the same (subjective) way? It appears that the same mental orientation toward subjective aspects with relative disregard for grounding representations in reality seems to emerge for the $7^{1/2}$-9-year-olds, whether in their justification responses or in their interpretation of the test question.

corresponding proportions for the youngest and for the oldest children being 57% and 50%, respectively).

When taking into account the justification responses for interpretive diversity on the event based task as well, it appears that the same age group shows some consistency across content domains in the tendency to justify interpretive diversity in subjective, relativist terms. However, it is important to keep in mind that only a minority of the $7^{1/2}$-9-year-olds (20% for the event based task and 40% for the perceptual task) used subjectivist/relativist explanations, and that all types of justifications were proposed by this age group, implying that these explanatory choices may reflect not so much general developmental differences, but rather the combined influence of several factors including age, styles or modes of thinking, modes of processing the informational content of a task (e.g., children's own narrative type of account).

Nevertheless, it is worth asking why do some of the children take such a relativist approach to justifying interpretive diversity, especially as this (subjectivist) orientation appears in two different and unrelated contexts (event-based task and perceptual task)? Unlike the event-based task, the perceptual task does not involve an underlying referentially opaque intentional landscape (e.g., of motives, intentions and attributions of intention). In its case, the possibility of interpretive diversity is grounded in, and limited by the nature of the stimulus itself -- which affords two and only two legitimately different interpretations--, thus in a direct mapping relationship between a reality state and a mental representation of it via perception.

Inconsistencies and subjectivist orientations in judging aspects of mental activities

Participants who provided subjectivist/relativist justifications may understand the mind as an active information processor, and probably have an incipient understanding of perception itself as an activity, as a process (as opposed to a direct copy of the stimulus /reality), given that they themselves had to 'make an effort' to see two different images in the reversible drawing. One can see a mouse at one time and a man at another, but not simultaneously, for some sort of active, effortful adjustment of gaze is needed to switch from one view to another, which invites the perceiver to become (unexpectedly) aware of the active, constructive aspect of the perception process itself. However, once aware of the constructive aspect of perception, when asked to judge the validity of different perceptual representations, children who suggested subjectivist/relativist explanations seemed to disconnect this mental activity from its given input. In a way, the realization that *how* you look influences *what* you see is transformed for them in the conviction that *how* you look *determines what* you see, and thus any interpretation of a stimulus is as good as any other (as in the case of considering 'giraffe' a legitimate interpretation of the man-mouse drawing).

It appears that the (mostly) 8-year-old 'relativists' in the sample did not take into account the constraints specific to contexts of interpretation, which are independent of the people's minds. For this group of children perception and imagination seem to be, in actuality, treated similarly, although ordinarily children of this age are able to display enough knowledge, when specifically asked about these different mental processes, to convince researchers that they can differentiate the two, even at a much younger age. In spite of their 'good theoretical knowledge' about differences between such mental

processes, some of the 7-8-year-olds revealed an incomplete understanding of *how* the connections between mental contents and their referents are established in specific situations, as suggested by their tendency to consider all kinds of representations equally legitimate irrespective of the situation, based on their relatively 'new discovery' of the constructive character of minds and subjectivity, or even to endow minds with the capacity to influence reality beyond the realm of representations (as in their sometimes fluctuating ability to draw a clear boundary between imaginary and real or in their lingering belief in 'wishing' as a way to make things happen.) For instance, a host of studies (e.g., Harris, Brown, Marriot, Whitthall & Harmer, 1991; Johnson & Harris, 1994;Vikan, & Clausen, 1993; Woolley 1997;Woolley, Phelps, Davis, & Mandell, 1999; Woolley & Wellman, 1993) examined various aspects of children's understanding of the imaginary/real distinction, using very different methods, from examining behavioral responses to experimenter prompted pretend that a monster is in a box, to direct questioning about whether wishing something will make it happen and what is involved in the process. Results consistently show a very mixed pattern of responses even among 7-8-year-olds, but the issue of individual differences is often glossed over in favor of (sometimes contradictory) developmental claims.

Moreover, mixed findings are often interpreted so as to fit into the dominant view that preschoolers already possess a coherent theory of mind, based on a set of ontological distinctions and causal relations between mental state concepts (e.g, according to Woolley and Wellman (1993) even $3^{1/2}$-year-olds understand the differential origins of epistemic and fictional mental states). When findings seem to contradict this view (such as the

finding that even 6-7-year-olds believe in 'wishing' as means of altering reality, see Woolley et al, 1999), investigators resort to "placing children's conception of wishing outside their theory of mind" in the domain of "magic", thus endowing children with yet another separate 'knowledge domain', their "theories of magic" (Woolley et al, 1999, p. 583), so that the conceptual coherence and noncontradiction of their theory of mind (in fact, of the investigator's model of the child's knowledge of mind) would remain unimpaired.

The currently predominant tendency in 'theory of mind' research to assimilate all new findings into the investigator's model of the child's knowledge about 'the mind' – especially a model which is conceived as a coherent causal-explanatory system --, and the persistent goal of determining 'the age' at which children understand certain mind-world relations, and can differentiate (or draw 'theoretical distinctions') between different mental states, seem misguided because, as this and other investigations suggest, the kind of knowledge children display may well depend on what type of situation they are in – on their mental orientations toward the 'test'. The implication is that children don't operate with a consistent, contradiction-free theory of mind at all times, which they occasionally revise in light of new data, once they have 'acquired' the basic understanding of mental concepts and their causal relationships, but, just as adults often do (e.g., in emotionally charged situations), they may fall on more 'primitive' ways of thinking about world-mind relations in certain situations; their making-sense tools, far from being coherent theories, resemble more a patchwork of modes of reflection which come in handy as explanatory schemes in different practical situations. This explains why the salience of different

elements of the implied representational relationships in different situations may influence the type of making sense reasoning strategy used, especially for the children showing 'transitional' knowledge (e.g. the kind reflected in the tentative justifications of interpretive diversity provided by those children 'seduced' by the subjectivity of the protagonists entertaining different representations, more than by the nature of the stimulus in task 2, or the 'material conditions' of the event in task 1).

However, this view does not minimize the significance of developmental changes in children's reasoning processes involved in sorting out just how does the mind work in different situations, and how to understand the very complex braid of possible relationships between things and events in the world and the people's mental processing of them. As Russell (1996) argues:

> (...) [N]ot only must children come to understand the relationship between [propositional] attitudes and contents, but they must come to appreciate that there are different ways of believing a content (...) There are many distinctions possible but we should at least distinguish between attitudes that are broadly *subjective* and those that are broadly *objective*, with expressions or appearance-to-me, taste, opinion and so forth being in the first category and logico-mathematical statements and states of empirical fact being in the latter. (p. 218)

"Objective-subjective" distinctions and the fact-value continuum

Several studies have shown (Carpendale, 1995; Carpendale & Chandler, 1996; Flavell, Mumme, Green & Flavell, 1992) that even 3-year-olds have no problem grasping the possibility that some people may find a food tasty and others may find it disgusting,

and that such different tastes are legitimate, that people may have different likes and dislikes, different from their own (e.g., adults may like coffee even though they don't, another child may be scared of dogs even though they themselves like dogs, etc.) and that such attitudes are related to previous experiences, desires are related to people's preferences, likes and dislikes are personal and idiosyncratic, and so on. However, the same children may fail to understand that an ambiguous message/image could be validly interpreted in different ways by people. The main difference between desires or likes-dislikes and interpretations, (i.e., representing in different ways a given situation, such as another's behavior by attributing different intentions, or entertaining different perceptual representations of an ambiguous image) relies in the **epistemic component** involved in the latter but not in the former. As Russell (1996) specifies, "to desire an object is to be related to an object in the world, not to be related to a representation of the world as being a certain way" (p. 228).

Desires, likes and dislikes could be understood almost entirely by reference to the person, to subjectivity as explanatory frame, without reflection on the particular relation between a person's mental state (content) and a state of affairs in the world, mostly because there is rarely an aspect of necessity/causality involved in this relationship (surely one may wonder *why* something is an object of desire for someone -- which implies relating the qualities of the 'object' to that person in some meaningful way --, but for an observer such a relation is not problematic, because subjectivity constitutes a sufficient explanation). Unlike nonepistemic mental attitudes (e.g., desires, tastes, likes-dislikes), interpretation of facts or events requires reflection on both poles of the 'individual mind-

world' equation, because reality imposes constraints on the range of interpretations afforded by a situation. But children come gradually to the reflective act of balancing the terms of this equation, and often one or the other aspect becomes more salient.

Thus, some of the 8-9-year-olds in this study, while acknowledging the constructive character of mental activities expressed in the fact that people can arrive at different interpretations of the same situation, also tended to disregard the constraints of the other pole (the context), declaring any interpretation as good as any other. This incomplete interpretive understanding is difficult to explain in terms of their supposedly well-established causal-explanatory theory of mind, which is assumed to connect mind to reality in unambiguous ways if 'all the data are in'. Much younger children, it has been shown (e.g., Gopnik & Graf, 1988; Montgomery, 1992; Pillow, 1989; Wimmer, Hogrefe, & Perner, 1988), have a solid understanding of the role of informational input in belief formation, but a qualitatively different epistemic insight is required to understand that informational input does not solely determine or explain the content of beliefs (interpretations): nor does the mind solely determine the content of beliefs -- except maybe in imaginings and pretense (although much debate surrounds the issue of whether or what kind of representational relationship is involved in these processes).

In this perspective it becomes apparent that all the important acquisitions in knowledge about the mental world have not been completed around the age of 4-years, when children show "a solid working knowledge of the possibility of false belief" (Chandler & Lalonde, 1996, p. 113) and implicitly an understanding of the 'active' character of minds, because they realize that minds "evaluate incoming information with

references to current beliefs" (ibid., p. 122). It may be that further conceptual developments are closely intertwined with – what James Russell (1996) named 'mental orientations', or different ways of establishing relationships between attitudes and contents:

> Something is wrong, for example if one's mental orientation to "2+2=4" is subjective, or if one's mental orientation to "Fresh strawberries are good with yogurt" is as towards that of hard fact. In short, what must develop is a theoretical grasp of the different kinds of mental orientations that different contents - indeed different kinds and domains of knowledge - naturally invite (...) Two things must develop: children must come to understand what it means to have a subjective versus an objective mental orientation to any content, and they must come to appreciate which kinds of content invite which kinds of mental orientation. (p. 217)

The findings of this research indicate that a great deal of these developments occur in middle childhood, reclaiming developmental significance for the '6-8 transition'. However, it would be misleading to characterize such developments in 'stage-like' terms, given the mixture of types of reasoning used by these children to arrive at consolidated interpretive understanding, suggesting that individual differences may be more the rule than the exception, although clear patterns of response emerged within age-groups. But to explain and integrate such patterns of response into larger developmental models, one cannot just relate them to (prespecified) 'conceptual acquisitions' without leaving out too much of the picture depicting the processes of cognitive change children

go through. At least, one needs to first analyze children's own interpretations of the given tasks, their mental orientations characterized by a certain type of management of attention, which implies that *different aspects* of the situation may carry the burden of meaningfullness for the child based on interpretive assumptions not immediately evident to the researcher. For instance, none of the children offering 'relativist/subjectivist' justifications in the context of the perception-based interpretive task spontaneously suggested that the reversible man-mouse drawing represented a giraffe, nor did they predict that another person would think it was a giraffe. However, such an interpretation – entirely different from their own and ungrounded in the stimulus – was not treated as problematic, but readily accepted as legitimate. In contrast, other children (especially, but not exclusively 9-10-year-olds), faced with the same stimulus-drawing, enthusiastically rejected the deviant interpretation proposed by a 3rd puppet, with that feeling of certainty that accompanies consolidated knowledge, the 'felt necessity' that it is obvious it could not be any other way: "No way, it looks **nothing** like a giraffe!" was a common answer.

Moreover, Russell (1996) argues that during the same age period children grapple with the distinction between 'subjective' and 'objective' (including as mental orientations to take toward a task) in different content domains, and illustrates this point by referring to a series of *conservation experiments* (Russell, 1981; Russell, Mills, & Reiff-Musgrove, 1990), which showed that nonconservers take a subjective orientation to contents that require an objective orientation, and as such, they readily agree to disagree about the right answer when paired with same level (nonconserver) children, and asked to both decide on the correct answer. The choice is made "on practical grounds and depending on social

dominance relations in the dyad", because "for them, there is nothing objective to disagree *about*" (p. 217). As in the case of the 'relativists/subjectivists' in this study, it appears that for children in the above mentioned dyads, the subjectivity of judgements for which adults assume that one naturally takes an objective attitude and expect a factual answer (such as questions about physical properties – e.g., conservation of length, volume, etc., or logical relations,) does not amount to a source of cognitive conflict, but is taken to be a 'natural' way of approaching the problem. "Children are not, in this view acquiring knowledge about substances, length, logic and so forth, but about how judgements about them *should be regarded* " (ibid. p. 218). Insofar as 'saliency manipulations' of tasks[26] involving children's understanding of such properties managed to push downwards the age at which children come to display the adult expected answer (thus making claims *'to have proven Piaget wrong!'*), by engaging children in experimental situations which 'made more human sense' (Donaldson, 1978) for them, it may be that children's understanding in such cases is, as suggested by Russell (1996) more a matter of learning to frame judgements in the adult expected terms, to adopt the mental orientation to the task/question required by the recognition of its 'place' on the fact-value continuum, rather than a case of the child's acquiring new concepts. More specifically, returning to the example of the conservation experiments, Russell argues:

> Conserving children may not have acquired a new concept, but they have

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Within the 'theory of mind' research area an impressive variety of studies based on clever manipulations of the saliency of different aspects of false belief tasks -- from the language (i.e., specific words or grammatical constructions) used, to the active engagement of the child in the action – resulted in substantial proportions of early 3-year-olds 'passing' the task.

> acquired the ability to 'think explicitly and at will' about abstract properties - with 'explicitly' referring to the fact that they can frame judgements in terms of other people's references to 'same amount of X', and 'at will' to the fact that they can regulate their attention when invited to think about these properties. Indeed these children are now able to share their thoughts about number, length, volume etc. with other people in more situations because when others refer to things being 'the same X' they will generally have the same thought as them. (p. 215)

However, this 'reframing of judgements' is not just a manifestation of increased linguistic sophistication, but a genuine cognitive transformation, in the sense implied by Piaget's notions of decentration and reversibility, with the specification that these processes are to a certain extent dependent on the representational function of language, which "amplifies and advances thinking in directions that it would otherwise not be possible to go" (Nelson, 1996, p. 87). The interdependency and even enmeshing of cognition and language "raises important questions in terms of how the cognitive representation is realized in linguistic form, and how that form may reflect back on and transform the underlying representation " (Nelson, 1996, p. 190): on the one hand "language makes possible the *construction* of abstract concepts and complex representations that cannot be acquired solely from unmediated direct experience because they are culturally constituted through language" (ibid. p. 290), and on the other hand, as Russell (1996) emphasized, "... achieving a reversibility of thought - regulating one's mental attention towards different dimensions in order to frame an adequate judgement -

is necessary if the child is to appreciate the status of certain objective, invariant and abstract properties" (p. 213 - 214).

What this interpretation of cognitive change brings to the fore is the active, transformative role of linguistic representations, which not only allow people to communicate about their representations (experiential or in whatever encodings), but gradually socialize children into the 'adult' ways of thinking about contents, or of taking the 'right' mental orientations toward specific contents, in the sense discussed previously (e.g., distinguishing matters of personal value from those of fact).

Such changes in 'mental orientation' to specific contents may function as procedural encodings that later undergo what Karmiloff-Smith (1995) calls processes of redescription[27] which lead to transforming implicit understandings into explicit knowledge. But explicit knowledge, as manifested in 'correct' answers to test questions involves sharing the same frame of reference with the investigator in interpreting the discourse of the task and its logic (even when not relevant to the child's immediate experience), which necessarily defines it as a process culturally and essentially linguistically mediated. The findings of this study shed new light on the role of linguistic competence in the development of mentalizing abilities, by revealing the significant

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[27] Karmiloff-Smith(1995) specifies that in the representational redescription model, it is not "the language capacity per se that explains development, but rather the redescriptive processes which allow for re-representation of knowledge in different (often linguistic) formats", but notes that language may play an additional role in the area of mind understanding: "However the theory-of-mind domain may be one area where the translation into natural language terms (e.g., the use of mental state verbs such as 'pretend that', 'think that', 'believe that', and 'know that') is an essential part of the redescriptive process" (p. 130).

contribution of expressive language scores, independently of age differences, to predicting performance in understanding interpretive diversity in the context of the two tasks used in this research.

Understanding interpretive diversity: implications for developmental changes in epistemological beliefs.

Assuming the tight interdependence between so many different contributors to changes in children's understanding of mind-world relationships, it appears that any characterization of the 'developmental trajectory' of children's view of the knowing process is open to revision, as is the meaning of epistemic stances open to redefinition. Chandler (1987), proposing one comprehensive description of such a developmental trajectory, argues that all preadolescents share some variant of the 'objectivist epistemology' which essentially implies these assumptions: "(1) the world-as-it-is-in-itself [Goodman, 1976] is held to be directly knowable; and (2) the truth or falsity of any claim is assumed to depend solely upon its relation to a rock-bottom and unassailable foundation of fact." (p.145).

However, discernible gaps in this 'objectivistic epistemology' were uncovered before the years of adolescence, as some forms of assuming the person-dependency of knowledge (not just of matters of taste or personal value) appear to be entertained by younger children, although without their taking the kind of reflective stance which would lead them to draw the unsettling conclusion of the hopeless relativity of all knowledge. To the contrary, the 7-8-year-old 'relativists/subjectivists' in this study, (unlike their

younger 'naive-realists' or their older 'doubt-ridden, dogmatic or skeptic' adolescent conspecifics) were willing to accommodate -- as Chandler (1987) puts it -- "a mixture of contradictory viewpoints and possibilities" (p.160), without falling prey to disabling cognitive conflict. One possible explanation for this 'relativism without bad consequences'- phenomenon may be that they do not take a reflective stance regarding the knowing process in general, and do not attempt to work out the epistemic implications of such relativistic understanding for their working notions of truth and value.

Chandler (1987) argues that later in adolescence, given their new metarepresentational skills and increased ability to reflect on the person-dependent, thus, subjective and relative nature of knowledge itself, adolescents experience a deep epistemological crisis: "...between childhood and maturity there automatically occurs a deeply problematic period of epistemologic confusion, marked by the collapse of absolute convinction and defined by an outcropping of nascent skeptical doubts" (Broughton, 1983, cited in Chandler 1987, p.138). At present there is very little research exploring what may contribute to these changes, leading young adolescents from "*case-specific* to *generic doubt*", from a set of relativistic, subjective mental orientations, already displayed under certain circumstances around the age of 7-8 years, to unraveling their deeper epistemologic meaning, undermining all sense of certainty around issues of knowledge and truth. Similarly, little is known about what later leads them, more or less 'naturally', to the resolution of relativism, to reevaluate the possibility and relevance of notions of 'evidence' and 'truth', this time understood not necessarily as accessing bias-free, objective 'facts' meant to be 'discovered' and to take their place in the puzzle of

knowledge, but as coordination of subjective perspectives within a larger socio-cultural-historical framework, which makes possible the transcending of individual perspectives.

The parallels of this proposed ontogenetic course of epistemological development with alternative philosophical positions regarding the nature and possibility of knowledge are explicitly drawn by Chandler (1987). He likens the adolescents' solution of "post-skeptical rationalism and commitment in the face of doubt" (p. 154) to that of a host of 'post-empirical' thinkers of various orientations, but who:

> (...) all more or less share the common view that the 'other minds problem', the egocentric predicament of the person-related knowledge, is essentially dissolved by the necessarily communal nature of language and thought, or other 'shared forms of human life' [Sass & Woolfolk, 1985]. According to this thesis, the capacity to form and exchange symbols, guaranteed by our communal sociohistorical and linguistic traditions, also guarantees our ability to share meanings and to achieve a legitimate consensus with others. [Thus] (....) it is possible to accept the ambiguity inherent in human experience without renouncing hope for a kind of discursive truth capable of being argumentatively validated by a common community of interpreters (p.143).

Interestingly, some incipient understanding of the value of conversational exchanges for establishing the kind of 'discursive' truth involved in settling interpretive differences was revealed in this study in the tendency of the older children to predict that, in the case of the event based task, the protagonists will end up talking about their respective differences to clarify intentions and justify their behavior; in contrast, most of

the 6-7-year-olds focused on predicting the protagonists' behavior - such as further hiding or sharing the cookie.

Sharing a culture with its manifold symbolic systems and especially a communal linguistic system, into which children are socialized from birth, is what renders human knowledge possible (in spite of its inherent subject-dependency and relativity), and what makes the social world meaningful (Nelson, 1996; Vygotsky, 1986; Wertsch, 1985). Without the almost limitless capacities of a shared language to provide a representational medium for constituting, and a communicational means for sharing representations, it may be that the unseen, immaterial, referentially opaque mental world of the other (or of self) would for ever remain inaccessible.

The centrality of language and narrative to the development of mentalizing abilities

The previous part of the discussion was organized mainly around children's *types of first explanation* for interpretive diversity in the context of the two tasks, without taking into account the *range* of their interpretive understanding, as reflected in their scores for each of the tasks (measures constituted by summing all the explanations provided by each child). Although, as expected, age-related differences emerged, with older children obtaining higher scores that the younger ones, multivariate analyses (analyses of correlations and regression analyses) revealed a much more complex picture of interdepedencies between various types of competencies. These analyses, using the interpretive scores as dependent variables and a set of independent variables

including, besides age, language measures (expressive and receptive language scores), narrative structure and narrative content measures for the story production task (the Frog-story), as well as for the child's own account of the video-scene, consistently indicated **expressive language** and the use of **narrative devices which reflect a mentalistic stance** (e.g., intentional narrative account of the event and proportion of affective enhancers used in the Frog-story narrative for the event based task, and proportion of intentional terms used in the Frog-story narrative for the perception-based task, respectively), as significant predictors for explaining variability in interpretive understanding scores. When using the composite scores (a summed across-tasks measure) for interpretive understanding as dependent variable, similar regression analyses indicated *expressive language*, *age* and *use of intentional narrative account* in retelling the video-scene as best predictors for explaining variability in performance.

Thus, at a later point in development than their early preschool years of speedy language acquisition, children's ability to make sense of mentality appears to be strongly related to their language abilities, independently of age. In what sense can we consider language essentially implicated in the child's later developing understanding of the interpretive aspect of mental activities? Understanding interpretive diversity implies more than acknowledging that mental states are representations of reality and, as such, can be different from it (e.g., holding in mind both the model of a real situation and the representation of it in another's mind, the *false belief*); it implies *holding in mind and comparing* different expressions of the representations entertained by others of a situation, representations which may well be altogether different from one's own model

of the same situation.

Let's consider the event-based interpretive task first. For an action (with its presumed intentional premise) to be object of interpretation, let alone of different interpretations, the experience must become accessible to reflection on it (Nelson, 1996). To evaluate the two interpretations voiced by the protagonists thus requires the observer to explicitly transcend one's own experiential representation of the event in order to reflect on it, *and* to reflect on the two characters' representation of it. This can only happen through language, which helps transcend the experience (the experiential representation), by providing another representational level where reflection on other representations becomes possible, or as Nelson (1996) points out, "Language establishes a separate possible level of representation through the purely verbal, and thus establishes the possibility of using one level to articulate another" (p. 318). Moreover, appreciating interpretive diversity and reflecting on potential sources of differences in others' representations implies keeping in mind simultaneously several models of the situation, linguistically expressed. This, however, involves a rather complex command of linguistic forms, (necessary first to support memory for the discourse expressing the others' representations, then to enable a comparison of those), which requires extensive practice with language, especially in its conversational and narrative formats, practice which is bound to be reflected in expressive language scores.

Although it could be argued that the task involves reliance on verbal ability, in this case one cannot separate a 'conceptual', essentially 'cognitive' accomplishment such as understanding the possibility of interpretive diversity (an aspect of psychological

knowledge), from the child's ability *to represent and to express representations in language*, which may be the *precondition* for the development of this understanding. The findings of this study support the conclusion of interdependent developments in both mentalizing abilities and the ability to use language not only for communicating about mental states, but more importantly, for what Nelson (1996) calls the '*reflective articulation and explanation function*' (p. 341), which provides the cognitive tools for reflection upon interpretive differences.

However, independent of the effects of both language and age, two other predictors contributed significantly to variance in interpretive understanding scores for the event-based task, and these were 'intentional narrative-type of the child's own account of the event' and 'proportion of affect enhancers' used in the Frog-story narrative. Again, it appeared that the child's own processing of the video-scene in narrative form made a significant contribution to the child's understanding of sources of interpretive differences (measured as interpretive understanding performance), just as it did to children's *first choices* of justification for interpretive diversity in the event-based task. Similar to the relationship previously discussed between children's use of informational source or intentional explanations for interpretive differences and their focus on the actions or the mental states of the actors in their accounts of the video, the participants who produced intentional narrative accounts tended to obtain higher interpretive understanding scores, both when measured for the event-based task only, and when measured as composite scores across tasks.

Not surprisingly, this ability to use psychological perspective information, which

reliably differentiated children's first explanations for interpretive diversity on the event - based task, and contributed to explained variance in the overall interpretive scores, was also strongly associated with children's narrative structure scores on an unrelated story telling task -- the 'Frog story' narrative production task, suggesting that narrative competence and mentalizing abilities may be related beyond their common association with age or general language skills. Even more directly, several narrative content elements which reflect children's ability to take a mentalistic stance in composing a story based on pictures, emerged as significant predictors for interpretive understanding. Thus, for the event based task, higher scores were associated with higher proportions of affective enhancers used, while for the perception-based task they were associated with higher proportions of intentional terms used in the Frog-story narrative production task.

Overall, the results of the present study support the hypothesis of a clear relationship between interpretive understanding performance and those aspects of narrative competence which go beyond verbal skills or conventional story-telling knowledge, reflecting children's ability to integrate different aspects of cognitive, social, linguistic and metalinguistic/pragmatic knowledge, using both referential and evaluative devices, to create coherent and meaningful story-narratives. Therefore, not every aspect of children's narrative productions was expected to be relevant as an 'indirect measure' of their mentalizing capacities. Indeed, more 'surface-level' aspects of narrative competence, such as number of propositions used (story-length) for the narratives based on the picture book, did not remain significantly correlated with the interpretive understanding measures after controlling for age and language scores, while narrative

structure scores and proportion of intentional terms used in the 'Frog-story' narratives remained correlated modestly, but significantly with at least one of the interpretive understanding measures (for the event-based task), after partialling out both age and language standard scores.

The importance of narrative competence as contributing to interpretive understanding beyond the contributions of age and general language can be explained in light of the multiple roles that narratives play in children's and adults' lives, from organizing experience in meaningful ways to conveying culturally significant messages and universal human concerns. The natural tendency for making sense of experience is to draw on narrative explanatory schemes, because narrative formats, stories heard, told, or collaboratively constructed, by their organization around a 'high-point' -- typically an unexpected element, an 'imbalance in the ratio of characters, settings, actions, goals and means' (Burke, 1945) which brings out the meaning of the happenings --, function as models for interpreting similar events in real life or in fiction. In particular making sense of social life, of others' behavior based on their mental states inaccessible to observers, relies on such models, which convey a multitude of possible relations between people's actions and their presumed underlying intentional premises, within scenarios which may have cultural and even universal human significance or narrower personal meaning.

As Feldman (1993) points out, "Knowledge of intentional states is encoded in the story-making of normal children from about 2-3 years of age..." (p. 276). However, *focusing* on the landscape of consciousness in stories, and especially creating an intentional dimension in their own narrative constructions appear to be a much later

achievement, typically not displayed until 6-7 years of age, and clearly dependent on familiarity and practice with the genre. This is understandably the case, considering that, as Nelson (1996) argues, "narrative language is not possible until complex language is learned", which is needed to support "a complex of structures and related skills", such as "the ability to take the perspective of different actors and of different spatial and temporal locations", "the ability to resolve deviations from the expected course of events in humanly and culturally understandable terms" and "the capacity to recognize and reformulate enduring culturally significant themes" (p. 190). These complex skills reflect in fact a more general capacity to make sense of the social and cultural world, to share the cultural attitudes and expectations which make human life meaningful (by accessing canonical understandings, as well as models for dealing with deviations from them) and to recognize and represent the intentional states of others and of self.

Children gradually come to understand, mainly from extensive practice with narrative forms and from narrativizing their experience, that meaning (in social encounters as well as in fictional events) is generated by people's *interpretation* of actions, situations, events, expressed in the intentional vocabulary of motives, goals, desires, affect, beliefs and values. In this sense narration/narrativizing, in contrast to description and other discourse forms, constitutes the main vehicle for conveying an intentional landscape, and increased familiarity with such encodings of experience may, in turn, facilitate the development of a mentalistic stance. This is reflected in interest in the intentional premises of people's actions, attunement to the expression of their mental states, ability to infer others' intentional states in various situations, and ability to

represent, evaluate and reflect on others' representations or interpretations of events with their underlying intentional landscape.

In light of these considerations, it is no wonder that the child's own retelling of the video-scene, in particular the use of intentional narrative accounts made a significant contribution to interpretive understanding scores for the event based task, over and above what was accounted for by general language ability and age. With respect to the Frog-story narrative production task, only two types of content elements, reflecting children's ability to depict and express the intentional dimension of the event related were shown to contribute to explaining variance in interpretive scores: for the event-based task this was 'proportion of affective enhancers', including emotion terms, character voice, intensifiers, and all other evaluative devices used to convey the affective involvement of the characters in the events and of the author in telling about them; for the perception-based task it was 'proportion of intentional .erms', directly reflecting the child's ability to convey the mental states of the characters in narrating the events. Although these were unsurprising findings, little can be said about why the use of socio-cognitive components did not emerge as significant predictor, or why the proportion of intentional terms used in the Frog-story narrative did not add significantly to the explained variance for performance on the event-based task, but did so for the perception-based task.

However, by comparison, for the perception based interpretive task the narrative competence variables played a lesser, although discernable, role in explaining variance in interpretive understanding, while age turned out to be the strongest predictor. Given the mixed results in the research literature reporting various patterns of correlation between

different aspects of narrative competence (measured in a variety of ways, some difficult to compare) and different measures of 'theory of mind' understanding, further research is needed to disentangle the complex issues of what specific aspects of narrative competence, and why, relate to the development of psychological understanding.

The findings of the present study indicate that overall, interpretive understanding performance in the two task contexts is related to a similar set of competencies involving mainly expressive language and narrative skills, which add to explaining variability over and above what is accounted for by age differences. However, some interesting differences emerged with respect to the *relative contribution* of these factors to explaining variability in performance for each of the two interpretive tasks.

Although the two interpretive measures were significantly correlated (and remained so even with age and general language ability partialled out), separate regression analyses for each of the two measures revealed a difference between the relative contribution of age (best predictor in the case of the perception-based task) versus language skills (best predictor in the case of the event-based task) to explaining variance in interpretive performance. The structure of the two tasks may be responsible for this difference: the first task, event-based/intentional, involves a multi episode narrative and implicitly invites more elaboration in children's explanations of the possibility of interpreting differently the same behavior, based on different intentional premises. From this perspective, children's ability to command complex language forms may have been more intrinsically relevant to their capacity to deal with different interpretations, linguistically presented, to compare and evaluate them, to reflect on their

possible sources. The second task, perception-based, is in a sense 'structurally simpler', involves no narrative, but just a visually ambiguous display, and it can be assumed that understanding the possibility of interpretive diversity with regard to the stimulus display doesn't involve reflecting ('back') on the characters behaviors *and* verbal accounts, but just ascribing different representations to different characters based on the same perceived object, reflecting on the differences, and reflecting on the lack of certainty in knowing what another would 'see' in the visual display. Although the representational potential of language is indispensable in performing these operations, they don't necessarily require skilled command of *complex* linguistic forms (such as narrative discourse). Performance on the two tasks is closely related though, suggesting that at some level the tasks draw on similar reasoning processes.

Concluding remarks

The purpose of this lengthy discussion around – more than about – the findings of this research was to propose a different way of looking at children's growing understanding of minds, other than presupposing that they acquire new mental state concepts in a developmentally pre-specified manner, concepts which become integrated into a causal-explanatory scheme constituting their coherent theory of mind. Although children may share early on in their lives many of the features we take for granted as the ways of our 'folk psychology', a close examination of their own interpretive assumptions in different contexts shows that they gradually and unevenly gain insight into the different ways in which mindful people can establish connections between their own/others'

mental contents and realities objectively outside their inner states. The grasp of the possibility of misrepresentation (false belief) marks a first fundamental insight in understanding that there is no automatic match between representations/mental contents and what is really the case in the world. But understanding that belief is not always a copy of reality falls short of saying anything about the constructivist nature of the processes by which representations and their referents are related, of the knowing process, of interpretation in its epistemic sense.

The possibility of establishing multiple relations between mental contents and the world, including the mental world of others, appears to be a gradual realization which involves an increasingly complex understanding of ***how*** these connections are established in different situations, depending on what both the person and the objective aspects of the event bring to the encounter. Something in this process may for ever remain elusive, subjective, unique to the person, while at times this process may become highly predictable, allowing for certain inferences in the manner of constrained causal links.

Thus, two related understandings are implied in developing a constructivist view of mental life: one is understanding that there is no directly perceptible or inferrable causal link, in a one-to-one mapping fashion between behaviors and possible intentional premises, which renders prediction often uncertain and attributions imperfect in the social world; the other is the complementary understanding that the varied one-to-many relations between reality and mental contents/representations are not completely indeterminate, but are often constrained by world features which make prediction and attribution possible, and enable our making sense of other people's behavior, instead of

rendering the social world a realm of the idiosyncratic and the arbitrary, of enclosed private minds as opposed to "a community of minds" (Nelson, Henseler, & Plesa, 2000).

What then does this intricate, multifaceted picture of children's reasoning about interpretive diversity suggest about their later developing understanding of the workings of the mind? Long before children are considered to demonstrate full ownership of their culture's folk psychology, even implicitly held, (let alone articulate a theory of mind as a coherent causal-explanatory system), they experience a world populated by mindful people who often act in familiar, and sometimes in bewildering ways. Communication about the latter instances, through a communally shared (although incompletely understood and sometimes confusing for the child) representational tool, mainly language -- used within a variety of discursive formats, especially conversation with familiar others and narratives--, typically succeeds in helping the child make sense of the unfamiliar happenings, and, over time, fosters the gradually dawning awareness that unobservable, inner states underlie behaviors and eventually, that mental contents are not direct copies of the realities they are about. But from these first glimpses of the representational character of mental life (e.g., acknowledging its special ability to misrepresent and thus possibly misguide behavior), children embark on a long journey toward other discoveries about the processes by which mindful people relate to the world, including the mental world of others. Unless they become professional philosophers or theory-theorists of nativist persuasion, they usually don't lose track of their earlier intuitions that minds are always embodied in people, who exist in a world which remains in essential ways a reality outside their minds, with its own objective laws, regardless of

how it is represented (even if considered 'in-itself' unknowable).

To understand people's behavior ultimately amounts to understanding that differences in the ways they relate to reality (including to others' presumed mental states) originate in the encounters between their internal, subjective, inner world and the world outside their own minds. The specifics of these encounters are context-bound, rendering most attempts at immediate and certain prediction imperfect, with the exception of the most familiar of situations and people, but thus ensuring the endless fascination with things human, providing the fuel for psychological and social dramas. Somewhere along the way in this journey, children come to know that people are endowed with subjectivity, making their meaning-making processes, in part, personal and unique, but not arbitrary and privately isolated, since they are necessarily framed by the ways of a shared communal linguistic system and a culturally constituted social and physical world, making us all human.

APPENDIX A: CODING MANUAL

The manual presents details of the coding procedures used for each task.

Coding procedures for Task 1 - Event-based/intentional interpretive task

Task 1 is comprised of two distinct parts:

I. The video scenario, followed by asking participants to retell what happened.

There are two versions of the video, differentiated by which puppet moves the cookie: Version A - Peter moves the cookie; Version B - Emma moves the cookie.

II. The verbal accounts of the two puppets, followed by asking the participants questions about the intentions/beliefs of the two protagonists (P1 and P2) and about the discrepancy in the protagonists' interpretations.

The two protagonists are differentiated by their role in the event, in each condition:

P1 - is always the puppet who moves the cookie to the drawer and who speaks first in the 2nd part (i.e., Peter in A1 and A2; Emma in B1 and B2)

P2 - is always the puppet who comes back at the end to look for the cookie in the box and speaks second in the 2nd part (i.e., Emma in A1 and A2; Peter in B1 and B2)

Levels of coding for the 1st part of Task 1

Children's own narrative accounts of the video-scene are coded for :

1.-- the type and structure of the narrative told after seeing the video (overall codes)

2. - the specific references children made to the protagonists' intentions, knowledge, beliefs, wishes (mental states) = the intentional content of their narratives (content codes)

I. 1. Narrative organization of their own retellings of the scenario

a). Overall Codes:

TYPE OF OWN NARRATIVE : The child's entire retelling of the video-scene is coded globally, as it is delivered, before any prompting:

0 = *no narrative* (phrases about what happened in no/random temporal order)

1 = *action-only narratives* - in which children do not spontaneously mention the protagonists' possible motives for actions but relate only the happenings in temporal sequence (only what the protagonists did, not why they acted so)

2 = *intentional narratives* - in which children spontaneously mention the protagonists' possible motives/beliefs for actions ("P1/2 wanted, expected, wondered, thought that, knew, was surprised, etc.")

b). Content Codes:

INTENTIONAL CONTENT of child's own account of the video-scene: The number of mental state words used both in the child's own narrative account and in responses to prompts is counted; each mental state word is considered 1 points, except for second order belief terms, which are accorded 2 points.

0 = no mention of mental states/behaviors

1 = mentions false belief of P2 - focus on the protagonist's surprise upon discovering something unexpected in the box as the 'highpoint' (= 1 p)

+1 = any other mental-state term mentioned

+2 = any mention of second order belief/intention attribution to the other character by one of the characters participating in event (e.g. P1 knows that P2 wouldn't know where the cookie was; P2 thinks that P1 wants to play a trick on her/him, etc.)

EXPLANATION OF P2's False Belief: Categorical coding of responses to the questions:

- *Why did P2 look there? How come P2 didn't know where it was?*

0 = Child doesn't know

1 = P2 didn't know (P2 thought it was there)

2 = P2 did not have perceptual access (P2 was out of room, was on phone, didn't see P1)

3 = P2's last action repeated (P2 left it there, put it there last)

4 = other (e.g., "It is a puppet show", "they are playing")

Multiple codes possible: e.g., 1 & 2

If the child spontaneously mentions P1's intention, the attribution of intention is coded as:

1 = Hiding intent (deceptive intent)

2 = Necessity (to prevent the rice from spilling = good intent)

Ex. of responses:

1 - *P1 then put the cookie in the drawer so that P2 wouldn't know where it was: to hide it from P2*

2 - *P1 moved the cookie because the rice was spilling and he needed the box, so he put away the cookie*

Coding procedures for the 2nd part of Task 1

II. Judgements about intentions, attributing intentions, expressing/inferring intentions.

1) (a) Child's ATTRIBUTION OF INTENTION to P1 after hearing the puppets' verbal accounts: Codes are assigned for responses to the questions: --*Did P1 want to share the cookie later or did he want to hide it from P2 ? -Was P1 being nice or selfish?*

1 = if accords with P1's account

2 = if accords with P2's account

0 = if contradicts self (e.g., P1 wanted to hide the cookie and P1 is nice):

(b) JUSTIFICATION for child attribution of intention to P1; Codes are assigned for answers to the question: *How can you tell?* [Referring to previous answer to [*Was Peter being nice or selfish?]* (*i.e, What makes you think he was being nice?)*

0 = no reason (e.g., Don't Know)

1 = P1 said so or P2 said so

2 = P1 personality (e.g., P1 is nice, likes to play tricks, is mean)

3 = child repeats action/intent expressed by P1 (e.g., Because he put the cookie in the drawer)

4 = other diff.reason (e.g., Because it is movie)

2) (a) Remembering P2's ATTRIBUTION of INTENTION to P1: Codes are assigned for answers to the questions: - *Why did P2 think P1 moved the cookie? - Did P2 think that P1 was being nice or selfish?*

0 = if child wrong (child's answer different from P2's attribution of intention)

1 = if child correct (child repeats P2's attribution of intention to P1 correctly)

(b) JUSTIFICATION for P2's ATTRIBUTION of INTENTION to P1:Codes are assigned for answers to the questions: *-How come? Why did P2 think that?*

0 = no reason (e.g., Don't Know)

1 = because P2 didn't know P1's intention (e.g., Because P2 didn't know that P1 really wanted to hide it/to save it for later)

2 = P1/P2 personality (e.g., Because P2 thought that P1 is nice, because P2 knows that P1 likes to play tricks, P1 is selfish, P2 is a nice person)

3 = P2' wishes (E.g., P2 wanted to eat some of the cookie, P2 likes cookies too)

4 = child repeats P1's action (e.g., Because P1 moved the cookie)

5 = communication gap/no information source (e.g., P1 didn't tell P2)

6 = other (e.g., Because you should always share; it was enough cookie for both)

3) (a) TYPES OF EXPLANATION for interpretive responses. Codes apply to the child's first explanation for interpretive diversity (i.e., 1st response to the question: -How come they [the 2 puppets] said such different things about what happened?)

0 = no reason/irrelevant (e.g., Don't know; One of them is wrong or is lying)

1 = subjectivist/relativist (e.g. They think different, have diff opinions, are different people)

2 = informational source (lack of perceptual access to the action: e.g., P2 didn't see/hear the other person)

3 = intentional/personality related (e.g., P2 knows that P1 likes to play tricks, so he thought she hid the cookie, but P1 wanted to use the box for the rice; They are brother and sister, so he thought she wanted to save the cookie to share it, he couldn't know she really wanted to hide it.)

4 = other (e.g., It is a puppet snow; there are two sides to every story)

(b) MAIN SCORE on Task1: Scores take into account the range of *justifications* proposed for interpretive differences in the protagonists' verbal accounts, adding the points obtained for each explanation. Explanations are ranked and receive points as

follows:

0 = noninterpretive (e.g., Don't know, irrelevant or saying it's not possible for the two protagonists to say different things about what happened - e.g., one is lying)

+ 1 = subjectivist/relativist (think differently; are diff. people)

+ 2 = informational source explanations (P1 & P2 were in diff.places; P2 didn't see P1)

+ 2 = intentional explanations (P2 cannot read P1's mind; P1 didn't tell P2)

4) Child's Prediction of P2's behavior and/or outcome of scenario: Categories of response for the question: What do you think P2 will do next? What would happen next?

0 = no answer, don't know

1 = hiding/take for self/revenge(e.g. P2 will hide the cookie and eat it alone)

2 = sharing, saving (e.g., P2 will share the cookie with brother/sister)

3 = emotions (e.g., P2 gets mad, angry, P1 feels sorry, apologizes)

4 = external resolve (e.g., P2 will tell mom)

5 = discussion (e.g., they will both talk about it, clarify intentions)

Coding procedures for Task 2 - Perception-based interpretive task

There are four main questions associated with this task. The 1st question probes the child's recognition of the validity of two different interpretations of the reversible-image drawing, and responses are coded as pass/fail only for this question:

1) Recognition of the legitimacy of two interpretations for the ambiguous/double-meaning visual figure: Codes refer to answers to the question:

- *Does it make sense for Mary to say it is a man with glasses and for Mike to say it's a mouse?* (Mary and Mike's interpretations were alternated between participants).

0 = no, only one interpretation possible

1 = yes, both interpretations Ok/make sense

2) Explanation type: Codes refer to answers to the question: -*Why does (doesn't) it make sense?*

0 = no reason (e.g., Don't know; It can't be different things)

0.5 = gives a reason why only one interpretation makes sense (e.g., If you look really carefully it's more a mouse than a man)

1 = subjectivist/relativist (e.g., They are different people; they think different)

2 = stimulus-grounded (e.g., It looks like both)

3) Prediction of another person's first interpretation: Codes refer to answers for the question: - *If we showed this picture to children in another school what would they first think it is, or wouldn't you know what they'd first think?* . Following the child's initial answer one of the probe questions is asked: -- *How sure are you that they will think that, very very sure or not so sure? Why?* Or -- *Why is it hard to tell what they would think?* Answers are scored:

0 = if child made a precise prediction and is very, very sure

1 = if child cannot make a precise prediction and gives a sound reason why (e.g., I wouldn't know what they's first think it is because it looks like two different things)

4) Evaluation of deviant interpretation: Answers to the question '-- *Does it make sense for Jane to say it's a giraffe or does it not make sense? How come?*' are scored as:

0 = it makes sense - without giving any reason

0.5 = it makes sense with some attempt at a subjectivist explanation (e.g., Because that's how she sees it, that's what he think it is)

1 = does not make sense + reason why not (e.g., because it does not look at all like a giraffe)

5) Overall score for task 2. Scores are calculated by adding the points obtained for the explanation, prediction and evaluation of deviant interpretation questions (range 0 to 6).

Coding procedures for Task 3 -'The Frog-story' narrative production task

The codes refer to the length of the narratives produced, the narrative structure and the content elements used in constructing stories based on the picture book.

I. (1). LENGTH = obtained by counting the number of propositions/clauses.

-A proposition/clause is defined as a verb and its arguments or a 'unified predicate' (i.e. that expresses a single situation/event/activity/state)

Ex: -- Treat as a single clause: 'want to go', 'started walking' BUT as 2 clauses 'I thought/ that I'd go'

-A proposition roughly corresponds to a clause representing one event/situation.(In general, treat as a single clause those utterances that have 2 verbs but one subject, and treat as 2 separate clauses cases when each verb has a different subject):

Examples of SINGLE CLAUSE/proposition:

- He's trying to get out; - They started walking; - He stopped running; - He's taken by surprise; - They had begun to search all over.

Examples of TWO CLAUSES/propositions:

- He said / he would find the frog; - He's calling for /the frog to come; - The boy told the dog/ to be quiet; - He decided / that it was an owl; - He thought/ he could get the bees.

Also, treat as 2 separate clauses strings in which the 2nd verb is lacking due to grammatical reductions, but the verb meaning is fully recoverable from the text:

Ex: - The boy looked in his boots/ and the dog in the jar [here- 'dog looked' is possible]

- He began searching for the frog/ and the dog too. [same as above]

- With the frog not there/ the boy felt upset. [here -'the frog was not there/so the boy felt upset']

- The boy was mad at the dog/ for breaking the jar. [here the 2nd clause could be: 'he broke the jar']

- Do not count as separate propositions any comments made by the child, such as, 'I think that...' , 'It appears that..', it looks like...', but keep with the matrix verb

Ex: I assume that the boy is happy = One proposition

It appears that the dog is going to fall = One proposition

In this one we see that the boy is searching all over = One proposition

Once this boy - I'm going to call him Mike- caught a frog. = One proposition

- Do not count the child's interruptions to ask the experimenter questions:

Ex: And then he saw - what is this animal called? - a deer = One proposition

-If the child makes up a title, count it as one proposition

(2) <u>FROG STORY MAIN SCORE</u> (basic story structure) - refers to the basic story components mentioned in child's narrative (each component receives 1 point)

1 for *Setting:* boy looks at frog, boy & dog got a frog, etc.

+ 1 for *Instantiation* (what triggers the events): frog escapes, runs away, is gone)

+ 1 for *Theme* (search for the frog): they look everywhere, they start looking for the frog; they go to find the frog.

+ 1 for *Obstacles* (at least 4 out of these 5): - dog ->jar stuck & falls out of window (either);- dog -> bees; boy ->gopher/; boy -> owl; boy->deer/moose & pond

+1 for *Resolution*: finding/taking a frog back home

+1 for *Formal beginning/ending* (e.g., 'once upon a time..', 'one day there was...','once there was a boy...', 'They lived happily...', etc.).

A TOTAL of 6 points may be obtained for narrative structure.

II. Coding for content elements. Each content element is counted within the entire narrative and the summed within the following categories:

1) **Intentional components** = any references to mental states (cognition, desire/volition - excluding basic emotions), such as 'thinking', 'wondering', 'know', 'want', 'trying to..'(=intention), 'to see if...', 'to find out...'

Examples: - When the boy woke up, he *knew* that the frog went away; - The frog *was thinking* that the dog *wanted* to eat him; - He was *surprised* to see the frog gone

2) **Socio-cognitive components**: = any aspects of the story that need to be inferred in order to motivate the sequence of events and that are not direct descriptions of the pictures: - negatives (propositions embedded in a negative form) or introduced by BUT conjunctions: Ex: 'The frog *wasn't there*'; 'He called again *but* still without success' (i.e., indicating a violation of expectations)

- causal statements (use of connectors such as because, so... since, that's why)

Ex: -'The dog was scared *'cause* the bees were after him', 'the bees were probably angry *that* the dog knocked their hive'

- inferences - where the narrator offers information that is not readily available in the picture; Ex: -' The boy *didn't realize* the branches were a deer's antlers', 'he's *probably trying to get rid* of them', 'the frog *who was very clever*, escaped', '*by accident* the boy slipped and fell'..

3) **Affective enhancers** = any devices used for dramatic effects, meant to emphasize the characters' emotions and the narrator participation in the story telling and to grab the audience's attention:

- emotion state terms: Ex: -'The dog was *scared*', 'he was *angry, mad*', 'they were *happy*'

- character speech: Ex: - 'The boy said: *Frog, where are you?*', 'He told the dog: *Be quiet!!*' (But not 'he told the dog to be quiet' - which is indirect speech)

- sound effects: Ex: 'Woof-woof', '*splash* - they went in the water'

- audience hookers - exclamatory phrases such as 'suddenly', 'lo and behold'

- intensifiers, such as '*very* slowly', '*terribly* scared', '*still* barking', searches *everywhere*'

- repetitions: '*really, really* scared', ' was *looking and looking and looking*'

APPENDIX B: PILOT STUDY

A pilot study was undertaken and completed to test the appropriateness and final details of the methodology proposed. The videotapes using hand puppets and a specially designed miniature kitchen decor were prepared and used in the pilot study. The initial choice of age groups included 4-5-year-olds with the intention of 'capturing' the transition from understanding false-belief (which has been the main focus of theory of mind research) to understanding how minds may interpret the same stimuli differently. Although all children in the sample (three 4-year-olds, three 5-year-olds and two 6-year-olds) could briefly tell what happened in the scene watched, and several spontaneously mentioned at least one character's intention, the 4 and 5-year-olds had obvious difficulties following and remembering both accounts of the event as presented successively by the two puppet-protagonists. The 6-year-old children seemed to have no such difficulties. As information processing limitations affected the ability of the youngest children to follow the task, the participants' distribution into age groups was modified accordingly, taking 1st graders (6-year-olds) as the youngest group for this study.

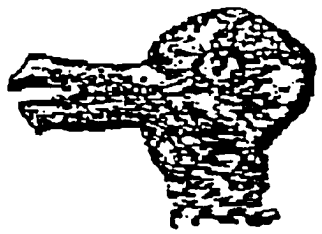
A preliminary analysis of children's answers in the pilot study revealed several different patterns of interpreting the event and the subsequent discrepant accounts of the two protagonists. While one 5-year-old and one 6-year-old assumed that the boy who moved the cookie to the drawer was being selfish and deceitful while the girl was wrong in attributing good intentions to him, one 6-year-old provided answers that revealed an understanding that both protagonists could be justified in their own (discrepant) assumptions. Based on these results it was concluded that the task as devised could be

used for the full study and that the new choice of age-groups was appropriate.

For the second interpretive task two drawings representing the famous double-meaning figures "duck-rabbit" (Jastrow, 1900; Attneave, 1974) and "man-mouse" (Bugelski, 1960) were used (see figure 5).

Figure 5. Reversible Double-meaning Drawings

The 'Man-Mouse'



The 'Duck-Rabbit'

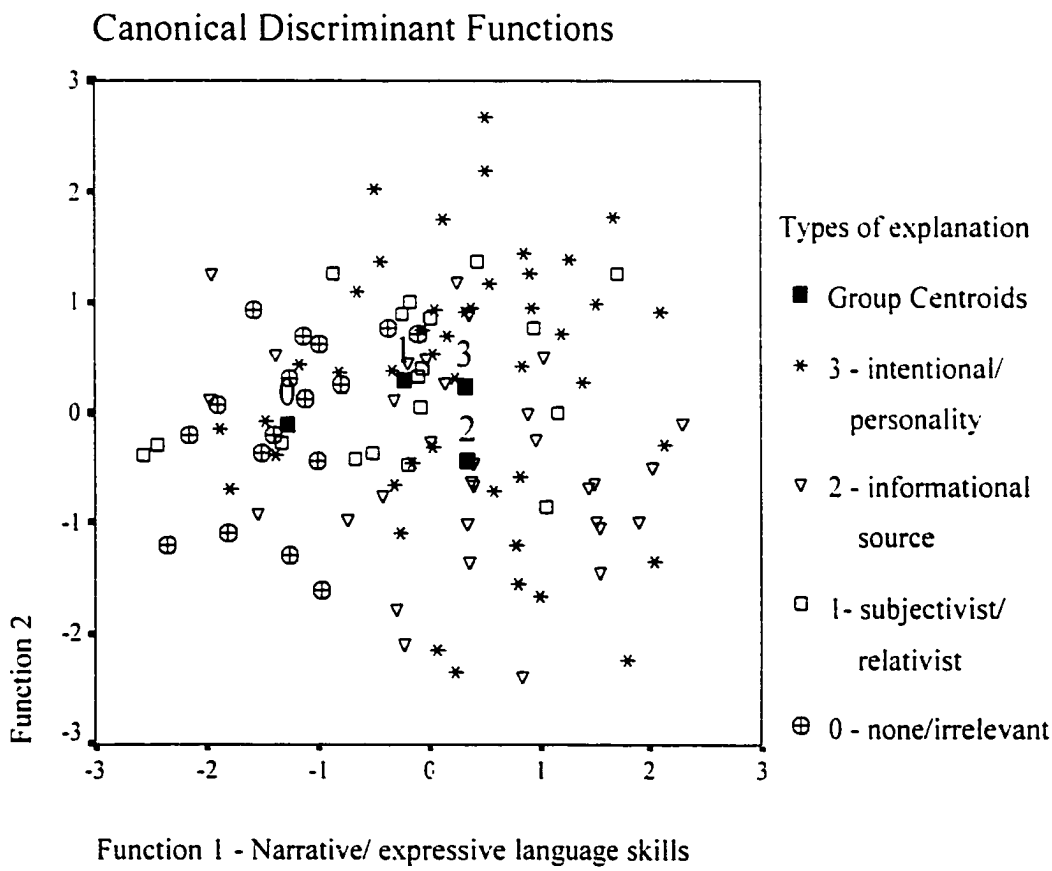
For half of the participants the 'duck-rabbit' drawing was presented first and the 'man-mouse' second, while for the other half of the sample the pictures were presented in reverse order. As children were asked almost identical questions when presented with the second drawing, many of them made comments such as "I already told you with the other picture", "it's like the same thing with this one", regardless of which one of the drawings was presented second. Therefore I considered that the two pictures could be treated as equivalent and decided to show children only one of the drawings -- the 'man-mouse' which, at least for the pilot sample, seemed to lend itself to an easier identification of both figures than the 'duck-rabbit' drawing.

APPENDIX C: GRAPHIC REPRESENTATION FOR DISCRIMINANT FUNCTION ANALYSIS

The four categories of response for explaining the possibility and sources of interpretive diversity in the event-based task were entered as dependent variables in a discriminant function analysis. Only the first calculated discriminant function reliably differentiated between groups, indicating narrative structure and expressive language skills as best predictors. Figure 6 represents the four group centroids on two discriminant functions or the mean scores of discriminant functions for each group of justification-type

Figure 6

Mean Scores of Canonical Discriminant Functions for Each Explanation-type Group



As shown graphically in figure 6 the first discriminant function maximally separates the 'no explanation/irrelevant' response group from the other three response categories. It is worth noting the lack of separation between the *informational source* and the *intentional justification* groups along the dimensions of the first discriminant function, but children in both these groups had relatively higher scores for narrative structure and expressive language than those who offered subjectivist/relativist explanations as indicated by the combined groups plot.

REFERENCES

Astington, J. W. (1990). Narrative and the child's theory of mind. In B. K. Britton & A. D. Pellegrini (Eds.), Narrative thought and narrative language (pp. 151 - 171). Hillsdale, NJ: Lawrence Erlbaum Associates.

Astington, J. W., & Gopnik, A. (1991). Theoretical explanations of children's understanding of the mind. British Journal of Developmental Psychology, 9, 7 - 31.

Astington, J. W., Harris, P. L., & Olson, D. R. (Eds.).(1988). Developing theories of mind. New York: Cambridge University Press.

Astington, J. W., & Jenkins, J. M. (1995). Theory of mind development and social understanding. Cognition-and-Emotion, 9, 151 - 165.

Astington, J. W., & Jenkins, J. M. (1999). A longitudinal study of the relation between language and theory-of-mind development. Developmental Psychology, 35, 1311 - 1320.

Attneave, F (1974). Multistability in perception. In R. Held (Ed.), Image, object and illusion: Readings from the Scientific American (pp. 90-99). San Francisco: W. H. Freeman.

Baldwin, D. A., & Moses, L. J. (1994). Early understanding of referential intent and attentional focus: Evidence from language and emotion. In C. Lewis & P. Mitchell (Eds.), Children's early understanding of mind: Origins and development (pp. 133 - 156). Hillsdale, NJ: Erlbaum

Bamberg, M.(1991). Narrative activity as perspective taking: The role of emotionals, negations, and voice in the construction of the story realm. Journal of Cognitive Psychotherapy, 5, 275-290.

Bamberg, M., & Damrad-Frye, R. (1991). On the ability to provide evaluative comments and further explorations in children's narrative competencies. Journal of Child Language, 18, 689-710.

Baron-Cohen, S. , Leslie, A. M., & Frith, U. (1986). Mechanical, behavioural and intentional understanding of picture stories in autistic children. British Journal of Developmental Psychology, 4, 113-125.

Baron-Cohen, S., Tager-Flusberg, H., & Cohen, D.(Eds.).(1993). Understanding other minds: Perspectives from autism. Oxford: Oxford University Press.

Baron-Cohen, S., Tager-Flusberg, H., & Cohen, D.(Eds.).(2000). Understanding other minds: Perspectives from developmental cognitive neuroscience (2nd ed.). Oxford: Oxford University Press.

Bartsch, K. (1996). Between desires and beliefs: Young children's action predictions. Child Development, 67, 1671-1685.

Bartsch, K., & Wellman, H. M. (1995). Children talk about the mind. New York: Oxford University Press.

Beal, C. R. (1988). Children's knowledge about representations of intended meaning. In J.W. Astington, P.L. Harris, & D.R. Olson (Eds.), Developing theories of mind (pp. 315-325). New York: Cambridge University Press.

Berman, R. A.(1988). On the ability to relate events in narrative. Discourse processes, 11, 469-497.

Berman, R. A., & Slobin, D. I. (Eds.).(1994). Relating events in narrative: A crosslinguistic developmental study. Hillsdale, NJ: Erlbaum.

Bonitanbus, G. (1988). What is said and what is meant in referential communication. In J. W. Astington, P. L. Harris, & D. R. Olson (Eds.), Developing theories of mind (pp. 326 - 338). New York: Cambridge University Press.

Botterill, G. (1996). Folk psychology and theoretical status. In P. Carruthers & P. K. Smith (Eds.), Theories of theories of mind (pp.105 - 118). Cambridge University Press.

Brentano, F. (1874/1973). Psychology from an empirical standpoint. (O. Kraus, Ed.; A. C. Ranculrello, D. B. Terell, & L. L. McAlister, Trans.) London: Routledge & Kegan Paul.

Bretherton, I. (1991). Intentional communication and the development of an understanding of mind. In D. Frye & C. Moore (Eds.), Children's theories of mind: Mental states and social understanding (pp. 49-75). Hillsdale NJ: Erlbaum.

Bretherton, I., & Beeghly, M. (1982). Talking about internal states: The acquisition of an explicit theory of mind. Developmental Psychology, 18, 906-921.

Britton, B. K., & Pellegrini, A. D. (Eds.).(1990). Narrative thought and narrative language. Hillsdale, NJ: Lawrence Erlbaum Associates.

Brown, J. R., Donelan-McCall, N., & Dunn, J. (1996). Why talk about mental

states? The significance of children's conversations with friends, siblings and mothers. Child Development, 67, 836-849.

Bruner, J. (1986). Actual minds, possible worlds. Cambridge, MA:Harvard University Press.

Bruner, J. (1990). Acts of meaning. Cambridge, MA: Harvard University Press.

Bugelski, B. R. (1960). An introduction to the principles of psychology. New York: Holt, Rinehart, & Winston.

Burke, K. (1945). A grammar of motives. New York: Prentice-Hall.

Butterworth, G., Harris, P. L., Leslie, A. M., & Wellman, H. M. (Eds.).(1991). Perspectives on the child's theory of mind. Oxford: Oxford University Press.

Carpendale, J. I. M. (1995). Conceptions of knowledge underlying children's understanding of false beliefs, taste, and interpretation. Poster presented at the biennial meetings of the Society for Research in Child Development, Indianapolis, IN.

Carpendale, J. I. M., & Chandler, M. J. (1996). On the distinction between false belief understanding and subscribing to an interpretive theory of mind. Child Development, 67, 1686-1706.

Carpendale, J. I. M., Chandler, M. J., & Lalonde, C. E. (1997). Relations between parenting styles and the development of an interpretive theory of mind. Poster presented at the biennial meetings of the Society for Research in Child Development, Washington, DC.

Carruthers, P., & Smith, P. K. (Eds.).(1996). Theories of theories of mind. Cambridge, England: Cambridge University Press.

Chafe, W. (Ed).(1980). The pear stories: Cognitive, cultural, and linguistic aspects of narrative production. Norwood, NJ: Ablex.

Chafe, W. (1990). Some things that narratives tell us about the mind. In B. K. Britton & A. D. Pellegrini (Eds.), Narrative thought and narrative language (pp. 79 - 98). Hillsdale, NJ: Lawrence Erlbaum Associates.

Chandler, M. J.(1987). The Othello effect: Essays on the emergence and eclipse of skeptical doubt. Human Development, 30, 137-159.

Chandler, M. J. (1988). Doubt and developing theories of mind. In J. W.

Astington, P. L. Harris, & D.R. Olson (Eds.), Developing theories of mind (pp. 387-413). New York: Cambridge University Press.

Chandler, M., & Boyes, M. (1982). Social cognitive development. In B. Wollman (Ed.), Handbook of developmental psychology, (pp.387 - 402). Englewood Cliffs, NJ: Prentice-Hall.

Chandler, M. J., & Carpendale, J.I.M.(1998). Inching toward a mature theory of mind. In M. Ferrari & R. Sternberg (Eds.), Self-awareness: its nature and development (pp.148 - 190). New York: Guilford Publications.

Chandler, M. J., & Helm, D. (1984). Developmental change in the contribution of shared experience to social role-taking competence. International Journal of Behavioral Development, 7, 145-156.

Chandler, M. J., & Lalonde, C. E. (1996). Shifting toward an interpretive theory of mind: 5-to 7-year-olds' changing conceptions of mental life. In A. Sameroff & M. Haith (Eds.), Reason and responsibility: The passage through childhood (pp.111 - 139). Chicago, IL: University of Chicago Press.

Chandler, M. J., & Sokol, B. W. (1999). Representation once removed: Children's developing conceptions of representational life. In I. E. Sigel (Ed.), Development of mental representation: Theories and applications (pp. 201 - 230). Mahwah, NJ: Erlbaum.

Charman, T., & Shmueli-Goetz, Y. (1998). The relationship between theory of mind, language and narrative discourse: An experimental study. Current Psychology of Cognition, 17(2), 245-271.

Clark, A., & Karmiloff-Smith, A. (1993). The cognizer's innards: A psychological and philosophical perspective on the development of thought. Mind & Language, 8(4), 487-519.

Cohen, J., & Cohen, P. (1983). Applied multiple regression/correlation analysis for the behavioral sciences (2nd ed.). Hillsdale, NJ: Erlbaum.

Cutting, A. L., & Dunn, J. (1999). Theory of mind, emotion understanding, language and family background: Individual differences and interrelations. Child Development, 70, 853-865.

Daiute, C. (Ed.). (1993). The development of literacy through social interaction. San Francisco: Jossey-Bass.

Daiute, C. (1995). Imposing the self on school. Paper presented at the meetings of the Jean Piaget Society, Berkeley, CA.

Daiute, C., & Dalton, B. (1993). Collaboration between children learning to write: Can novices be masters? Cognition and Instruction, 10, 281-333.

Daiute, C., & Griffin, T. M. (1993). The social construction of written narratives. In C. Daiute (Ed.), The development of literacy through social interaction (pp. 97-120). San Francisco: Jossey-Bass.

D'Andrade, R. (1987). A folk model of the mind. In D. Holland & N. Quinn (Eds.), Cultural models in language and thought (pp.112-148). New York: Cambridge University Press.

Debold, E. (1995). Knowing distress and controlling passion: Development of abstract reasoning and mind-body dissociations in adolescent girls. Paper presented at the 25th Annual Symposium of the Jean Piaget Society, Berkeley, CA.

Dennett, D. C. (1987). The intentional stance. Cambridge, MA: MIT Press.

Dennett, D. C. (1988). Precis of The Intentional Stance. Behavioral and Brain Sciences, 11, 495-546.

de Villiers, J. G. (2000). Language and theory of mind: What are the developmental relationships? In S. Baron-Cohen, H. Tager-Flusberg, & D. J. Cohen (Eds.), Understanding other minds: Perspectives from developmental cognitive neuroscience (2nd ed.), (pp.83 -123). Oxford: Oxford University Press.

de Villiers, J. G. & Pyers, J.(1997). Complementing cognition: The relationship between language and theory of mind. In Proceedings of the 21st annual Boston University Conference on Language Development. Cascadilla Press, Somerville, MA.

Donald, M. (1991). Origins of the modern mind: Three stages in the evolution of culture and cognition. Cambridge, MA: Harvard University Press.

Donaldson, M. (1978). Children's minds. Glasgow, Scotlad: William Collins & Sons, Inc.

Dunn, J. (1988). Beginnings of social understanding. Cambridge, MA: Harvard University Press.

Dunn, J. (1994). Changing minds and changing relationships. In C. Lewis & P. Mitchell (Eds.), Children's early understanding of mind: Origins and development (pp.

297- 310). Hillsdale, NJ: Erlbaum.

Dunn, J. (1995). Children as psychologists: The later correlates of individual differences in understanding of emotions and other minds. Cognition-and-Emotion, 9, 187-201.

Dunn, J. (1999). Making sense of the social world: Mindreading, emotion, and relationships. In P. D. Zelazo, J. W. Astington , & D. R. Olson (Eds.), Developing theories of intention: Social understanding and self control (pp. 229 - 242). Mahwah, NJ: Erlbaum.

Dunn, J., Bretherton, I., & Munn, P. (1987). Conversations about feeling states between mothers and their young children. Developmental Psychology, 12, 132 - 139.

Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. Psychological Review, 95, 256 - 273.

Eisenmajer, R., & Prior, M. (1991). Cognitive linguistic correlates of 'theory of mind' ability in autistic children. British Journal of Developmental Psychology, 9, 351 - 364.

Fabricius, W. V., Schwanenflugen, P. J., Kyllonen, P. C., Barclay, C. R., & Denton, S. M. (1989). Developing theories of mind: Children's and adults' concepts of mental activities. Child Development, 60, 1278-1290.

Feldman, C. F. (1988). Early forms of thought about thoughts: Some simple linguistic expressions of mental state. In J. W. Astington, P. L. Harris, & D. R. Olson (Eds.), Developing theories of mind (pp.126 - 137). New York: Cambridge University Press.

Feldman, C. F. (1999). Intentionality and interpretation. In P. D. Zelazo, J. W. Astington, & D. R. Olson (Eds.), Developing theories of intention: Social understanding and self control (pp.317 - 328). Mahwah, NJ: Erlbaum.

Feldman, C., Bruner, J., Kalmar, D., & Reinderer, B. (1994). Plot, plight, and dramatism: Interpretation at three ages. In W. F. Overton & D. S. Palermo (Eds.), The nature and ontogenesis of meaning (pp. 255 - 277). Hillsdale, NJ: Erlbaum.

Fivush, R. (1991). The social construction of personal narratives. Merrill-Palmer Quarterly, 37, 59-82.

Fivush, R., & Fromhoff, F. A. (1988). Style and structure in mother-child conversations about the past. Discourse Processes, 11, 337 - 355.

Fivush, R., & Haden, C. A. (1997). Narrating and representing experience: Preschoolers' developing autobiographical accounts. In P. W. van den Broek, P. J. Bauer, & T. Bourg (Eds.), Developmental spans in event comprehension and representation: Bridging fictional and actual events (pp.169 - 198). Mahwah, NJ: Erlbaum.

Fivush, R., & Hudson, J. A.(Eds.).(1990). Knowing and remembering in young children. New York: Cambridge University Press.

Flavell, J. H. (1978). The development of knowledge about visual perception. In C. B. Keasey (Ed.), Nebraska symposium on motivation (Vol. 25, pp. 43 - 76). Lincoln: University of Nebraska Press.

Flavell, J. H., Everett, B. A., Croft, K., & Flavell, E. R. (1981). Young children's knowledge about visual perception: Further evidence for the Level 1- Level 2 distinction. Developmental Psychology, 17, 99-103.

Flavell, J. H., Flavell, E. R., Green, F., & Moses, L. J. (1990). Young children's understanding of fact beliefs versus value beliefs. Child Development, 61, 915-928.

Flavell, J. H., Green, F. L., & Flavell, E. R. (1995). Young children's knowledge about thinking. Monographs of the Society for Research in Child Development, 60 (1, Serial No. 243).

Flavell, J. H., & Miller, P. H. (1998). Social Cognition. In W. Damon (Series Ed.) & D. Kuhn & R. Siegler (Vol. Eds.), Handbook of child psychology: Vol. 2. Cognition, perception, and language (5th ed., pp. 851 - 898). New York: Wiley.

Fonagy, P., Redfern, S., & Charman, T. (1997). Individual differences in theory of mind acquisition: The role of attachment security. British Journal of Developmental Psychology, 15, 51 - 61.

Fonagy, P., & Target, M. (1996). Playing with reality: I. Theory of mind and the normal development of psychic reality. International Journal of Psychoanalysis, 77, 217 - 233.

Fox, R. (1991). Developing awareness of mind reflected in children's narrative writing. British Journal of Developmental Psychology, 9, 281 - 298.

Frye, D., & Moore, C. (Eds.).(1991). Children's theories of mind: Mental states and social understanding. Hillsdale, NJ: Erlbaum.

Frye, D., Zelazo, P. D., & Palfai, T. (1995). Theory of mind and rule-based reasoning. Cognitive Development, 10, 483 - 527.

Gellatly, A. (1997). Why the young child has neither a Theory of Mind nor a theory of anything else. Human Development, 40, 32 - 50.

Goodman, N. (1978). Ways of worldmaking. Indianapolis, Hackett Publishing.

Gopnik, A. (1990). Developing the idea of intentionality: Children's theories of mind. Canadian Journal of Philosophy, 20, 89-112.

Gopnik, A. (1993). How we know our minds: The illusion of first-person knowledge of intentionality. Behavioral and Brain Sciences, 16, 1-14.

Gopnik, A., & Astington, J. W. (1988). Children's understanding of representational change and its relation to the understanding of false belief and the appearance-reality distinction. Child Development, 59, 23 - 37.

Gopnik, A., & Graf, P.(1988). Knowing how you know: Young children's ability to identify and remember the sources of their beliefs. Child Development, 59, 1366-1371.

Gopnik, A., & Slaughter, V. (1991). Young children's understanding of changes in their mental states Child Development, 62, 98 -110.

Happe, F.G. E.(1995). The role of age and verbal ability in the theory of mind task performance of subjects with autism. Child Development, 66, 843 - 855.

Harris, P. L. (1994). Thinking by children and scientists: False analogies and neglected similarities. In L. A. Hirschfeld & S. A. Gelman (Eds.), Mapping the mind: Domain specificity in cognition and culture (pp.294 - 315). New York: Cambridge University Press.

Harris, P. L., Brown, E., Marriott, C., Whittall, S., & Harmer, S. (1991). Monsters, ghosts and witches: Testing the limits of the fantasy-reality distinction in young children. British Journal of Developmental Psychology, 9, 33 - 51.

Hobson, P. R. (1991). Against the theory of "Theory of mind". British Journal of Developmental Psychology, 9, 105 - 123.

Hobson, P. R. (1993). Understanding persons: The role of affect. In S. Baron-Cohen, H. Tager-Flusberg, & D. J. Cohen (Eds.), Understanding other minds: Perspectives from autism. (pp. 204 - 227). Oxford: Oxford University Press.

Hudson, J. A. (1990). The emergence of autobiographical memory in mother-child conversations. In R. Fivush & J. A. Hudson (Eds.), Knowing and remembering in young children (166 - 196). New York: Cambridge University Press.

Hudson, J. A., & Shapiro, L. R. (1991). From knowing to telling: The development of children's scripts, stories, and personal narratives. In A. McCabe & C. Peterson (Eds.), Developing narrative structure (pp. 89 - 136). Hillsdale, NJ: Erlbaum.

Hughes, C. (1998). Executive function in preschoolers: Links with theory of mind and verbal ability. British Journal of Developmental Psychology, 16, 233 - 253.

Hughes, C., & Dunn, J. (1997). "Pretend you didn't know": Young children's talk about mental states in pretend play. Cognitive Development, 12, 477 - 499.

Jastrow, J. (1900). Fact and fable in psychology. Boston, MA: Houghton-Mifflin.

Jenkins, J. M., & Astington, J. W. (1996). Factors and family structure associated with theory of mind development in young children. Developmental Psychology, 32, 70 - 78.

Johnson, C., & Harris, P. L. (1994). Magic: Special but not excluded. British Journal of Developmental Psychology, 12, 35 - 51.

Johnson, C. N., & Wellman, H. (1980). Children's developing understanding of mental verbs: Remember, know and guess. Child Development, 51, 1095 - 1102.

Karmiloff-Smith, A. (1992). Beyond modularity. Cambridge, MA: MIT Press.

Keasey, D. B. (1977). Young children's attributions of intentionality to themselves and others. Child Development, 48, 261 -264.

Kernan, K. T.(1977). Semantic and expressive elaboration in children's narratives. In S. Ervin-Tripp & C. Mitchell-Kernan (Eds.), Child discourse (pp. 91 - 102). New York: Academic Press.

King, P. M., Kitchener, K .S., Davison, M. L., Parker, C. A., & Wood, P. K. (1983). The justification of beliefs in young adults: A longitudinal study. Human Development, 26, 106 - 116.

Kitchener, K. S., & King, P. M. (1981). Reflective judgement: Concepts of justification and their relationship to age and education. Journal of Applied Developmental Psychology, 2, 89 - 116.

Labov, W. (1972). Language in the inner city. Philadelphia: University of Pennsylvania Press.

Labov, W., & Waletsky, J. (1967). Narrative analysis: Oral versions of personal

experiences. In J. Helm (Ed.), Essays on the verbal and visual arts (pp. 12 - 44). Seattle: University of Washington Press.

Labouvie-Vief, G. (1982). Dynamic development and mature autonomy. Human Development, 25, 161 - 191.

Lalonde, C. E., & Chandler, M. J. (1995). Theory of mind goes to school: On the social-emotional consequences of coming early or late to a first theory of mind. Cognition-and-emotion, 9(2-3), 167-185.

Lalonde, C. E., & Chandler, M. J. (1997). The development of an interpretive theory of mind. Poster presented at the biennial meeting of the Society for Research in Child Development, Washington, DC.

Leadbeater, B. (1986). The resolution of relativism in adult thinking: Subjective, objective or conceptual? Human Development, 29, 291 - 300.

Leadbeatter, B., & Kuhn, D. (1989). Interpreting discrepant narratives: Hermeneutics and adult cognition. In J. D. Sinnot (Ed.), Everyday problem solving. Theory and applications (pp.175 -1 90). New York: Praeger

Lewis, C. (1994). Episodes, events, and narratives in the child's understanding of mind. In C. Lewis & P. Mitchell (Eds.), Children's early understanding of mind: Origins and development (pp. 457 - 480). Hillsdale, NJ: Erlbaum

Lewis, C., & Mitchell, P.(1994).(Eds.). Children's early understanding of mind: Origins and development. Hillsdale, NJ: Erlbaum

Lewis, C., Freeman, N., Hagestadt, C., & Douglas, H. (1994). Narrative access and production in preschoolers' false belief reasoning. Cognitive Development, 9(4), 397-434.

Lewis, C., Freeman, N. H., Kyriakidou, C., Maridaki-Kassotaki, K., & Berridge, D. (1997). Social influences on false belief access: Specific sibling influences on general apprenticeship? Child Development, 67,2930 - 2947.

Lewis, C., & Osborne, A. (1990). Three-year-olds' problem with false belief: Conceptual deficit or linguistic artifact? Child Development, 61, 1514 - 1519.

Lillard, A. S. (1997). Other folks' theories of mind and behavior. Psychological Science, 8(4), 268 - 274.

Lillard, A. S. (1998). Ethnopsychologies: Cultural variation in theories of mind.

Psychological Bulletin,123, 3 - 33.

Lillard, A. S. (1999). Developing a cultural theory of mind: The CIAO approach. Current Directions in Psychological Science, 8(2), 57 - 61.

Loveland, K. A., McEnvoy, R. E.,Tunali, B., & Kelley, M. L.(1990). Narrative story telling in autism and Down's syndrome. British Journal of Developmental Psychology, 8, 9 - 23.

Loveland, K. & Tunali, B. (1993). Narrative language in autism and the theory of mind hypothesis: a wider perspective. In S. Baron-Cohen, H. Tager-Flusberg, & D. J. Cohen (Eds.), Understanding other minds: Perspectives from autism. (pp. 247 - 266). Oxford: Oxford University Press.

Lucariello, J. (1990). Canonicality and consciousness in child narrative. In B. K. Britton & A. D. Pellegrini (Eds.), Narrative thought and narrative language (pp.131 -150). Hillsdale, NJ: Erlbaum.

Macnamara, J. (1989). Children as common sense psychologists. Canadian Journal of Psychology, 43, 426 - 429.

Mandler, J. M.(1984). Stories, scripts and scenes: Aspects of schema theory. Hillsdale, NJ: Erlbaum.

Mandler, J. M., & Johnson, N. S.(1977). Remembrance of things parsed: Story structure and recall. Cognitive Psychology, 9, 111 - 151.

Marvin, R. S., Greenberg, M. T., & Mossler, D. G. (1976). The early development of perspective taking: distinguishing among multiple perspectives. Child Development, 47, 511 - 514.

Mayer, M. (1969). Frog, Where are You? New York: Dial.

Mayes, L. C., & Cohen, D. J. (1992). The development of a capacity for imagination in early childhood. The Psychoanalytic Study of the Child, 47, 23- 47.

McCabe, A., & Peterson, C. (1985). A naturalistic study of the production of causal connectives by children. Journal of Child Language, 12, 145-159.

McCabe, A., & Peterson, C. (Eds.).(1991). Developing narrative structure. Hillsdale, NJ: Erlbaum.

McCabe, A., Capron, E., & Peterson, C. (1991). The voice of experience: The

recall of early childhood and adolescent memories by young adults. In A. McCabe & C. Peterson (Eds.), Developing narrative structure (pp.137 - 173). Hillsdale, NJ: Erlbaum.

McGeough, A. (1992). A Neo-structural analysis of children's narrative and its development. In R. Case (Ed.), The mind's staircase (pp. 171 - 188). Hillsdale, NJ: Erlbaum.

Menig-Peterson, C. L., & McCabe, A. (1978).Children's orientation of a listener to the context of their narratives. Developmental Psychology, 14, 582-592.

Miller, P. J. (1994). Narrative practices: Their role in socialization and self construction. In U. Neisser & R. Fivush (Eds.), The Remembering self: Construction and accuracy in self-narrative (pp. 158 - 179). New York: Cambridge University Press.

Miller, P. & Aloise, P. A. (1989). Young children's understanding of the psychological causes of behavior: A review. Child Development, 60, 257 - 285.

Mitchell, P. (1996). Acquiring a conception of mind: A review of psychological research and theory. London, UK : The Psychology Press.

Mitchell, P., & Lacohee, H. (1991). Children's early understanding of false belief. Cognition, 39, 107 - 127.

Mitchell, P., Munno, A., & Russell, J. (1991). Children's understanding of the communicative value of discrepant verbal messages. Cognitive Development, 6, 279-299.

Mitchell, P., & Robinson, E. J. (1994). Discrepant utterances resulting from a false belief: Children's evaluations. Child Development, 65, 1214 - 1227.

Montgomery, D. E. (1992). Young children's theory of knowing: The development of a folk epistemology. Developmental Review, 12, 410-430

Montgomery, D. E. (1993). Young children's understanding of interpretive diversity between different-age listeners. Developmental Psychology, 29, 337-345.

Montgomery, D. E. (1994). Situational features influencing young children's mentalistic explanations of action. Cognitive Development, 9, 425 - 454.

Moore, C., Furrow, D., Chiasson, L., & Patriquin, M. (1994). Developmental relationships between production and comprehension of mental terms. First Language, 14, 1 - 17.

Moore, C., Jarrold, C., Russell, J., Lumb, A., Sapp, F., & MacCallum, F.

(1995). Conflicting desire and the child's theory of mind. Cognitive Development, 10, 467- 482.

Moore, C., Pure, K., & Furrow, D. (1990). Children's understanding of the modal expression of speaker certainty and uncertainty and its relation to the development of a representational theory of mind. Cognitive Development, 61, 722 - 730.

Moses, L. J., & Flavell, J. H. (1990). Inferring false belief from actions and reactions. Child Development,61, 929 - 945.

Nelson, K. (1981). Individual differences in language development: Implications for development and language. Developmental Psychology, 17, 170 -187.

Nelson, K. (1985). Making sense: The acquisition of shared meaning. New York: Academic Press.

Nelson, K. (1993). Event, narratives, memories : What develops? In C. Nelson (Ed.), Memory and affect in development: Minnesota symposium on child psychology (vol. 26, pp. 1 - 24). Hillsdale, NJ: Erlbaum

Nelson, K. (1996). Language in cognitive development: The emergence of the mediated mind. New York: Cambridge University Press.

Nelson, K., Henseler, S., & Plesa, D. (2000). Entering a community of minds: "Theory of mind" from a feminist standpoint. In P. Miller & E. Scholnick (Eds.), Toward a feminist developmental psychology (pp. 61 - 83). New York: Routledge.

Nelson, K., Plesa, D., & Henseler, S. (1998). Children's theory of mind: An experiential interpretation. Human Development, 41, 17 - 29.

O'Neill, D. K., Astington, J. W., & Flavell, J. H. (1992). Young children's understanding of the role that sensory experiences play in knowledge acquisition. Child Development, 63, 474 - 490.

Olson, D. (1988). On the origins of belief and other intentional states in children. In J. W. Astington, P. L. Harris, & D. R. Olson (Eds.), Developing theories of mind (pp. 414 - 426). New York: Cambridge University Press.

Olver, R., & Ratner, N. K. (1994). Children's understanding of false belief in two contexts. Psychological Reports, 15, 1136-1138.

Pelletier, J. (1997). Action, consciousness and theory of mind in children's story retelling. Paper presented at the biennial meetings of the Society for Research in Child

Development, Washington, D.C.

Perner, J. (1991). Understanding the representational Mind. Cambridge, MA: MIT Press.

Perner, J., & Davies, G. (1991). Understanding the mind as an active information processor: Do young children have a "copy theory of mind"? Cognition, 39(1), 51- 69.

Perner, J., Leekam, S., & Wimmer, H. (1987). Three-year-olds' difficulty in understanding false belief: The case for a conceptual deficit. British Journal of Developmental Psychology, 5, 125 - 137.

Perner, J., Ruffman, T., & Leekam, S. R. (1994). Theory of mind is contagious: You can catch it from your sibs. Child Development, 65(4), 1228 - 1238.

Perry, W. (1970). Forms of intellectual and ethical development in the college years. New York: Holt, Rinehart & Winston.

Peskin, J. (1996). Guise and guile: Children's understanding of narratives in the purpose of pretense is deception. Child Development, 67(4), 1735-1751.

Peterson, C., & McCabe, A. (1983). Developmental psycholinguistics: Three ways of looking at a child's narrative. New York: Plenum.

Piaget, J. (1950). The psychology of intelligence. London: Routledge & Kegan Paul.

Piaget, J. (1962). Play, dreams, and imitation in childhood. New York: Norton.

Piaget, J. (1977). The development of thought: Equilibration of cognitive structures. Oxford: Blackwell.

Pillow, B. H. (1989). Early understanding of perception as a source of knowledge. Journal of Experimental Child Psychology, 47, 116 - 129.

Pillow, B. H. (1991). Children's understanding of biased social cognition. Developmental Psychology, 27, 539 - 551.

Pillow, B. H. & Henrichon, A. J. (1996). There's more to the picture than meets the eye: Young children's difficulty understanding biased interpretation. Child Development, 67, 803 - 819.

Pillow, B. H., & Mash, C. (1999).Young children's understanding of

interpretation, expectation and direct perception as sources of false belief. British Journal of Developmental Psychology, 17, 263 - 276.

Pillow, B. H., & Weed, S. T. (1995). Children's understanding of biased interpretation: Generality and limitations. British Journal of Developmental Psychology, 13, 347 - 366.

Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind? Behavioral and Brain Sciences, 4, 515 - 526.

Quine, W. V. (1961). From a logical point of view. Cambridge, MA: Harvard University Press.

Reese, E., Haden, C. A., & Fivush, R. (1993). Mother-child conversations about the past: Relationships of style and memory over time. Cognitive Development, 8, 403 - 430.

Robinson, E. J. (1994). What people say, what they think, and what is really the case: Children's understanding of utterances as sources of knowledge. In C. Lewis & P. Mitchell (Eds.), Children's early understanding of mind: Origins and development (pp. 355 - 381). Hillsdale, NJ: Erlbaum.

Robinson, E. J., & Mitchell, P. (1992). Children's interpretation of messages from a speaker with a false belief. Child Development, 63, 639 - 652.

Robinson, E. J., & Mitchell, P. (1994). Young children's false-belief reasoning: Interpretation of messages is no easier than the classic task. Developmental Psychology, 30, 67 - 72.

Robinson, E. J., Mitchell, P., & Nye, R. (1995). Young children's treating of utterances as unreliable sources of knowledge. Journal of Child Language, 663 - 685.

Robinson, E. J., & Whittaker, S. J. (1987). Children's conceptions of relations between messages, meanings and reality. British Journal of Developmental Psychology, 5, 81 - 90.

Robinson, E. J., & Whittaker, S. J. (1985). Children's responses to ambiguous messages, and their understanding of ambiguity. Developmental Psychology, 12, 446 - 454.

Ruffman, T., Olson, D. R., & Astington, W. J. (1991). Children's understanding of visual ambiguity. In: British Journal of Developmental Psychology, 9, 89 - 102.

Rumelhart, D. (1975). Notes on a schema for stories. In D. Bobrow & A. Collins (Eds.), Representation and understanding (pp. 2237 - 272). New York: Academic Press.

Russell, J. (1979). Verbal and nonverbal judgements of length invariance. British Journal of Developmental Psychology, 70, 313 - 317.

Russell, J. (1981). Dyadic interaction in a logical reasoning problem. Child Development, 52, 1322 - 1325.

Russell, J. (1992). The theory-theory: So good they named it twice? Cognitive Development, 7, 485 - 519.

Russell, J. (1996). Agency: Its role in mental development. Hove: Erlbaum (UK) Taylor & Francis.

Russell, J., Mills, I., & Reiff-Musgrove, P. (1990). The role of symmetrical and asymmetrical social conflict in cognitive change. Journal of Experimental Child Psychology, 49, 58 - 78.

Saarni, C., & Harris, P. L. (Eds.).(1989). Children's understanding of emotion. New York: Cambridge University Press.

Schoenfeld, A. H. (1983). Beyond the purely cognitive: Belief systems, social cognitions, and metacognitions as driving forces in intellectual performance. Cognitive Science, 7, 329 - 363.

Schommer, M. (1990). Effects of belief about the nature of knowledge on comprehension. Journal of Educational Psychology, 82, 498 - 504.

Schommer, M. (1993). Epistemological development and academic performance among secondary students. Journal of Educational Psychology, 85, 406 - 411.

Schwanenflugen, P. J., Fabricius, W. V., & Alexander, J. (1994). Developing theories of mind: Understanding concepts and relations between mental activities. Child Development, 65, 1546 - 1563.

Schwanenflugel, P. J., Fabricius, W. V., & Noyes, C. R. (1996). Developing organization of mental verbs: Evidence for the development of a constructivist theory of mind in middle childhood. Cognitive Development, 11, 265 - 294.

Searle, J. R. (1983). Intentionality. An essay in the philosophy of mind. Cambridge, England: Cambridge University Press.

Shanker, S. (1992). In search of Bruner. Language & Communication, 12, 53 - 74.

Shatz, M. (1994). Theory of mind and the development of social-linguistic intelligence in early childhood. In C. Lewis & P. Mitchell (Eds.), Children's early understanding of mind: Origins and development (pp. 311- 329). Hillsdale, NJ: Erlbaum.

Shatz, M., Wellman, H. M., & Silber, S. (1983). The acquisition of mental verbs: A systematic investigation of the first reference to mental state. Cognition, 14, 301 - 321.

Shaver, K. G. (1975). An introduction to attribution processes. Cambridge, Mass: Winthrop Publishers, Inc.

Shultz, T. R., & Pilon, R. (1973). Development of the ability to detect linguistic ambiguity. Child Development, 44, 728 - 733.

Shultz, T. R., Wells, D., & Sarda, M. (1980). Development of the ability to distinguish intended actions from mistakes, reflexes and passive movements. The British Journal of Social and Clinical Psychology, 19, 301 - 310.

Siegal, M., & Peterson, C. (1994). Children's theory of mind and the conversational territory of cognitive development. In C. Lewis & P. Mitchell (Eds.), Children's early understanding of mind: Origins and development (pp. 427 - 455). Hillsdale, NJ: Erlbaum.

Smith, M. C. (1978). Cognizing the behavior stream: The recognition of intentional action. Child Development, 49, 736 - 743.

Sodian, B. (1990). Understanding verbal communication: Children's ability to deliberately manipulate ambiguity in referential messages. Cognitive Development, 5, 209 - 222.

Stein, N. L., & Glenn, C. G. (1979). An analysis of story comprehension in elementary school children. In R. O. Freedle (Ed.), New directions in discourse processing (Vol. 2, pp. 52 - 120). Norwood, NJ: Ablex.

Stein, N. L., & Policastro, M. (1984).The concept of a story: A comparison between children's and teacher's perspective. In H. Mandle, N. L. Stein, & T. Trabasso (Eds.), Learning and comprehension of text (pp.113 - 155). Hillsdale, NJ: Erlbaum.

Stitch, S., & Nichols, S. (1992). Folk Psychology: Simulation or tacit theory? Mind & Language, 1(2), 35 - 71.

Sullivan, K., & Winner, E. (1995). How children tell a lie from a joke: The role of

second-order mental state attributions. British Journal of Developmental Psychology, 13, 191 - 204.

Tager-Flusberg, H. (1993). What language reveals about the understanding of minds in children with autism. In S. Baron-Cohen, H. Tager-Flusberg, & D. Cohen, (Eds.), Understanding other minds: Perspectives from autism. (pp.138-157). Oxford: Oxford University Press.

Tager-Flusberg, H. (1995). Once upon a ribbit: Stories narrated by autistic children. British Journal of Developmental Psychology, 13, 45 - 59.

Tager-Flusberg, H. (2000). Language and understanding minds: Connections in autism. In S. Baron-Cohen, H. Tager-Flusberg, & D. J. Cohen (Eds.), Understanding other minds: Perspectives from developmental cognitive neuroscience (2nd ed.), (pp. 124 - 149). Oxford: Oxford University Press

Tager-Flusberg, H., & Sullivan, K. (1995). Attributing mental states to story characters: A comparison of narratives produced by autistic and mentally retarded individuals. Applied Psycholinguistics, 16, 241- 256.

Tannen, D. (1980). A comparative analysis of oral narrative strategies: Athenian Greek and American English. In W. Chafe (Ed.), The pear stories: Cognitive, cultural, and linguistic aspects of narrative production. (pp.)Norwood, NJ: Ablex.

Tannen, D. (1993). What's in a frame? Surface evidence for underlying expectations. In D. Tannen (Ed.), Framing in discourse (pp. 14 - 55). New York: Oxford University Press.

Target, M., & Fonagy, P. (1996). Playing with reality: II. The development of psychic reality from a theoretical perspective. International Journal of Psychoanalysis, 77, 459 - 479.

Taylor, M. (1988). Conceptual perspective taking: Children's ability to distinguish what they know from what they see. Child Development, 59, 703 - 718.

Taylor, M., Cartwright, B.S. & Bowden, T. (1991). Perspective taking and theory of mind: Do children predict interpretive diversity as a function of differences in observers' knowledge? Child Development, 62, 1334 - 1351.

Tessler, M., & Nelson, K. (1994). Making memories: The influence of joint encoding on later recall by young children. Consciousness and Cognition, 3, 307 - 326.

Trabasso, T., & Rodkin, P. C. (1994). Knowledge of goals/plans: A conceptual

basis for narrating "Frog, where are you?" In R. A. Berman & D. I. Slobin (Eds.), Relating events in narrative: A cross linguistic developmental study (pp.85 - 106). Hillsdale, NJ: Erlbaum.

Trabasso, T., Stein, P. C., & Johnson, L. R. (1981). Children's knowledge of events: A causal analysis of story structure. In G. Bower (Ed.), Learning and motivation (vol. 15). New York: Academic Press.

Umiker-Seboek, D. J. (1979). Preschool children's intraconversational narratives. Journal of Child Language, 6, 91 - 109.

Vikan, A., & Clausen, S .E. (1993). Freud, Piaget or neither? Beliefs in controlling others by wishful thinking and magical behavior in young children. The Journal of Genetic Psychology, 154(3), 297 - 314.

Vygotsky, L.S. (1966). Development of the higher mental functions. Cambridge, MA: MIT Press.

Vygotsky, L.S. (1978). Mind in society. Cambridge, MA: Harvard University Press.

Watson, A. C., Nixon, C. L., Wilson, A., & Capage, L. (1999). Social interaction skills and theory of mind in young children. Developmental Psychology, 35(2), 386 - 391.

Wellman, H. M. (1985). A child's theory of mind: The development of conceptions of cognition. In S. R. Yussen (Ed.), The growth of reflection in children. San Diego: Academic Press.

Wellman, H. M. (1990). The child's theory of mind. Cambridge, MA: MIT Press.

Wellman, H. M., & Banerjee, M. (1991). Mind and emotion: Children's understanding of the emotional consequences of beliefs and desires. British Journal of Developmental Psychology, 9(2), 191 - 214.

Wellman, H. M., & Estes, D. (1986). Early understanding of mental entities: A reexamination of childhood realism. Child Development, 57, 910 - 923.

Wellman, H. M., & Hickling, A. K. (1994). The mind's "I": Children's conception of the mind as an active agent. Child Development, 65, 1564 - 1580.

Wertsch, J. V. (Ed.).(1985). Culture, communication and cognition: Vygotskyan perspectives. New York: Cambridge University Press.

Whiten, A. (Ed).(1991). Natural theories of mind: Evolution, development and simulation of everyday mindreading. London: Basil Blackwood.

Wimmer, H., & Hartl, M. (1991). Against the Cartesian view on mind: Young children's difficulty with own false beliefs. British Journal of Developmental Psychology, 9, 125 - 138.

Wimmer, H., Hogrefe, A., & Perner, J. (1988). Children's understanding of informational access as a source of knowledge. Child Development, 59, 386 - 396.

Wimmer, H., & Leekam, S. (1991). Distinguishing irony from deception: Understanding the speaker's second-order intention. British Journal of Developmental Psychology, 9, 257-270.

Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: Representations and constraining function of wrong beliefs in young children's understanding of deception. Cognition, 13, 103 - 128.

Wittgenstein, L. (1953). Philosophical investigations. New York: Macmillan.

Woolley, J. (1997). Thinking about fantasy: Are children fundamentally different thinkers and believers from adults? Child Development, 68, 991 - 1011.

Woolley, J. D., Phelps, K. E., Davis, D. L., & Mandell, D. J. (1999). Where theories of mind meet magic: The development of children's beliefs about wishing. Child Development, 70, 571 - 587.

Woolley, J., & Wellman, H. M. (1993). Origin and truth: Young children's understanding of imaginary mental representations. Child Development, 64, 1 - 17.

Wolf, D., & Gardner, H. (1979). Style and sequence in symbolic play. In M. Franklin & N. Smith (Eds.), Early symbolization. Hillsdale, NJ: Erlbaum.

Wolf, S. A., & Heath, S. B. (1992). The braid of literature: Children's worlds of reading. Cambridge, MA: Harvard University Press.

Wood, M. E. (1984). Children's developing understanding of other people's motives for behavior. Developmental Psychology, 14, 561 - 562.

Zaitchik, D. (1991). Is only seeing really believing?: Sources of the true belief in the false belief task. Cognitive Development, 6, 9 - 103.