EVENT SALIENCY AS A CONSTRAINT UPON YOUNG CHILDREN'S DEVELOPING THEORIES OF MIND

by

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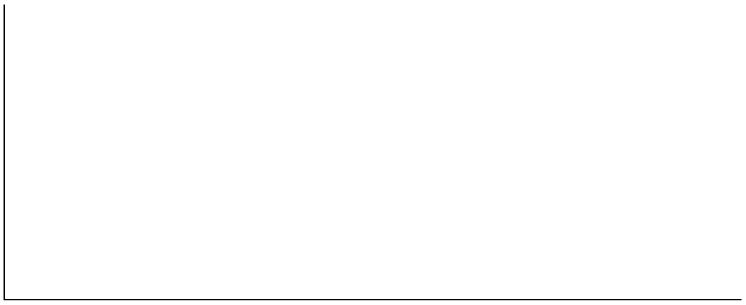

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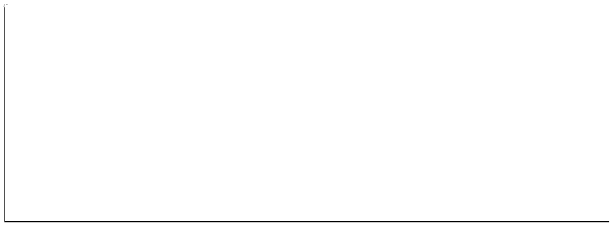

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ABSTRACT

This dissertation explores the previously underrecognized possibility that especially salient perceptual events might act to interfere with young children's abilities to grasp the possibility of false beliefs and consequently to hold to a so-called "theory of mind". With the aim of determining whether event saliency does in fact operate as such a constraining factor upon 3-year-olds' typical performance on so-called standard measures of false-belief understanding, the present study sequence was designed to minimize the saliency-generating conditions operative in the two most widely used standard measures of false-belief understanding, the "Unexpected Change Task" (Wimmer & Perner, 1983) and the "Unexpected Contents Tasks" (Astington & Gopnik, 1987; Wimmer, Hogrefe & Perner, 1986). Both of these standard procedures make use of experimental protocols that inadvertently attach special saliency to parts of the stimulus narrative which, if accorded undue emphasis in the thinking of young children, will lead them into making false-belief errors. It was reasoned that if 3-year-old children could competently ascribe false beliefs to themselves and others when the effects of such event saliency were reduced or eliminated, then the commonly held assumption that 3-year-olds' routine failures on these measures stem from some fundamental inability to recognize the possibility of false belief would be called into question.

In the first and most popular measure of false-belief understanding, the Unexpected Change Task, children are asked to predict where an inadequately informed protagonist will search for candy that has been relocated in his absence. In Study One the saliency-generating conditions seen to operate in this measure were minimized by substituting for the candy usually employed a hypothetical or "pretend chocolate". In the alternative standard Unexpected Contents Task, subjects are asked to comment upon their own and others' false beliefs about the contents of a box upon having discovered that it contains items different from those normally expected. In Study Two the perceptual saliency effects thought to be associated with the unexpected contents employed in the standard procedures were reduced by arranging that the box was left empty, rather than filled with some unexpected contents.

Results for Study One and Study Two showed that the present saliency manipulations had the predicted facilitating effects upon 3-year-olds' abilities to ascribe false beliefs to themselves and other persons. Of the 54 3-year-olds, who participated in Study One, 79% (59% younger and 89% older 3-year-olds) were able to correctly predict the false belief of the story character when they were no longer distracted by especially salient perceptual events. Successful performance was even more impressive in Study Two. Of the 55 participating subjects, 87% (78% younger and 96% older 3-year-olds) were able to recall their own prior beliefs about the contents of a box even though they recognized that subsequent events had rendered these earlier beliefs

false. Similarly, of the 29 3-year-olds who participated in the parallel task of correctly identifying another person's now false belief about the changed contents of a box, 78% of the younger and 91% of the older 3-year-olds were able to successfully do so.

These findings suggest that the typically poor performance of 3-year-olds on standard versions of these false belief measures is at least a partial result of experimental conditions that promote the operation of saliency biases. These results lend further support to the growing number of other studies that show such young children already to appreciate the role of mind in the process of knowledge acquisition.

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INTRODUCTION

Young persons' first realization that others behave, not with reference to how the world actually is, but rather how they believe it to be, marks an immensely significant turning point in their epistemic development. No longer confined by the bounds of what they take to be a single shared reality, such young persons begin for the first time to take account of the beliefs others hold. How and when it is that children first acquire such a fledgling knowledge of mental life, or what have come to be called "theories of mind", are questions which have received a great deal of attention from developmentalists in the last several years.

The research described in this dissertation was meant to help provide answers to these important questions by extending currently available accounts of such developing theories of mind along a previously underexplored path. Specifically, I have examined the possibility that previously unrecognized perceptual salience effects, operative within popular measures of false-belief understanding, may have distracted young children in their efforts to reason about the beliefs of others, leading to a serious underestimation of their real working knowledge about other persons' mental lives.

The work to be described here turns upon a careful analysis of standard research practices in the measurement of false-belief understanding. This specific focus, I will argue, is an appropriate place to begin because it is constitutive of the notion of beliefs that they may be mistaken (e.g., Chisholm, 1967). For this reason researchers of a first theory of mind have generally agreed that any legitimate theory-like understanding, at a minimum, would need to include an appreciation of the possibility that ideas may be counterfactual. For this reason, investigators working within this research domain have regularly turned to false-belief understanding as a critical measure of early beliefs about beliefs. This otherwise defensible practice can and has given rise to an interpretive dilemma, however. The problem lies in the fact

that children who fail to pass certain standardized measures of false-belief understanding, nevertheless manage to behave in other ways that suggest that they do in fact already possess some real working knowledge of other minds. Two possible routes around this interpretive impasse seem available. Either such children actually do fail to understand counterfactuals and therefore only appear to otherwise express real knowledge of others' beliefs, or, alternatively, the specific measure by which their knowledge of false beliefs has been assessed is in some way faulty. This thesis argues the second of these possibilities. Why this is so is briefly outlined in the section below.

Statement of the problem

Any cursory review of the available literature concerning preschoolers' earliest theories of mind would demonstrate that 3-year-olds, as distinct from 4-year-olds and still older children, generally fail so-called standard tests of false-belief understanding. On such tests 3-year-olds typically fail to ascribe false beliefs to other persons by mistakenly insisting that their beliefs must be congruent with the actual state of affairs in the world. This error commonly has been referred to as a "reality" error. Although some (e.g., Gopnik & Astington, 1987; Perner, Leekam, & Wimmer, 1987; Sodian, Taylor, Harris, & Perner, 1991) have concluded from their reviews of these findings that 3-year-olds must suffer some cognitive deficit that blocks them from acquiring any theory-like understanding of other minds, others, myself included, have urged that such conclusions are at least premature (see Chandler, Fritz, & Hala, 1989; or Wellman, 1990, for recent reviews of the numerous studies that have contributed to this debate). Impressed by the competencies that 3-year-olds demonstrate on other tasks requiring some real theory of mind, we have continued to explore the possibility that certain standard tests of false-belief understanding may be difficult for such young subjects for reasons other than the general inability of young children to recognize that beliefs may be mistaken.[1]

Researchers on either side of this debate each face specific tasks that need to be addressed if the dilemma posed by the contradictory evidence currently available is to be resolved. Those convinced that 3-year-olds' regular errors on standard false-belief tasks function as valid indicators of the lack of some fledgling but real theory of mind need to demonstrate that any piece of evidence suggesting otherwise is somehow flawed or open to more reductive interpretations. Those, such as myself, more impressed by 3-year-olds' competencies in matters mentalistic than by their deficits, must be able to explain why 3-year-olds, if they really do appreciate that people have beliefs about the world, are unable to correctly identify others' false beliefs on certain standard false-belief measures. There are at least two ways in which this latter task might be taken up. One such way would involve attempting to show, using some alternative set of measures, that 3-year-olds do in fact already recognize false beliefs. Alternatively, one might try to find fault with standard false-belief measures as a way of demonstrating that errors on these tasks are attributable to something other than a failure to grasp the possibility of counterfactual beliefs.

Recently my colleagues and I completed a series of studies in which we pursued the first or early-onset alternative outlined above by demonstrating that when measures of deceptive intent are employed even young 3-year-olds are quite capable of appreciating others' false beliefs (Chandler, Fritz, & Hala, 1989; Hala, Chandler, & Fritz, 1991). That is, we showed that 3-year-olds not only readily set out to instill false beliefs in the minds of others, but also competently express their appreciation of the purpose of their own deceptive action. Though many colleagues have judged our experiments to be a convincing demonstration of a working theory of mind in children younger than four, others more committed to standard measures of unexpected change as criterial tests of false-belief understanding have sought to dismiss our findings as somehow specific to our particular assessment procedure. A logical next step given such dismissive attitudes was to follow the

second of the alternatives outlined earlier by attempting a reexamination of the standard false-belief measures themselves. The studies described in this dissertation were designed to do just that. The specific question addressed was whether event saliency may be acting as a constraint[2] such that it is responsible, in whole or in part, for young children's typical failure on standard tests of false-belief understanding. Consequently, this research was undertaken with the aim of accomplishing two goals. Most importantly I hoped to find some way of explaining why 3-year-old subjects, so apparently facile in navigating some aspects of mental life, have routinely failed at other standard tests of false-belief understanding. Second, I hoped that if, by modifying those standard procedures in minor ways, 3-year-olds could be made regularly to show an understanding of false beliefs, then those data would contribute importantly toward convincing those colleagues who, so far, have resisted the implications of our own earlier deception studies and the findings of other colleagues who succeeded in demonstrating that by three years of age young children already know much about mental life.

Saliency and its suggested role in false-belief understanding

As a way of trying to clarify the phenomenon of saliency, and how I have envisioned its place in explaining discrepancies in available results regarding false-belief understanding, I began by looking the term up in Funk and Wagnall's New Standard Dictionary of the English Language (1959). On this generalized authority, salience or saliency, from the latin "salire - to leap, jump," is said to refer to "1. The condition of being salient or standing out distinctly; projection; protrusion; also figuratively the quality of being important, striking or noteworthy;...," and " 2. Any thing or part that protrudes beyond a surface; a projection; ...." Although generally instructive, such dictionary definitions nevertheless fall short by not drawing sufficient attention to the fact that one matter is only "important," "striking" or "noteworthy" as it stands in relation to still other matters that are

somehow less impressive. In short, saliency is more of a relational concept than the dictionary acknowledges for the reason that certain features within a given interpretive context are only eminent, important or noteworthy in relation to some other less noteworthy features. Consequently, what makes any one thing salient in a particular context, is itself determined by its place among other events that are simultaneously present.

The relativistic nature of saliency just alluded to makes it difficult, if not impossible, to work out task- or person-independent ways of conceptualizing or measuring it. What is salient in one context may not be in another and, similarly, what is salient for one person need not be for another. One danger posed by this fact is that one can be drawn easily into a circular form of reasoning that allows saliency to be diagnosed only by its effects. Although no means of wholly avoiding this sort of circularity might exist, strategies are available to guard against the danger of evoking the phenomenon of saliency only after the fact. One way of doing this is to try to identify the specific factors that are assumed to make one matter more salient than another. What is necessary to satisfy this requirement is some more or less explicit theory or proto-theory meant to specify in general terms why one aspect of mental life proves more salient than another.

Although there exist no broadly accepted theories successfully identifying those processes underlying the phenomenon of event saliency, there are some commonly agreed-upon assumptions that, separately and together, might help to define what makes one thing "stand out distinctly" relative to another. First and foremost on this list is the fact that event saliency is generally assumed to be a perceptual phenomenon in the psychological literature. This is so for the self-evident reason that any event we experience in the external physical world, must first be registered by our perceptual processes. Accordingly, it has been assumed that, mental phenomena originating in perceptual experience will prove to be more salient than mental events not directly grounded in perceptual experiences, other things being

equal. Furthermore, it is widely supposed that we do not register all the features in our environment in equal measure, for reasons that are supposed to serve the evolutionary cause of adaptation. Some cues attract more attention than others. In such instances, what makes a particular perceptual cue more salient may be determined by any one or more of several factors, such as the intensity of a cue relative to its background, its extension in time and space, or its degree of "unexpectedness" or norm violation.

Such common-sense assumptions about saliency—that (a) perceptually-based mental experiences tend to be more salient than other more endogenous mental experiences such as imaginings, and that (b) within the perceptual domain itself cues that are somehow of greater intensity or novelty tend to be more salient than others—find theoretical support in Werner's Orthogenetic Principle and in Piaget's Theory of Cognitive Development (e.g., 1950). Werner (as cited by Rogers & Kegan, 1991) states that development may be viewed as an increasing differentiation between subject and object involving "the corollary that the organism becomes increasingly less dominated by the immediate concrete situation; the person is less stimulus-bound and less impelled by his own affective state" (pp. 126–27). Similarly, Piaget describes cognitive development as a "progressive escape from the most accessible perceptual features in the environment" (Gold, 1987). This theme is discussed by Gold as part of his efforts to provide a theory-consistent explanation for the frequently misinterpreted findings of décalage in children's performances on various versions of class inclusion and conservation tasks. According to Gold, Piaget viewed cognitive development as a progressive liberation from the domination of the most accessible, and consequently most salient, perceptual features. At the early stages of development, perceptual processes are seen to dominate the child's cognition, to the exclusion of everything else. Gradually, according to this account, children become more able to focus on cues that lack perceptual saliency. With this increasing liberation from the magnetic-like pull that material objects and events in the

perceptual world first exert upon their developing minds, children are said by Piaget to acquire the ability to "go beyond" what is given in perceptual terms to what they can imagine or conceive to be the case.

This theoretical rationale for the operation of event saliency as a developmental phenomenon provides a basis for the present hypothesis that the so-called "reality" error, typically committed by young preschoolers on various traditional "theory of mind" measures, is traceable to problems of perceptually-based saliency bias, rather than, as has been commonly assumed, to some absolute inability to grasp the notion of false belief. The set of studies outlined below tested this possibility by investigating the ability of 3-year-old children to ascribe false beliefs to others under experimental conditions in which the perceptual saliency noted in the two most popular measures of false-belief understanding was systematically manipulated. The way in which this was accomplished in the so-called standard measures was dictated by the specific biases that were hypothesized to be associated with the perceptual saliency in each case. In the first study, the planned reduction of presumably disruptive event saliency was accomplished by creating circumstances in which non-perceptual stimulus events (i.e., the subjects' memory of a story character's prior beliefs) were no longer placed in competition with beliefs currently supported by more salient, perceptually accessible stimulus events. In the second study, the likely effects of saliency were manipulated by reducing the overall intensity, as well as degree of unexpectedness, of the perceptually salient stimulus events.

Before going on to explicate the methods and findings of these studies, it will be useful, however, to review the relevant research literature. Actually, there are two different sets of literature that require reviewing. Obviously, one of these is the companion literature on children's developing theories of mind. A second and more remote history also exists, however, which is made up of those studies that, although largely external to contemporary theories of mind work, nevertheless, has importantly shaped, and served

as a precursive condition for, most recent studies of children's knowledge of mental life. These earlier studies, known under the headings of "role-taking" or "perspective-taking", are discussed in the chapter that follows. Because the research on role-taking was conducted to investigate issues that partially overlapped with those guiding this and other studies concerning the development of a theory of mind, it is important to make clear why these two research enterprises are as separate as they are. The following review takes up this troublesome matter.

HISTORICAL BACKGROUND TO THE STUDY OF THEORIES OF MIND

The new interest in the study of young children's understanding of their own and others' beliefs, desires, intentions, and sentiments, that seemingly arose de novo in the early 1980's does in fact have many of the characteristics of a brand new research undertaking. It uniquely focussed upon the general domain of what philosophers have defined as intentional states, introduced its own methods and generated new research findings. Still, it is hard to ignore the obvious intellectual debt this new field of study owes to the earlier endeavors aimed at exploring children's role-taking or perspective-taking abilities. Interest in such abilities, which reached its peak and then began to flounder in the 70's, not only functioned as a progenitor to more recent theories of mind research, but, through its successes and failures, has also helped to shape its current methods and research practices. These earlier formative influences are outlined below.

The identity formation of contemporary "theories of mind" research

Bretherton, McNew and Beeghley-Smith (1981) were perhaps the first to directly apply the notion of a "theory of mind" (Premack & Woodruff, 1978; Pylyshyn, 1978) to the developmental study of young children's implicit knowledge of others' intentional states. In studying how older infants manage to communicate with others, Bretherton and her colleagues came to the conclusion that such young children already demonstrate a kind of person-knowledge that entails implicit understanding of human intentionality. Other developmentalists who shared a common interest in the child's theory of mind but who were focussing on the abilities of somewhat older and already verbal children soon adopted the term theory of mind (for an early review of this literature see, for example, Astington, Harris & Olson's, 1987, edited volume Children's Developing Theories of Mind). Since then it has become the key heading for the multitude of research efforts which have been undertaken in

the last decade to explore young children's first grasp of the mental world.

Wellman (1988, 1990) has been most precise in spelling out which criteria must be satisfied for an understanding of mental states, however implicit, to qualify as "theory." According to his analysis, any body of knowledge warrants being called a theory when it (a) is organized in a coherent fashion, (b) rests upon specific ontological distinctions or commitments, and (c) allows for causal-explanatory statements regarding its relevant phenomena. Along with others (e.g., Carey, 1985), Wellman contends that our own "naive" or "lay" views of various scientific domains such as psychology or biology or physics fulfill these basic criteria. Wellman explicitly argues that our naive understanding of mind is precisely such a theory. To illustrate his point, Wellman provides a list of the obvious common-sense assumptions about mind typically shared by most adults. He goes on to develop the argument—and this is the main thrust of his book The Child's Theory of Mind (1990)—that 3-year-olds also hold implicit theories of mind accordant with the above three criteria. In reviewing the available research findings, Wellman concludes: (a) that the beliefs of most 3-year-olds concerning such states as beliefs, desires, hopes, intentions are, in fact, coherently interrelated rather than divorced and isolated from one another; (b) that their knowledge about mind betrays commitment to the necessary ontological distinction between mental and physical entities; and, finally, (c) that their concepts function to interpret human actions and interactions in a causal-explanatory fashion.

Although most developmentalists interested in children's first theories of mind agree with Wellman's detailed analysis of the criteria, not everyone is prepared to accept his claim that 3-year-olds already demonstrate such a theory-based understanding. It is around this issue of how to best interpret the available evidence concerning 3-year-olds' understanding of other minds that researchers have most disagreed. A summary of this debate, and the so-called "booster" and "scoffer" positions it generated, is provided in the following chapter. Having laid out the criteria required for any theory-based

understanding of mind it will serve the present definitional purposes to consider next the issue of the presumed functional significance of a first theory of mind.

To summarize the foregoing, to entertain a theory of mind means to have productive knowledge, in the sense of Wellman's criteria, about one's own and others' intentional states. Intentional states are constructs of the mind that have been central to how we humans have traditionally understood our place in the world. There are three important features about intentional states that are generally held to contribute to their reflexive and meaning-making character. First, as abstract, internal reflections (accurate or inaccurate) of actual events, intentional states are said to be representational in nature, that is, they mediate the relationship between mind and world. Second, as part of their role as mediators between mind and world such mental entities are thought to be causally related to events in the world in two ways. As premeditators of ensuing actions (e.g., "I believe we should take this road"), and as explanations of events already taken place (e.g., "He must have assumed I would drop by"). Third and last, but not least, intentional states are seen to constitute a part of communication per se, primarily linguistic communication. That is, not only are intentional states interpersonally shared through the use of language, but they are also imagined to be crucial for the maintenance of any dialogical interaction. In order to engage in dialogue each participating member needs to entertain assumptions about both the process of linguistic interchange and the content of what is being shared (Grice, 1975). Both of these sets of assumptions, one referring to the rules governing speech acts (Searle, 1969), the other referring to the "background" assumptions concerning the speakers' natural and cultural reality (Searle, 1980) are traditionally fashioned out of the fabric of intentional states.

Presumably through the use of such intentional states, and more specifically by reflecting upon them, we are said to be able to recognize ourselves

and others as entities which think. This singular feature about intentional states is held to make them an essential, perhaps the essential, part of human self-consciousness. Although the exact relationship between consciousness and intentional states is hardly a matter of consensus among philosophers, these two aspects of mental life are widely seen to be intimately related (see Landsman, 1967, for a review of this literature). Although it is not within the scope of the present work to pursue this matter still further, these considerations have a long history that, so far, has received inadequate attention from developmentalists studying first theories of mind (Samet & Zaitchick, 1991). It seems that developmentalists' efforts to address the more general, overarching topics in the field (i.e., the ontogeny of a first theory of mind, the cross-cultural universality of any such theory, or the possibility of a theory-like understanding of others in certain species other than our own) could benefit especially from being informed by available philosophical analyses of the relation between "consciousness" and "states of consciousness" (i.e., intentional states).

Even though definite answers to the foregoing questions remain open, most developmentalists (and philosophers, too) would agree that self-consciousness or the awareness of oneself and others as "entities that think" is an essential requirement for full participation in ordinary human life. Wellman (1990) illustrates the significance of subscribing to such a theory of mind by suggesting the thought experiment of imagining a creature that altogether lacked self-reflection. He writes that "Such an alien might be able to remember, to know, to learn but would possess no constructs such as memory, knowledge, and mind to frame its understanding of behavior and cognition. For such a creature, persons would be seen and heard but they would not be understood as possessing a backlog of ideas or beliefs organizing their actions and lives" (Wellman, 1990, p. 4).

Given the special significance of a persons' "growing aware of being aware" of their own and others' mental life developmentalists naturally have

been interested in the linked questions of: (a) when young children first acquire (or more accurately first evidence) such a theory-based awareness of other minds; and (b) how many restructurings of such a theory do occur in the course of children's development.

As seemingly without precedent as these contemporary questions are, it is, nevertheless, important to uncover the historical circumstances out of which they arose. In this regard, research into the topics of role-taking and perspective-taking abilities (e.g., Shantz, 1983), language acquisition and communication (e.g., Chapman, 1981; Shatz, 1983), and social problem solving in other species (Byrne & Whiten, 1988), as well as more formal inquiries into intentional state philosophy in general (e.g., Dennett, 1987), and speech act theory in particular (Grice, 1975; Searle, 1969, 1980), all seem to have influenced, in one way or another, the study of children's theories of mind. Among these several lines of influence, the research on children's role-taking abilities occupies a unique role, even though its contributions are perhaps the least easy to trace. This is so because the objectives of studies of children's role-taking abilities were partially overlapping with those of current investigations into early theories of mind, but their findings appear to differ considerably. The history of the role-taking literature is outlined below.

The early study of "role-taking abilities"

The developmental study of children's role-taking or perspective-taking abilities (these terms typically having been employed interchangeably) was directly motivated by the goal of applying Piaget's theory of intellectual development to the domain of so-called social cognition. Such investigators were interested in how children at certain stages of cognitive development would orient themselves within the social and interpersonal world. More specifically, the focus was upon the construct of egocentrism (Piaget, 1926) and its implications for children's interpersonal functioning. The concept

of role-taking became a way of conceptualizing as well as operationalizing the notion of egocentrism. Generally speaking, egocentrism refers to an embeddedness in one's own point of view. Role-taking was then postulated as "egocentrism overcome" (Shantz, 1983) or, metaphorically speaking, as the ability to "put oneself into another's shoes." Higgins' definition speaks more to the details of this process by specifying that role-taking is the inferential process whereby one apprehends or determines certain internal attributes about another person based on available but not necessarily directly indicative informational cues (Higgins, 1981).

Although some agreement existed concerning the general definition of the role-taking construct, the fate of its study, nevertheless, soon became fraught with theoretical as well as methodological confusions. A lack of clarity in terms of the theoretical foundations for the construct of role-taking, on the one hand, and a lack of convergence across the different measures of role-taking, on the other, combined to undermine continued interest in these topics. By the late 70's studies on role-taking abilities, which had constituted a major area of active research for almost two decades, were largely discontinued (see, however, Dixon & Moore, 1990; LeMare & Rubin, 1987 and Taylor, Cartwright, & Bowden, 1991 for recent contributions). The lack of conceptual clarity that plagued the role-taking literature is itself a byproduct of a similar confusion concerning the notion of egocentrism, which is itself partially traceable to how this concept was originally defined by Piaget. The methodological confusion evident in the lack of convergence between the various measures employed is also largely a byproduct of these conceptual confusions (Shantz, 1983).

Piaget (1926, 1929), as well as Werner (1959) and Baldwin (1906), all viewed egocentrism as a way of understanding the undifferentiated functioning that characterizes children in the preschool period. According to these theorists egocentrism refers to a state of undifferentiatedness or fusion between the self and non-self, making it impossible for young children to rec-

ognize a difference between their own and others' inner states. Development, in this regard, was characterized as a shift from such an undifferentiated and unreflective view of the physical and social world (egocentrism) to an increasingly differentiated and objectified outlook (perspectivism). In Piaget's theory, for example, children's conception of reality, through a developing ability to decenter, is seen to evolve from a position of egocentrism and realism to objectivity, reciprocity and relativity.

Egocentric functioning is most thoroughly described by Piaget in his early works Language and Thought of the Child (1926) and Judgment and Reasoning of the Child (1928). Although he later revised his notion of egocentrism somewhat (1966), these early works still provide the most detailed statements of his views. By these accounts the lack of differentiation between self and other said to characterize children younger than approximately 7 or 8 years, leads to their falsely assuming similarities between their own and others' thoughts, wishes, feelings, and intentions. Similarly, according to Piaget, this same egocentric failure on part of young children to differentiate between the physical and social world manifests itself in the intellectual tendencies of realism, animism and artificialism. Anchored in a relative non-differentiation between the self and external world, realism refers to children's tendency to grant objective reality to inherently subjective phenomena. Animism is similarly said to be the consequence of a relative non-differentiation between animate and inanimate existence, and refers to children's tendency to attribute to non-living entities qualities usually associated with living beings. Artificialism stems from a relative non-differentiation between human creative activity and natural causes, and is observed in children's tendency to assume intentionality and finality in the origins of all natural phenomena (Chapman, 1988).

There are two conceptual problems that the research on role-taking abilities more or less directly inherited from Piaget's theory. One arose from the theory's emphasis upon egocentrism as the organizing construct of early

childhood thought. Because egocentrism was considered by Piaget to be a central as well as an all-encompassing feature of pre-operational thought (more so than realism, for example), role taking came to be exclusively defined in terms of egocentrism. Retrospective analyses of the role-taking literature have concluded that the notion of egocentrism probably was not the best choice for characterizing young children's successes and failures in ascribing knowledge, viewpoint or feelings to other persons (e.g., Shantz, 1983; Higgins, 1981) precisely because the judgments of pre-operational children do not, under all circumstances, show a lack of differentiation between self and other. A second problem which necessarily resulted from the focus upon egocentrism was the almost exclusive research emphasis on concrete operational abilities rather than pre-operational skills. Because egocentrism was seen to profoundly constrain pre-operational thought, the knowledge and skills of children at this stage of development were underresearched as well as underestimated in comparison to the concrete operational period. This is as true for Piaget's original research as it later proved to be for the Piaget-inspired research on role-taking.

Although most of the early evidence (Piaget, 1926, 1928, 1929) that Piaget collected to describe pre-operational egocentrism is contained in the clinical dialogues he conducted with preschoolers, his later developed so-called Three Mountains task (Piaget & Inhelder, 1956) became well-known as a perceptually-based measure of such young children's egocentric thoughts. Functioning as a jumping-off place for empirical work on role-taking this measure initially came to mark the supposed transition between the inabilities of preschoolers and the abilities of school-aged children to take another person's point of view. Piaget and Inhelder (1956) as well as subsequent investigators (Flavell, Botkin, Fry, Wright, & Jarvis, 1968; Laurendeau & Pinard, 1970) had found that children at the pre-operational stage of development were generally unable to determine how another observer stationed at a different location than their own would view the array of mountains displayed in front

of them. In the early days of this research tradition six- and seven-year-old subjects typically responded egocentrically, by attributing their own view to the other observer. As research using this procedure progressed, however, task simplifications were introduced (e.g., Fishbein, Lewis, Keiffer, 1972; Masangkay, McCluskey, McIntyre, Sims-Knight, Vaughn, & Flavell, 1974) with the consequence that younger and younger children appeared no longer to be egocentric. Utilizing a modified version of the Three Mountains task, Flavell, Shipstead, and Croft (1978) found, for example, that preschoolers could accurately infer visual perspectives different from their own. These studies came to form the core of the research on spatial or visual role-taking (for reviews see Flavell, 1978; or Lempers, Flavell, & Flavell, 1977). Such efforts to distinguish visual perspective-taking from studies of conceptual and affective perspective-taking abilities helped to impose some order upon the otherwise contradictory role-taking literature. In addition to the finding that children were able to accurately assess another's visual percept much earlier than Piaget and Inhelder's original work had suggested, Flavell and his colleagues (Flavell, 1978; Lempers, Flavell, & Flavell, 1977) also demonstrated that two developmentally distinct types of knowledge about visual perception could be identified: knowledge <u>that</u> another person does or does not see something (Level I), and the more conceptually complex knowledge of <u>how</u> another person perceives something (Level II).

Although there is some threat that such a distinction between perceptual and conceptual role-taking could serve to reintroduce the old perception-cognition dichotomy into the role-taking literature (Chandler & Boyes, 1982), the partition of the field into perceptual and conceptual (and sometimes also affective) domains has generally been maintained throughout the literature. According to this division into sub-areas the term "conceptual role-taking" came to be used as a way of describing the ability to differentiate what others <u>think</u> or <u>know</u> from one's own knowledge or thought (for review see Chandler & Boyes, 1982; Higgins, 1981; Shantz, 1983). Analogously, "affective role-

taking" came to refer to the ability of children to infer what others feel, particularly in circumstances where such feelings differed from children's own (e.g., Borke, 1971; Rothenberg, 1970).

In contrast to the various investigations of perceptual role-taking, the numerous studies on conceptual role-taking could never be integrated effectively to form a coherent set of findings. A larger number of these studies—especially those conducted early in the course of these research undertakings—indicated that, well into their middle childhood years, children often continued to fail at tasks requiring that they take conceptual perspectives different from their own (Chandler, 1973; Chandler & Greenspan, 1972; Chandler & Helm, 1984; Feffer & Gourevitch, 1960; Flavell, Botkin, Fry, Wright & Jarvis, 1968; Selman, 1971; Miller, Kessell & Flavell, 1970). Several other studies reported contradictory results, however, suggesting that even preschool-aged children could accurately identify thoughts and feelings different from their own (e.g., DeVries, 1970; Glucksberg & Krauss, 1967; Maratsos, 1973; Mossler, Marvin & Greenberg, 1976).

Comparative studies especially designed to explore the congruence of various role-taking measures served to further demonstrate the inconsistent and inconclusive findings described above (e.g., Kurdek & Rodgon, 1975; Rubin, 1973; 1978; Sullivan & Hunt, 1967; Zahn-Waxler, Radke-Yarrow, & Brady-Smith, 1977; but see Cowan, 1966, for exception). The general conclusion of these comparative studies was that the concepts of egocentrism or role-taking do not form a single coherent or unitary factor.

In addition to the theory-based issues already discussed a number of other factors have been identified as possible sources of the contradictory findings characteristic of the role-taking literature. Some of these explanatory efforts have been built on the assumption that the lack of coherence evident in the research literature is traceable to the disparate ways in which the concept of egocentrism was understood and operationalized. Central among these is the claim by Chandler and Boyes (1982) that egocentrism

was treated as a "raw, atheoretical fact." In their analysis of the role-taking literature these authors showed that the notion of egocentrism became abstracted from its place within theories such as that of Piaget. Shantz (1983) argued a similar point, claiming that the concept of egocentrism was often treated as a monolith, and incorrectly equated with lack of role-taking. As Shantz pointed out, not all incorrect judgments necessarily indicate egocentric functioning, and similarly, not all correct social judgments indicate non-egocentric functioning. On this basis she argued that non-egocentrism is not the same thing as role-taking, as has been assumed in the literature. While non-egocentrism is necessary for role-taking, role-taking involves a lot more than non-egocentrism. There are many social processes that can influence correct as well as incorrect social judgments, and the generalized notion of role-taking serves only as a conglomerate term with which to cover certain of those skills (see also Higgins, 1981, for discussion of role-taking processes).

Because role-taking measures often involved not only the ability to overcome egocentric functioning, but also other social inferential skills, a number of methodological problems arose (e.g., differences concerning the choice of response criteria, and the structure as well as content of measurement tasks) that all but guaranteed incommensurate findings. Studies especially designed to correlate different measures of role-taking repeatedly reported non-significant or low correlations (e.g., Rubin, 1973, 1978). In view of the argument made by Chandler and Boyes (1982) suggesting that there were no theoretical grounds upon which to expect such a unitary factor, the low correlations observed between many of these measures were not surprising. These low correlations then went a long way toward undermining the enthusiasm of investigators for their social-cognitive research enterprise. A widely-shared conclusion adopted by many working in this field was that their studies had provided evidence for the existence of some still more basic capacity underlying the early role-taking abilities of pre-operational children (e.g., Higgins, 1981; Turiel, 1983).

How the study of theories of mind distinguishes itself from earlier research investigating role-taking abilities

Although contemporary research on children's theories of mind was prompted by the findings from many different research areas, it is still the case that this new field is most closely related to the earlier work on role-taking, and that theory of mind research essentially begins where the role-taking literature left off: That is, current theory of mind research can be conceptualized as an inquiry into the basic capacity of knowledge about mind that mediates the expression of other skills such as the understanding of true and false beliefs, and the maintenance of distinctions such as real-mental, real-pretend, real-apparent, saying-meaning, and seeing-knowing (Flavell, 1988). Of these, the understanding of false belief has been regarded as the best single criterion for a working theory of mind (e.g., Chandler, Fritz, & Hala, 1989; Hala, Chandler, & Fritz, 1991).

Having proceeded from the assumption that knowledge of intentional states is the basic capacity that enables a person to metarepresent or understand recursions, recent research on theories of mind has focussed upon the ways in which this understanding is most reliably accessed (e.g., understanding of false belief). The older role-taking literature, by contrast, largely overlooked the special role of intentional states, and focussed instead upon the multi-dimensional ability to behave non-egocentrically in a variety of circumstances requiring social inferences. For example, in a classic study by Miller, Kessel and Flavell (1970), children's conceptual role-taking abilities were investigated by presenting elementary school-aged subjects with a stimulus drawing depicting a boy and his thoughts, using a series of embedded "think bubbles": (a) the boy thinking about another person(s) ("contiguity"), (b) the boy thinking about another person talking ("action"), (c) the boy thinking about a boy thinking about a boy ("one-loop recursion"), and (d) the boy thinking about a girl thinking about a man thinking about a woman ("two-loop recursion"). According to these authors, success on only

the latter two steps in this nested hierarchy required true metarepresentation or recursive thought. This ability was found not yet to be fully present in the oldest sixth-grade participants. Based on current research on theories of mind, however, the first two of these items, referred to by the authors as "contiguity" and "action" items, have been recognized to involve an understanding of beliefs as beliefs, an ability now generally believed to be well in place by four years of age.

As the foregoing pages were intended to have demonstrated, the central difference between the older role-taking literature, and its focus upon the generalized ability to function non-egocentrically in varied social circumstances, and the more contemporary theory of mind research is found in the assumption of the latter that the basic ability to recognize desires and beliefs about beliefs constitutes the raw materials out of which a real if fledgling theory of mind develops. Other such differences concern the multidimensionality of the construct of role-taking, in comparison to the unitary nature of a first theory of mind and the resultant differences in terms of the clarity of findings in each literature. Although researchers studying first theories of mind are currently occupied with several unresolved issues, a major one being the interpretation of differences in the mental state understanding between three- and four-year-old preschoolers, the field in general has significantly contributed to existing knowledge of young children's awareness of the mind in novel and important ways. In contrast, the research on role-taking, at least for the time being, produced a largely incoherent assemblage of findings that only became partially interpretable when it was broken down into different content areas (i.e., cognitive, perceptual and affective role-taking) or at the level of analyses by task-as-unit.

Despite the eventual confusion into which it fell, the earlier role-taking literature still served the useful purpose of setting the stage for a new research undertaking concerning the preschool years. By showing that such young children did not always attribute their own knowledge and feelings to others

this work has enabled more recent investigations of children's theories of mind to shift focus to the pre-operational period of development, and to demonstrate that such children can take account of others' internal states at much younger ages than had been assumed previously.

In addition to this general conclusion, it has also proven to be the case that the details of the methods, procedure and findings of the perceptual role-taking studies have been especially valuable to the research on first theories of mind. The Level I/Level II distinction introduced by Flavell and his colleagues (e.g., Flavell, 1978) has been further substantiated by research on theories of mind in the realm of children's ability to distinguish appearance from reality (Flavell, 1988; Flavell, Flavell, & Green, 1983; 1987). Furthermore, the recognition of the important role that the perceptual representation of stimulus events plays for very young subjects has been an important contribution to current accounts of early theories of mind and has most recently become a topic of special investigation as discussed in this dissertation. The present studies on the role of perceptual saliency in young children's ability to accurately infer the false belief of another person are an example of such research. The findings of the present studies on the role of perceptual saliency not only support Flavell's distinction between Level I and Level II perspective-taking abilities in the realm of knowledge about beliefs but also highlight the perceptually-based nature of this distinction.

In order to best explicate the methods and findings of these studies, it will prove useful to begin by first reviewing the research literature relevant to the standard false-belief error, before going on to discuss in greater detail why and how event saliency might exercise more constraint upon 3-year-olds' than 4- or 5-year-olds' understanding of false beliefs. The following chapter takes these issues up in turn.

Early theories of mind and the standard false-belief error

As alluded to in the introduction to this dissertation, a major difficulty faced by anyone attempting to understand what very young children know about other minds lies in the challenge of coming to terms with the contradictions suggested by the available data. On the one hand 3-year-old children demonstrate remarkable knowledge about others' mental states as assessed on a variety of measures. On the other hand they regularly fail certain so-called standard tests of false-belief understanding by committing what is commonly referred to as a "reality" error. Evidence in favour of the claim that children younger than four already have at least some understanding of other minds comes from many quarters (see Wellman, 1990, for a recent review). For example, by three years of age most young persons correctly employ mental state terms in their everyday speech (Bartsch & Wellman, 1990; Shatz, Wellman, & Silber, 1983; Woolley & Wellman, 1990), actively participate with others in a world of pretense (Bretherton & Beeghley, 1982; Leslie, 1987, 1988), and manifest a basic knowledge of the distinction between mental states and reality (Flavell, Flavell, & Green, 1987; Harris, Brown, Marriot, Whithall, & Harmer, in press; Wellman & Estes, 1986; Woolley & Wellman, 1990). Furthermore, recent findings by Moses (1990) provide clear evidence that 3-year-olds already have a good grasp of some of the fundamental aspects of the concept of intention (see also Shultz & Wells, 1985; Shultz, Wells & Sarda, 1980). At least a clear majority of 3-year-olds in Moses' studies knew about the role of intention in goal-directed behaviours and showed some understanding that unfulfilled intentions are typically accompanied by false beliefs about the intended action. In still another domain of mental state understanding, two separate series of studies (Bartsch & Wellman, 1989; Wellman, & Bartsch, 1988) provide further evidence that 3-year-olds have a working knowledge of belief ascription.

The children in these studies were quite capable of explaining the actions of a protagonist by invoking both true (Wellman & Bartsch, 1988) and false beliefs (Bartsch & Wellman, 1989), although other investigators have reported contradictory results (e.g., Moses & Flavell, 1990; Wimmer & Hartl, 1989).

The findings summarized above provide considerable evidence for at least a beginning understanding of mental life in young preschoolers. This conclusion would certainly receive the whole-hearted endorsement of many parents and other adults who work with children. Everyday observations of 3-year-olds, who appear to regularly "trade meanings" with us, leave most lay onlookers with little doubt that these children are in some way aware of the mental lives of those around them. Unfortunately the richness of the real-life data provided by such young persons is particularly difficult to capture in our usual scientific reports (however, see Dunn, 1988).

Despite all the foregoing evidence of their growing awareness of mental states, however, 3-year-olds seem fickle at best when it comes to passing experimental procedures meant to assess their ability to attribute false beliefs to others. When their understanding of false beliefs has been put to direct experimental test, a few investigators recently have reported that 3-year-olds typically perform well, but most others have shown them to fail. On the one hand, 2- to 3-year-old children have consistently and reliably committed errors on certain by now traditional tests of false-belief understanding (Flavell, Flavell, & Green, 1983; Gopnik & Astington, 1988; Hogrefe, Wimmer, & Perner, 1986; Perner, Leekam, & Wimmer, 1986; Wimmer & Perner, 1983). On the other hand, young children of the same age also have succeeded on several recently designed, alternate measures of false-belief understanding (Chandler, Fritz, & Hala, 1989; Freeman, Lewis & Doherty, in press; Hala, 1991; Hala, Chandler, & Fritz, 1991; Lewis & Osborne, 1990; Mitchell & Lacohee, in press; Wellman & Bartsch, 1988; Zaitchik, 1991).

Not surprisingly, researchers have differed with respect to their interpretations of these contradictory findings. Although most agree that a working

theory of mind does not develop in an all-or-none fashion, the positions so far adopted nevertheless have polarized researchers into oppositional groups that we have previously characterized as "boosters" and "scoffers" (Chandler et al., 1989). Those in the latter or "scoffer" group remain convinced that 3-year-olds lack the metarepresentational understanding required for a theory of mind (e.g., Gopnik & Astington, 1987; Hogrefe, Wimmer & Perner, 1986; Perner, 1991; Perner, Leekam, & Wimmer, 1987; Sodian, Taylor, Harris, & Perner, 1991). Such investigators routinely base their more withholding views on reductionist readings of young children's apparent successes on certain recent candidate measures of false-belief understanding. They claim that 3-year-olds, as compared to their 4- to 5-year-old peers, exhibit a so-called "conceptual deficit" (Perner et al., 1987), assumed to wholly block any capacity for metarepresentational understanding. In opposition to this claim, representatives of the first or "booster" group hold the contrary view that 3-year-olds do in fact already subscribe to real if fledgling theories of mind, while still allowing for the fact that first approximations to such a theory are not yet robust and therefore are prone to error-producing interferences of various kind (e.g., Bretherton & Beeghley, 1982; Leslie, 1987; Lewis & Osborne, 1990; Siegal & Beattie, 1991; Wellman, in press; Wellman & Bartsch, 1988; Wolley & Wellman, 1990).

To restate briefly, researchers on either side of this debate face important responsibilities. Those insisting that 3-year-olds do not yet know what it means to hold false beliefs are confronted increasingly with new evidence that speaks against their claim and so must again and again find procedural grounds upon which to discount or reductively interpret such data. Those who argue the opposite conclusion are backed by some promising new findings, but face the challenges of explaining why 3-year-olds consistently and reliably commit errors on more traditional measures of false-belief understanding. The role of the present program of research was to help answer questions of this second sort by studying the effects of event saliency on young

children's developing capacity to recognize the possibility of false beliefs.

Event saliency as a potential cause of the standard false-belief error

An obvious first step toward coming to some better understanding of why 3-year-olds fail some tests of false-belief understanding while passing others is to attempt a careful accounting of exactly what sort of error such children actually do make on the former type of tasks.

The "Unexpected Change Task." In what has been the most widely used measure of false-belief understanding, the so-called Unexpected Change Task originally designed by Wimmer & Perner (1983), children witness a puppet show in which "Maxi" and his "Mother" are shown to place a chocolate bar into one of two available kitchen cabinets. Maxi then leaves the room and in his absence his Mother moves the chocolate bar into the other cabinet. Children then are asked to predict where Maxi, who now should hold a false belief about the true location of the candy, will think the chocolate is (or, alternatively, will look for the chocolate). Three-year-old, but not 4-year-old children typically fail these test questions by making the so-called "reality" error of pointing to where the chocolate really is rather than where Maxi has a right to mistakenly suppose it to be.

The "Unexpected Contents Task." Another equally strong demonstration of this kind of reality error is provided by children's behaviour on a second, also frequently employed, measure of false-belief understanding, the so-called Unexpected Contents Task (also sometimes referred to as the "Representational Change Task" or the "Smarties Task") (Gopnik & Astington, 1988; Perner, Leekam & Wimmer, 1987). In this task children are shown a familiar box of candy ("Smarties"), the original contents of which previously have been removed and replaced by new, unexpected contents (e.g., pencils). Children are asked to state what they think is inside the box, to which they routinely respond by appropriately naming the candy. Next, children are asked to open the box and take a look at what is inside. Upon discovering

the unexpected contents they are asked to state what they or another person had first thought was in the box, before it was opened. Once again answering in ways that are consistent with current objective reality, rather than their own prior beliefs, against all reason most 3- but not 4-year-old children so far tested wrongly state that they or others had originally thought that the box actually contained pencils or whatever other improbable items had been unexpectedly substituted for the original contents.

Stated more generally, in experimental cases like those described above, 3-year-olds typically fail to ascribe false beliefs to either themselves or another target person, by mistakenly insisting that such beliefs are always congruent with objective reality. This kind of error bears certain of the characteristics of what Piaget originally called errors of "realism," in that in such cases children demonstrate what Piaget (1929, 1930) described as the inability to distinguish the "sign" from the "signified," the internal from the external, or the thought from its object. If such a systematic logical confusion should indeed underlie 3-year-olds' mental state reasoning, then they necessarily ought to be incapable of recognizing the possibility of false belief, and the above errors may be seen as speaking to this fact.

In summary, those researchers of children's first theories of mind who have concluded that 3-year-olds lack any real metarepresentational understanding have interpreted the so-called "false-belief error" evident in standard Unexpected Change and Unexpected Contents measures as providing unambiguous evidence for such young children's failure to appreciate that individual minds play any kind of active role in the knowing process. Such conclusions have received support from the facts that such error patterns by now (a) have been replicated in a very large number of studies (e.g., Gopnik & Astington, 1987; Leekam, Wimmer & Perner, 1987); and (b) have been observed in tightly controlled experimental contexts that have typically included elaborate control procedures meant to make it improbable that errors on these procedures are artifacts of usual task demands such as semantic

complexity, memory overload, fatigue or failure to understand experimenter expectations.[3]

Despite the apparent care that has been taken to rule out possible measurement artifacts, proponents of the "scoffers'" view must, if they are to be convincing, win the following difficult argument. As champions of the claim for some previously unmarked watershed between the third and fourth year of cognitive development, they also inherit the unenviable task of showing that every piece of evidence that seems to suggest that 3-year-olds do already possess some rudimentary grasp of the possibility of false belief can be discounted as misleading or open to more reductive explanations.

As a "booster," more persuaded by children's successes than their failures, I am more inclined to trust the growing number of good performances of 3-year-olds on modified false-belief measures. The onus upon me and other advocates of an early-onset view is to search further for possible explanations as to why most standard measures of false-belief understanding may wrongly work against the ability of such young persons to display their already available grasp of the possibility of false belief. In doing so, I mean to put forward the broad possibility that certain general features of standard false-belief tasks may inadvertently introduce obstacles to the efforts of such young children to express their knowledge that others actually do harbour and act upon beliefs that are "objectively" false. With this prospect, which has guided not only my own research, but that of several other investigators (e.g., Freeman, Lewis & Doherty, in press; Hala, 1991; Lewis & Osborne, 1990; Mitchell & Lacohee, in press; Siegal & Beattie, 1991; Woolley & Wellman, 1990), the study sequence described below was set out in an effort to reexamine the "false-belief error" that has served as the principal point of argument for the so-called scoffers' view. More specifically, the aim of this undertaking was to determine whether one could explain such standard false-belief errors as something other than the expression of a necessarily realist world view. This was attempted by examining the question of whether

the special saliency of certain features of the testing situations commonly employed in these standard measures somehow acted to distract children in their efforts to reason about mental states.

The general hypothesis that some form of event saliency might be masking children's earliest abilities to form beliefs about the beliefs of others was prompted by the observation that, in their performance on standard false-belief measures such as Wimmer and Perner's Unexpected Change Task, 2 1/2- and 3-year-old children show a special preoccupation with whatever is presented to them last (e.g., the most recent hiding place of the chocolate). In light of this fact it could be reasoned that the stimulus events most recently presented are so salient to young children that previous representations of the stimulus events, which are no longer physically available (e.g., the former, now empty hiding place of the chocolate), are simply not considered.

Historically, the tendency for subjects to assign disproportionately more weight to prominent parts of a stimulus or informational display has been referred to as a "salience bias" in cognitive psychology. The effects of salience biases have been the subject of numerous studies in adult cognition (Kahneman, Slovic, & Tversky, 1982) with particular focus on the effects of reality biases upon cognitive processes such as decision making (e.g., Margolis, 1987), probabilistic reasoning (e.g., Kahneman & Tversky, 1972), and deductive reasoning (e.g., Braine, 1978). The phenomenon of salience bias has also been studied in the realm of social attribution where it has been identified as one potential triggering process for the employment of the so-called "availability heuristic" (Tversky & Kahneman, 1973), namely the tendency to determine the likelihood of an event by the ease with which instances or associations come to mind. Thus, objectively rare events may be judged as quite common if appropriate examples of the event can be readily brought to mind. According to Taylor (1982), in the domain of social perception and interaction, "salience biases refer to the fact that colorful, dynamic, or other distinctive stimuli disproportionately engage attention and accordingly

disproportionately affect judgments" (p. 192).

Such definitions, though formulated to address a general process observable in adult social cognition, are nevertheless relevant to present purposes. What may be gleaned from them is that in adulthood our cognitive processes are said to be systematically influenced by perceptual matters that are not necessarily tied to our overall levels of logical or epistemic development. That is, as adults, our judgment and decision making is often influenced by reality biases, yet this fact is not understood as indicating that we, like the 3-year-old subjects of standard tests of false-belief understanding, are handicapped by some object-based or "realist" epistemic outlook.

Any attempt to directly apply to the theory of mind literature the potentially instructive conclusions based upon research into the place of saliency biases in adult reasoning is complicated, however, by the fact that all cognitive and perceptual processes appear to be more intertwined during the early stages of development than they are in adulthood (e.g., Odom, 1978). Therefore it is much more difficult to establish separately just how far each of the perceptual, logical and epistemic systems have developed. These complications aside, the fact that salience biases have been observed to influence adult cognition suggests their potential impact upon thought processes at any age of development and certainly contributed to my own motivation to take their existence and effects seriously when investigating the mental state reasoning abilities of three-year-old preschoolers.

Motivated by these concerns, the task taken up in this study sequence was that of analyzing the two most widely employed measures of false-belief understanding discussed above with respect to the prospect that certain of the stimulus events featured in these procedures serve to promote saliency effects that may disrupt the attempts of young subjects to take others' false beliefs into account. Because it is regularly the case that 3-year-olds fail such standard measures of false-belief understanding and 4-year-olds pass them, some further grounds for making predictions about saliency biases specific

to 3-year-olds are necessary. Consequently, before I turn to such an analysis of the specific experimental tasks employed in the present study sequence, I will first draw attention to some observations noted in other studies that are relevant to the prospect that 3-year-olds' attempts to reason about the mental lives of others might be more easily influenced by salient events than those of somewhat older children.

Experimental evidence regarding the role of event saliency upon developing abilities to ascribe mental states

The developmental literature provides ample evidence that emerging competencies are particularly prone to the influence of perceptual salience biases (e.g., Odom, 1978). A familiar example is given in a study conducted by Frank (as cited by Bruner, 1965), in which children's direct visual access to the transfer operations of a standard Piagetian conservation task was manipulated. In this study, 4-year-olds performed remarkably better on standard tests of liquid conservation when, contrary to usual practice, they were unable to observe the experimenter perform the actual pouring of liquids from one container to another. Bruner refers to these findings to stress the point that saliency biases often operate to mask otherwise evident reasoning abilities when assessment tasks are structured in such a way as to draw attention especially to the perceptual effects of reality constraints.

More to the present purposes, certain observations noted in a few recent studies on children's theories of mind offer support to the speculation that the salience of certain physical events may act to interfere with the emerging abilities of 3- to 4-year-old children to interpret the observable behaviour of others as attributable to their private mental states. Furthermore, some of this evidence suggests that the interfering influence of event saliency on such children's understanding of mental life may not be restricted to matters operating in the physical or material world. That is, it looks as though events taking place within the world of pretense or imagination also sometimes

become sufficiently salient that they too can act to override other less salient physical events. These recently reported observations are discussed below with the aim of demonstrating how they were used as raw material out of which to build a testable hypothesis regarding the influence of salience biases on developing theories of mind.

The first of these studies is reported by Zaitchik (1991) who modified Wimmer and Perner's standard Unexpected Change Task using a manipulation originally carried out by Johnson and Maratsos (1977). Replicating these authors' findings, Zaitchik also observed that 3-year-olds' (age range 35–47 months; $\underline{M} = 42$ months) ability correctly to ascribe false beliefs to other persons depended upon how her young subjects had come to know the relevant information. That is, 3-year-old subjects who only heard about an object being displaced from its original location to some new hiding place, were significantly more successful in correctly ascribing false beliefs to story characters who were ignorant of this "unexpected change" than were children who actually watched this same event (72% vs. 44%, respectively). These findings, among the first of their kind, importantly draw attention to the prospect that salient events may distract 3-year-olds to such a degree that their abilities to ascribe mental states to others is masked. Although in explaining her findings, Zaitchik does include some acknowledgment of the role of event saliency on early false-belief understanding, she nevertheless does not consider the possibility that 3-year-olds already have some real understanding of other minds. Instead, she adheres in her paper, as she has elsewhere (D. Zaitchik, personal communication, June 1, 1990), to a "cognitive deficit" view of 3-year-olds' metarepresentational competencies. Although Zaitchik's findings seem to provide important encouragement for the present saliency hypothesis, her own interpretation of these findings surprisingly runs somewhat counter to such a saliency argument. In order to better understand Zaitchik's interpretation, her discussion of her findings is considered in greater detail below.

Briefly, Zaitchik explicitly subscribes to Perner's (1988) so-called one-way correspondence principle, according to which 3-year-olds are considered always to think beliefs correspond to reality. She suggests, however, that an exception needs to be made to this general correspondence rule, especially in cases like her own, in which the pertinent information for belief formation is marked by uncertainty. Accordingly, children's belief ascriptions are assumed by Zaitchik to be determined by the correspondence principle, but only when the truth of information in question is certain, as is said to be the case when they see the object in a particular location. But when children are uncertain of the truth of the information at their disposal, as is said to be the case when they only hear about the location of a hidden object, such uncertainty is said to force them into the position of actually attending to and evaluating the conflicting beliefs about the true location of the object.

Although the claim that verbally communicated information is somehow less certain than visual information may be plausible, this fact, if true, is nevertheless poorly integrated with the general proposition, to which Zaitchik also subscribes, that is, that young children should generally adhere to a correspondence view of beliefs and reality. Such a correspondence principle, it will be recalled, was originally proposed to account for the supposed inability of 3-year-olds to recognize the category of false beliefs. Thus, the very fact that the overwhelming majority of 3-year-olds in the "hear" condition of Zaitchik's study did recognize the false belief of another actor, rules out the possibility that these children could have operated under the principle that beliefs must correspond to reality.

According to Zaitchik, it was the certainty of visually perceived information that acted to constrain the abilities of her 3-year-old subjects to reason about mental states. In her view, the more certain the information seemed to these young children, the more salient it was to them. There is obvious merit to Zaitchik's efforts to specify the conditions generating saliency effects in terms of the measurable factor of certainty of informational content.

Whether it actually was the certainty or uncertainty of informational content that constrained or facilitated 3-year-olds' reasoning about beliefs, however, is not clear for the following two reasons. First, as Zaitchik herself points out, verbally communicated information is not necessarily marked by uncertainty. Were verbal reports really that untrustworthy, then much of the knowledge we rely on daily would have to be treated as hypothetical. Second, there is something potentially circular about Zaitchik's argument. This follows for the reason that the notion of certainty is commonly understood to require an appreciation that one may be mistaken in one's knowledge. In this sense, Zaitchik's suggestion that 3-year-olds first recognized that beliefs based on verbal reports are uncertain, and that this uncertainty then facilitates their abilities to reason about mental states, all seems to require that such children must already have beliefs or at least proto-beliefs about beliefs.

Despite the foregoing disagreements with Zaitchik's interpretation of her own results, in particular her invoking of Perner's correspondence principle of reality-belief relations, along with a special uncertainty-based belief recognition procedure, as an explanation for 3-year-olds' successes on her task, her findings as such effectively demonstrate that young children's abilities to reason about mental states may be powerfully influenced by perceptually salient events. That is, Zaitchik's findings that 3-year-olds succeed in ascribing false beliefs to others when they are told rather than shown the relevant information, helps to demonstrate that 3-year-olds' ability to evidence their own understanding of false beliefs is dramatically influenced by how they perceive the relevant stimulus information.

In addition to Zaitchik, other investigators also have expressed the view that 3-year-olds' ability to attribute to others false beliefs about some fact may depend upon how certain, as opposed to uncertain, such subjects' knowledge about that fact is taken to be. For example, Wellman & Bartsch (1988) designed a task in which subjects were asked to comment upon others' beliefs about the locations of hidden objects, when in fact the presumably hidden

items were actually unavailable altogether or were to be found in more than one location. On these variations of the standard Unexpected Change Task, even 3-year-olds performed well suggesting that they already appreciated that others may act upon beliefs that are either false or at least constitute only partial truths.

Similarly, Flavell, Flavell, Green, & Moses (1990) have suggested that the saliency of the child's own perspective is one possible reason why the 3-year-olds in their study performed much worse on false-belief prediction tasks involving so-called "fact" beliefs than "value" beliefs. These two categories of beliefs differ, according to these authors, in how ascertainable their truth values are, in that fact beliefs presumably make verifiable claims about the external physical world, whereas value beliefs are said to only refer to much less easily documented internal mental states. According to these authors, children may have experienced their own fact beliefs as so salient or certain that these taken for true matters interfered with their ability to attribute the correct false belief to a story protagonist.

In a somewhat different, but no less relevant manner, a recent study by Russell, Mauthner, Sharpe, & Tidswell (1991) also provides support for the idea that salience biases may act to constrain 3-year-olds' false-belief understanding. Russell and his colleagues tested 3-year-olds, 4-year-olds and a group of mixed-aged autistic children for their ability to mislead another person on a hiding task. In contrast to the good performances recently reported by Hala, Chandler, & Fritz (1991; see also Chandler, Fritz, & Hala, 1989) on a differently structured hiding task, the 3-year-old subjects studied by Russell and his colleagues seemed wholly unable to mislead their opponent and instead relentlessly erred by disclosing the real state of affairs to their opponent. The difficulty experienced by these young subjects, these investigators suggest, may have been due to the influential role of event saliency in their particular procedure. In an initial training phase, the 3-year-old subjects of their study were told that a piece of chocolate was always in either

one of two boxes and that, even though they were uninformed as to the true location of the candy, they were to tell an opponent where to search for it. The unspoken rule of the game was that when subjects coincidently pointed to the empty box, they themselves got to keep the chocolate, otherwise their opponent got it. In this way subjects were introduced to the possibility that it was in their best interest to have sent the opponent to the empty box, even though they themselves did not know which box was empty until after the opponent's search.

The actual testing phase of this study consisted of going on with the same task, except that this time the hiding boxes had transparent windows facing the subjects, permitting them a clear view of where the chocolate was located. These investigators found that 3-year-old subjects (range 3 years; 0 months to 3 years; 10 months) generally failed this procedure by operating against their own best interest and sending their opponent to the box that actually contained the chocolate, whereas 4-year-olds were more strategic and generally pointed to what they knew to be the empty box. Furthermore, a substantial proportion of the 3-year-olds not only acted against their own best interest by initially pointing to the box actually containing the candy, but continued to do so throughout as many as twenty trials. This finding marks an especially persistent form of self-defeating behaviour that, surprisingly, was not extinguished despite continuous efforts to encourage subjects to make sure that they, and not their opponent, got the chocolate. According to those investigators, 3-year-olds' inability to mislead others on this task may be attributed to "the tendency of salient knowledge about object locations to overwrite knowledge of epistemic states" (Russell et al., 1991, p. 101). They hypothesized that the salience of physical reality over mental reality acted like an insuppressible impulse in their young subjects.

Still further evidence for the potentially disruptive role of salience biases is provided by a series of studies by DeLoache (in press a,b), originally conducted to investigate young children's understanding of various repre-

sentational media. In these studies DeLoache tested 2 1/2-year-old children in terms of their ability to use different kinds of symbolic representations, specifically (a) scale models, and (b) pictures, as alternative means of guiding their retrieval of a hidden object. In general, she found that 2 1/2-year-olds had no trouble at all retrieving a hidden object when they were shown a picture of the object's hiding location prior to their efforts to search for it. Surprisingly, however, subjects of this same age had an extremely difficult time retrieving the same hidden object when a 3-dimensional scale model rather than a 2-dimensional picture was used to alert them to the actual hiding location. That is, although it was easy for these young children to grasp the relation between a picture and its referent, it was extremely difficult for them to relate the scale model to the larger space it represented. DeLoache suggests that the reason for this initially paradoxical finding is due to the dual role associated with scale models. Three-dimensional scale models, DeLoache argues, are not only about some different and larger space, but are also salient objects in their own right. It is because of this saliency, she reasons, that the scale models used in her research were impossible for 2 1/2-year-old children to suppress, and consequently interfered with their emerging ability to treat such displays as nothing more than representations of a second reality.

More recently still, studies by Woolley (1990) provide further evidence that the effects of salience biases may not be limited to events in the external physical world, but may include internal mental events as well. Her findings, which serve to expand importantly upon more usual speculations regarding the role of salience biases in children's early grasp of mental states, show that by 3 years of age children understand the distinction between reality-based and fictional mental states. Woolley gave such children tasks that required them to contrast the two types of mental states in terms of (a) the role of perception in their origin, and (b) their truth relation to reality. In response to this task 3-year-olds, like older children and adults, were much more likely

to claim that perception is necessary for knowledge than for imagination, and that knowledge represents reality more truthfully than does imagination. In addition to these findings, Woolley reports the interesting observation that, unlike still older persons, 3-year-olds often claimed that imagination reflected reality. This observation supports earlier findings reported by Harris, Brown, Marriot, Whittall, & Harmer (in press) that their 4- to 6-year-old subjects, who otherwise evidenced a firm grasp of the distinction between fantasy and reality, behaved in ways that suggested that they were not always certain that the fantasy creatures they had been told to imagine were not also real. As an interpretation of her own findings Woolley suggests that the reason young children made such a claim is that they experienced the imaginary states as especially salient in her task. According to Woolley, salience of fictional states can influence children's reasoning about mental states in a fashion parallel to that of the salience of reality-based mental states. With this argument she provides not only a plausible explanation for children's fear of monsters and related phenomena but also develops an important extension to the salience hypothesis, stressing the importance of considering the salience of, not only perception, but also other types of mental states as well.

The foregoing review of evidence concerning the role of event saliency in children's early beliefs about mental life can be summarized in terms of the following two conclusions. First, it is evident from the studies cited that especially salient perceptual experience can serve to interfere with young children's abilities to reason about mental states; although most of the evidence available so far speaks to saliency effects of events perceived in the external material world, some recent evidence also shows that salient events experienced internally, through imagining, can also interfere with the ability of young children to reason about mental states. Second, the effects of salience biases on children's understanding of beliefs seem to be especially operative during the period from three to four years of age. It appears to be

the case that 3-year-old children, and presumably still younger children, are very easily distracted by especially salient events, such as those operative within standard measures of false-belief understanding. In short, because cognitive competencies of any kind are typically more sensitive to some kind of error-producing distraction in the early, as opposed to more advanced, stages of their unfolding, the phenomenon of salience bias is assumed here to affect the first and tender expressions of a working theory of mind more than the later and more robust ones.

Potential causes for the perceived saliency in certain standard false-belief measures

The organizing assumption of the present study sequence was that the routine failure of 3-year-olds on standard measures of false-belief understanding is not due, as is widely supposed, to their inability to entertain the possibility of false or counterfactual beliefs, but results instead from the susceptibility of such young persons to perceptual saliency biases inherent in the specific testing procedures typically used. What needs to be made explicit in further developing this argument is what it is exactly about such standard false-belief measures that might lead to the emergence of these hypothesized saliency biases. That is, what specific features contained in the Unexpected Change and Unexpected Contents Tasks might disproportionately engage the attention of our youngest subjects? Based on the preceding discussion it was hypothesized that young children's developing minds are at least as open to the influences of salience biases as are more mature minds, and furthermore that 3-year-olds, because they are only just beginning to reason about their own and others' beliefs, are especially prone to salience biases when initially engaging in thinking about various mental states. In order to identify the specific stimulus conditions hypothesized to be responsible for generating the saliency biases believed to affect 3-year-old subjects, let us turn to the specific procedures employed by the standard Unexpected

Change and Unexpected Contents measures.

These two widely used measures of false-belief understanding, both turn upon the same line of inquiry regarding a target person's once correct, but now mistaken belief. The point at which, in the unfolding of the stimulus narrative of these procedures, the child subject is asked about some target person's or their own earlier beliefs, is also a moment in which he or she is directly confronted with a set of circumstances different from those associated with the beliefs in question. That is, the new and changed circumstances, but not the ones that earlier gave rise to their own or the target character's now mistaken belief, are physically displayed in front of the child. This sort of a contrast between the physical representation of the most recent event, set in contrast to the now absent earlier events of the stimulus narrative is likely to make the currently available events especially salient to the subject. Although this type of a circumstance is certainly not an uncommon one in our daily lives, it was hypothesized to present a particular challenge to young children's fledgling attempts to reason about mental states. It was argued that the contrast between physical availability of some stimulus events over others in the standard procedures is responsible for causing these matters to be especially salient in the minds of 3-year-olds.

The studies detailed below were designed to test this saliency hypothesis in the critical realm of false-belief ascription ability. The specific approach taken in this research was to attempt to minimize or eliminate the effects of event saliency in standard experiments of false-belief understanding by variously reducing the saliency of current stimulus displays relative to those earlier matters that would have shaped the beliefs of the target characters in question. It was reasoned that if 3-year-old children could competently ascribe false beliefs to themselves and others when such effects of event saliency were reduced or eliminated, then the above hypothesis would have been supported.

Study One and Study Two were each modelled after one or the other

of the standard measures of false-belief understanding regularly employed in the literature. The methods and findings of each one of these studies are outlined separately in the sections below.

STUDY ONE

Study One turned upon an effort to reduce the prospects for the operation of saliency bias in what is the first and most widely used standard false-belief measure, Wimmer and Perner's Unexpected Change Procedure. In this standard task, the key test question regarding the story character's false belief is typically put to the subject at a moment in the unfolding of the story sequence when the child is directly confronted with a new and changed physical reality, different from that which originally gave rise to the protagonist Maxi's originally correct and now false belief. More concretely, at the very same moment when the child is asked the critical test question regarding Maxi's now outmoded belief concerning the whereabouts of the chocolate, he or she is simultaneously confronted with the salient fact that the chocolate, which used to be in cabinet A, is now located in cabinet B. The physical reality that cabinet B is in fact the current location of the chocolate, I have argued, serves to make cabinet B more salient than A, at least in the minds of easily impressionable 3-year-olds. Such a saliency bias, it was suggested, typically leads young subjects to commit the now classical reality error of misattributing to Maxi the full knowledge that his chocolate is now in cabinet B.

In attempting to modify the saliency-generating conditions characteristic of the standard Unexpected Change Procedure, the procedures employed in Study One substituted for the real piece of candy a hypothetical or "pretend" chocolate. That is, no real chocolate or chocolate substitute was actually employed in the task and subjects were simply invited to join in with the pretense that the experimenter's empty hand contained a "pretend" bar of chocolate. Having proceeded in this way, it was assumed that the second cabinet B, into which the pretend chocolate was said to have been moved, was no longer accorded any special saliency due to being physically marked as the placeholder of the chocolate. Instead, it was reasoned that, because

the chocolate of one's rememberings and of one's present imaginings are both made of the same mental stuff, both cabinets would be more evenly matched in their saliency due to the fact that both are equally marked as having been designated, through an act of imagining, as the location of the pretend candy.

Like the standard version of the Unexpected Change Task, the present "Pretend Object False-Belief Task" also turns on the recognition of the fact that the unexpected change in the status of cabinet A as placeholder of the chocolate causes Maxi to labour under a false belief. In the original paradigm the contents of Maxi's false belief refer to a set of events relating an actual piece of chocolate to a certain location, but in the present version the contents of Maxi's false belief refer to a set of events relating an imaginary or pretend piece of chocolate to a certain location. Thus, although the nature of the realm in which the stimulus events occur was changed from the material to the mental plane, the present procedure nevertheless faithfully preserves the feature essential to all false-belief measures of having these events change unexpectedly. The likely effect of this manipulation, it was anticipated, would be to reduce the possibility of saliency bias operative within the standard Unexpected Change Task and allow 3-year-olds to better display their previously obscured ability.

Pilot study

In order to establish whether this manipulation would actually serve to mitigate the effects of salience bias in the standard Unexpected Change Task the first undertaking was a pilot study. The procedural details of this initial pilot effort, because they were the same as those later employed in Study One, are more carefully laid out in the description of that larger-scale effort. Essentially, however, this procedure was the same as the standard practices followed by Wimmer and Perner, with the important exception that, to reduce the saliency-eliciting conditions of the standard task, the usual real

chocolate had been replaced by a pretend version of the same thing. For the purposes of the pilot testing, 22 3-year-olds (15 girls, 7 boys) enrolled in local university daycares were divided into two age groups. Because two of these children (1 girl, 1 boy) proved to be non-native English speakers, their responses were excluded, thus leaving the responses from 10 "young" (age range 35–41 months; $\underline{M}$ = 38 months) and 10 "old" (age range 42–49 months; $\underline{M}$ = 45 months) subjects for the analyses. All of these children readily participated in the experimental procedure and correctly answered a set of memory control questions. The apparent ease with which these 3-year-olds accepted the introduction of a hypothetical rather than real chocolate suggested that this novel experimental feature was no less believable from their point of view than the materials of the original Wimmer and Perner procedure upon which it was based.

The results of this pilot study were very encouraging in that, in sharp contrast to the usual finding that most 3-year-olds fail such unexpected change measures, a full 80% of these children responded correctly to the criterial question, "Where will Maxi look for his chocolate?" Although the small sample employed in this pilot study worked against the prospects of actually observing age differences, the young 3-year-olds in this study were found to have performed just as well as their somewhat older peers.

In light of the especially good performance of these 3-year-old pilot subjects (i.e., 80% correct versus 15% to 45% correct reported for standard administrations), and the lack of evident differences between younger and older subjects, it was decided to pursue this experimental manipulation of saliency effects in a larger and better controlled study.

Method

Subjects. The participants of the main study were 54 preschoolers enrolled in university daycares, divided into 27 younger 3-year-olds (19 girls; 8 boys; age range 35–43 months, $\underline{M}$ = 39 months) and 27 older 3-year-olds

(13 girls, 14 boys; age range: 43–49 months; $\underline{M}$ = 45 months). Eight additional young 3-year-olds had to be excluded from the study. Two of these children did not complete the procedure, four failed memory questions, one child's testing session was severely disrupted by a minor crisis in the school, and another child had to be eliminated because of experimenter error during testing.

Materials. Patterned as closely as possible after Wimmer and Perner's standard Unexpected Transfer Task, the Pretend Object False-Belief Task introduced here made use of two conventional (approximate height 33 cm) hand puppets, a hat-stand like arrangement made of stick (21 cm) and a wooden block to serve as a "chair" for one puppet, a dividing wall (88 cm × 36 cm) with a hinged door to separate off an area of the playing surface that served as a kitchen, and two (one red, one blue) wooden cabinets (8 cm × 22 cm × 28 cm) with sliding doors.

Procedure. The Pretend Object False-Belief Task, like the original Unexpected Change Task after which it was modelled, consisted of a puppet show enacted by the experimenter. Like the original, the present procedure began with Maxi and his Mother entering the kitchen upon returning from shopping. Subjects were told that Maxi and his Mother had bought some chocolate which Maxi (who was in fact entirely empty handed) was purportedly holding in his hands, and that it was "pretend chocolate" (i.e., "Maxi is holding the chocolate right here in his hands, it's pretend chocolate"). After this initial mention of the fact that only pretend chocolate was involved (one reference of this fact always proved to be sufficient) the pretend object was referred to simply as "chocolate" from then on. The procedure continued along the basic outline of the standard Unexpected Change Task (for a complete script of the Pretend Object False-Belief Task see Appendix A). In his Mother's presence Maxi placed the pretend chocolate in one (A) of the two cabinets (across subjects, the red and blue cabinets were used alternatingly as cabinet A). Maxi then left the kitchen to sit on his "chair" placed just

outside the entrance way to the kitchen. From his position Maxi watched his Mother's actions in the kitchen. Then Mother temporarily closed the kitchen door. Subjects' attention was drawn to the fact that Maxi could no longer see what his Mother was doing. Once the Mother puppet was out of Maxi's line of sight it was explained that she wanted to bake a cake. In order to do so she was first made to get the chocolate from cabinet A and, after using some of it for the cake, to put the remaining chocolate into cabinet B. At this point three control questions were asked to check whether subjects correctly remembered (a) where the chocolate was before the aforementioned transfer from cabinet A to cabinet B, (b) where the chocolate was at the moment, and, (c) whether Maxi had or had not witnessed his Mother moving the chocolate. After having been told that Maxi was soon to return to the kitchen expecting to get his chocolate, subjects were posed the first of two test questions regarding Maxi's false belief ("Where does Maxi think his chocolate is?" – "Think Question"). Next the kitchen door was opened, Maxi was made to enter the kitchen and subjects were then asked the crucial "Look" false-belief test question ("Where will Maxi look for his chocolate?").

This second or Look Question has been adopted widely as the most straightforward test question of false-belief understanding. To successfully predict where Maxi will look for the chocolate subjects have to make correct inferences regarding Maxi's false belief. The Think Question, on the other hand, initially included by Perner and his colleagues (1987) as a control condition to rule out the possibility that subjects are pragmatically glossing the Look Question to mean "Where should he look for the chocolate?", has been regarded with some unease by many investigators (e.g., Wellman, 1985). The primary concern that has been raised is that, although many young 3-year-olds already employ the verb "to think" (e.g., Shatz, Wellman, & Silber, 1983), it is not yet as common in their speech as is "to look". Despite this fact, Perner and his colleagues (Hogrefe, Wimmer, & Perner, 1986; Perner, Leekam, & Wimmer, 1987) have observed no significant differences between

them. Nevertheless, cautious concerns still exist over the possibility that the Look and the Think Questions may be tapping somewhat different abilities, and, consequently, prudence was seen to favour the inclusion of both test questions. Most recently, however, further evidence regarding the temporally specific character of the Look Question (Freeman, Lewis, & Doherty, in press; Siegal & Beattie, 1991) has further strengthened the case that, at least in the instance of the Unexpected Change paradigm, the Look Question is probably the better choice as a measure of false-belief understanding. Because the issue remains unsettled, and in order not to prematurely exclude any potentially unique information supplied by children's responses to the Think Question, the conservative approach taken in the present study was to include it along with the generally more favoured or criterial Look Question.

Design. The first objective of Study One was to investigate whether the reduction of opportunities for the operation of event saliency accomplished by the use of only a pretend chocolate had the hypothesized effect of allowing the otherwise obscured abilities of 3-year-olds to ascribe false beliefs to others to manifest themselves. Second, in order to explore the possibility that there might be age-associated developmental changes in their understanding of false beliefs during this critical year, participating 3-year-olds also were divided into two age groups of younger and older 3-year-olds.

Between-studies order effects

Because the present study was only the first of two related investigations meant to manipulate the possible effects of saliency biases in the two most commonly employed standard measures of false-belief understanding, it was decided to counterbalance the administration of both experimental procedures. Because a few investigators of children's understanding of mental states have recently found that task order affects particularly young preschoolers (DeLoache, in press; Woolley, 1990), Study One and Study Two, which both involved an age comparison between the successful false-

belief ascriptions of young and old 3-year-olds, were counterbalanced for order effects to form a 2 × 2 (age × task order) between-subjects repeated measures design.

Building acquaintanceships between subjects and experimenters

Prior to administering the first study, the two female experimenters spent at least four mornings playing and interacting with the children as they went about their normal classroom activities. This practice of building up an acquaintanceship between subjects and experimenters was considered particularly important for the experimental testing of young 3-year-olds. Such young children are often anxious about being separated from their peers and required to follow strange adults to a separate area for testing. After four days of "warming up", subjects were generally willing and eager to participate in the studies.

Results

The Pretend Object False-Belief Task had as its purpose the establishment of a method for testing 3-year-olds' knowledge of another's (the protagonist Maxi) false belief under conditions in which possible distractions attributable to especially salient features of the assessment task were kept at a minimum. The false-belief test questions embedded in this experimental procedure were identical to the standard test questions typically employed in earlier applications of the Unexpected Transfer Task. Concretely, children's understanding of others' false beliefs was assessed primarily by asking subjects to predict where Maxi would look for his chocolate (Look Question). The report that follows begins with the results of an analysis meant to test for possible order effects between Study One and Study Two, and then turns directly to an examination of 3-year-olds' answers to the false-belief test questions.

Order effects. For the purpose of examining whether the order of pre-

sentation of these assessment procedures has an effect upon 3-year-olds' performance, the design of the present investigation included a counterbalanced administration of Study One and Study Two. As mentioned above, DeLoache (in press) as well as Woolley (1990) have recently noted such effects. In the present study sequence 13 young and 14 old 3-year-olds participated first in the Pretend Object Task of Study One, and then in the as yet to be described Empty Box Task of Study Two. The remaining 14 young and 13 old 3-year-olds received the tasks in opposite order. It was found that this order reversal of task administration had no significant effect on children's responses to the false-belief test questions. In fact, the percentages of correct responses to the various test questions of both studies were nearly identical for the two task orders. As a consequence the data from both task orders were combined in subsequent analyses.

Control Questions. Three control questions were included in the procedure of Study One to allow a check of whether children had adequately attended to and remembered the facts essential to the false-belief ascription tasks at hand. Results show that children generally performed very well on these control questions, indicating that they had taken in the essential details of the unfolding story problem. Only four children (3 young, 1 old) failed one or more of the three control questions. These subjects were dropped from Study One, leaving 54 participants to be included in the final analyses.

General performance. As a group, these 3-year-old subjects performed remarkably well under the saliency-reduced conditions of the Pretend Object Task. Almost 3/4 (74%) of all 3-year-olds pointed to the correct location when asked to predict where Maxi would look for his chocolate, suggesting that they were able to appreciate that, because the location of the pretend chocolate had been unexpectedly changed in his absence, he would be led into holding a false belief about its location. When this success rate is compared to those typically reported in conjunction with standard administrations of this task it clearly exceeds the standard rates. Table 1 contains

a listing of correct false-belief ascriptions by 3-year-olds as measured by the Look Question in various standard conditions, as well as in the present saliency-reduced condition of the Unexpected Change Task. Although only somewhere between 15% and 45% of 3-year-olds previously

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Insert Table 1 about here

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have been found to succeed under standard versions of the Unexpected Change Task, three out of every four 3-year-olds of this study identified Maxi's false-belief understanding. This is a significant improvement over the 45% of 3-year-olds who correctly identified the protagonist's false belief in the standard condition of our own earlier study ($\chi^2(1) = 4.29$, $\underline{p} < .05$) (e.g., Hala et al., 1991).

Young versus old 3-year-olds. One further aim of the present investigation was to search for possible age-related developmental changes in 3-year-olds' abilities to make correct false-belief ascriptions. Consequently, the 54 subjects of this study were divided into "young" and "old" 3-year-olds. Comparing younger and older 3-year-olds in their responses to the Look Question under saliency-reduced conditions revealed that, although the majority of the younger (59%) as well as the majority of the older 3-year-olds (89%) gave correct responses, older 3-year-olds, who were nearly at ceiling in their correct false-belief ascriptions, were measurably better at this task than young 3-year-olds ($\chi^2(1) = 4.73$, $\underline{p} < .05$). When young and old 3-year-olds' performances were examined separately, both age groups were found still to perform remarkably better than a standard condition comparison sample drawn from the same preschool population in one of our own earlier investigations (Hala, Chandler, & Fritz, 1991). This standard comparison condition was administered by the same experimenters employing materials of the same type as those used in the present investigation. Table 2 displays

the percentages of younger and older 3-year-olds who answered correctly in the standard condition of our previous study,

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Insert Table 2 about here

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the saliency-reduced condition of the pilot study, and the saliency-reduced condition of Study One. For younger 3-year-olds the improvement attained in the saliency-reduced conditions is most impressive. Whereas only 20% passed the task in its standard version, 80% and 59% passed the task in the saliency-reduced version of the pilot study and Study One, respectively. For the older age group, this same improvement is also evident, though the degree of difference for these subjects was not quite as dramatic. Here 70% of older 3-year-olds successfully passed the standard measure in our earlier study which, to date, is actually the best performance reported for standard versions administered to this age group. This is still lower, however, than the 80% and 89% of older 3-year-olds who passed the saliency-reduced versions of the pilot study and Study One, respectively.

Overall, these results suggest that the salience manipulation of the Pretend Object task did importantly facilitate 3-year-olds' ability to make false-belief ascriptions, and it did so particularly for the youngest subjects who, according to most other investigators, regularly fail such unexpected change measures.

Look Question versus Think Question. When children's responses to the Look Question were compared to the supplementary Think Question, an interesting performance difference was observed. Compared to the 74% of 3-year-olds (59% young, 89% old) who correctly inferred Maxi's false belief when asked to predict where he would look for his chocolate, a somewhat smaller majority of 57% (33% young, 81% old) was also able to do so when asked instead to predict where Maxi would think his chocolate was located.

A within-subjects comparison revealed that nine subjects passed the Look Question and failed the Think Question, but no one showed the reverse pattern, a difference which was found to be significant using McNemar's binomial test of sample proportions ($\underline{p} < .005$). Further analyses demonstrated that it was younger but not older 3-year-olds who found the Think Question significantly harder. Of the younger 3-year-olds, seven subjects passed the Look Question, but not the Think Question and none of them showed the reverse pattern. Testing these proportions specific to the younger age group with McNemar's binomial test again showed a significant difference ($\underline{p} < .02$).

STUDY TWO

After the Unexpected Change Task, the so-called Unexpected Contents Task (also sometimes referred to as the "Representational Change Task" or the "Smarties Task") first introduced by Hogrefe, Wimmer, & Perner (1986; but see also Gopnik & Astington, 1987; Perner, Leekam, & Wimmer, 1987) is the most widely used additional measure of children's false-belief understanding. Like the former, this latter measure also typically has shown 3-year-olds to fail on the crucial test questions asked to assess their understanding of the possibility of false belief. For reasons similar to those already detailed in Study One, it was supposed here that the usual failures of 3-year-olds on this measurement procedure were also traceable to the disruptive effects of certain especially salient features of the methods and materials employed. Consequently, Study Two was designed to test the efficacy of procedural changes meant to minimize the saliency-promoting features of Gopnik and Astington's standard version of the Unexpected Contents Task.

In the standard procedure, children are shown a familiar Smarties box and asked what they think is in it. Subjects are then made to discover that the box contains different and unexpected contents, for example, pencils. Following the discovery of these unexpected contents, the box is closed up again with the pencils kept inside. Subjects are then posed the false-belief test question ("Other Question") in which they are asked what another person, who has never seen inside the box, would believe its contents to be. Some variants of this procedure have, as an additional measure of false-belief understanding, included children's ability to comment on, not only others', but also their own earlier beliefs about the contents of the box, prior to its being opened and having its unexpected contents revealed ("Own Question"). The typical error made by most 3-year-olds assessed by this task has been to insist, in response to the false-belief test question, that they or others already knew that the box contained pencils.

In a manner analogous to the standard Unexpected Change Task of Study One, the experimental procedures employed in this standard Unexpected Contents Task also appear to structure events in such a way that special salience is lent to those features of the stimulus display, which, if mentioned in response to the key false belief questions, will result in so-called reality errors. In this case there are in fact pencils inappropriately stored in a Smarties box and this present reality holds the potential of paling into insignificance the earlier and now unwarranted belief that Smarties were to be found there.

The method introduced in an effort to minimize this saliency bias was to alter the procedure, not by arranging that the box contained some different unexpected contents, but by leaving it empty. This manipulation was intended to leave subjects' original belief that the box contained candies no less false, but without confronting them with the salient experience of having discovered some second attention-grabbing real objects. That is, in the present alternative measurement procedure, the reduction of the disruptive salience effects was meant to be achieved by eliminating the physical objects (pencils in a box) used by others putting nothing whatsoever in their place (no objects in a box).

Studies that have employed the original Smarties Task, and variants thereof, have generally reported success rates of less than 50% for false-belief ascriptions by children younger than four years of age (Gopnik & Astington, 1987; Hogrefe, Wimmer, & Perner, 1986; Moses, 1990; Perner, Leekam, & Wimmer, 1987). The most extensive data set so far collected with this measure of false-belief understanding is provided by Gopnik and Astington, who administered several variants of the Smarties Task to 3-, 4-, and 5-year-olds. Those authors tested children's ability to comment on their <u>own</u> previously held false beliefs as well as on the future false beliefs predicted for <u>other</u> persons. The 3 1/2-year-old subjects in their studies performed between 27% – 47% on the Own Question, as measured by various versions

of the task. On the Other Question, subjects of all age groups combined performed significantly better than on the Own Question, but, nevertheless, 3 1/2-year-olds were still only around 50%.

Studies by other investigators employing standard versions of the Unexpected Contents Task (Hogrefe, Wimmer, & Perner, 1986; Moses, 1990) have reported comparable or still lower performance rates for 3- and 3 1/2-year-old subjects. One exception to the generally poor performance rates observed for 3-year-olds is reported by Perner, Leekam, & Wimmer (1987). These investigators found in one of their studies that 3- to 3 1/2-year-olds performed much better on the Own Question than the Other Question, 75% versus 35%, respectively. Those findings not only contradict Gopnik and Astington's results regarding the Other Question and Own Question, but also diverge considerably from the Own Question performance rates typically observed in other studies. As different from other studies, there also was no improvement with age observed for performances of 3-year-olds and 3 1/2-year-olds. At this stage these contradictory findings need to be treated with caution, in part because the sample size in the Perner et al. study only included eight subjects. In short, then, the norm for 3-year-olds' abilities to correctly ascribe false beliefs to themselves or others on standard versions of the Unexpected Contents Task has been variable, but most typically lies somewhere below 50%.[5]

Method

Subjects. The participants of Study Two were, with minor changes due to attrition, the same children as in Study One. The 55 preschoolers in Study Two were divided into 27 young 3-year-olds (18 girls, 9 boys; age range 35–43 months; $\underline{M}$ = 39 months) and 28 older 3-year-olds (14 girls, 14 boys; age range 43–49 months, $\underline{M}$ = 45 months). An additional four subjects had to be eliminated from the study for various reasons. Two failed the memory questions, one refused participation and another subject's testing session was

severely interrupted by a minor crisis in the classroom.

Materials. This empty box version of the standard Unexpected Contents false-belief task made use of a typical "Smarties" candy box emptied of its contents and a large stuffed cloth doll (95 cm) "Raggedy Andy" to serve in the role of the protagonist to whom children were to ascribe false beliefs.

Procedure. The "Empty Box False-Belief Task," administered by two female experimenters, followed the basic procedure of Gopnik and Astington's Unexpected Contents Task with the exception that, instead of replacing the original Smarties with some unexpected contents such as pencils, subjects were simply presented with an empty box. At the beginning of the procedure, subjects were introduced to Raggedy Andy and were then told that Andy was going to be sent out of the room for a short while, so that Experimenter One could show them something she did not want Andy to see right away. After Experimenter Two had taken Andy out of the room, subjects were then shown the Smarties box and asked what they thought was inside it, to which they essentially all answered, "Smarties," or "Candy." Those children who did not immediately respond to this question were prompted by having their attention drawn to the candies depicted on the outside of the container. Next, subjects were asked to open the box, at which point they discovered that it was empty. Subjects were told to put the lid back on and, following that, were asked about their own previously held false belief ("What did you think was inside this box before you took the top off?"–Own Question). If subjects hesitated to respond, this question was followed by a forced choice for which the order of choices was alternated from one subject to the next ("Did you think there was Smarties in the box or nothing in the box?"). As a control question to assure that subjects were clear about the objective state of affairs they were then asked what was really in the box. Next, children were told that together with the experimenter they would soon show the box to Andy. They were told that Andy had never looked inside this box before, that together they would show the closed box

to him for the very first time, and that they would ask him what he thought was inside it. Children then were posed the second test question regarding Andy's predicted false belief ("What will Andy think is inside the box before he takes the top off?" – Other Question). Again, if subjects had trouble responding to this question, it was followed by a forced-choice format analogous to the one described above for the Own Question (see Appendix B for a more detailed, step by step account of these procedures).

Design. As in Study One, the 3-year-old subjects were divided into younger and older age groups. Subjects' false-belief ascriptions were assessed using two test questions as measures. This resulted in a comparison of younger and older 3-year-olds' successful false-belief ascriptions to themselves as well as another person.

Follow-up condition for the Other Question

An additional experimental condition was also introduced that was designed to follow up on the apparent incongruity between the temporal inferences required to respond to the two original test questions, the Other Question and the Own Question. As commonly administered, those two test questions differ not only in terms of the person about whom they are asked, but in terms of whether they ask about future or past events. That is, the Other Question inquires about a protagonist's predicted future false belief, whereas the Own question asks about subjects' own previous belief. As discussed in an earlier section, Wellman & Bartsch (1988) found a related difference between children's ability to infer false beliefs as parts of efforts to predict as opposed to "postdict" or explain after the fact a protagonist's behaviour. Recall that these authors found that 3-year-olds generally succeeded on so-called false-belief explanation tasks, performing significantly better than on standard false-belief prediction tasks. In a parallel fashion, the Other and Own Questions of the standard Unexpected Contents Task are also divergent in terms of the false-belief prediction versus "postdiction"

requirements they pose to subjects. The Other Question requires subjects to predict a protagonist's future false-belief guided behaviour, whereas the Own Question requires subjects to make reference, in face of the changed circumstances, to their own past and presently false belief. Because these questions parallel what Wellman and Bartsch have described earlier as false-belief prediction and false-belief explanation tasks, it is possible that, for 3-year-olds, they are associated with varying degrees of difficulty that so far have been obscured by the generally low performances on standard measures. To assure that any potential performance differences in the present study between the Own and Other measures of false-belief understanding would not arise because of such obvious procedural incongruities, a follow-up condition was designed that employed a postdiction-based test question regarding another's false beliefs ("Modified Other Question"). That was accomplished by having subjects first witness another person discover that the box was empty before posing to them the crucial false-belief test question concerning the other individual's own prior belief.

To serve as subjects in this follow-up procedure, 18 young (11 girls; 7 boys; age range 35–42 months; $\underline{M}$ = 40 months) and 11 old (5 girls; 6 boys; age range 43–47 months; $\underline{M}$ = months) 3-year-olds were selected, based on availability, from the participants of Study One and Study Two. As different from the original saliency-reduced task the materials used in this follow-up procedure were an empty "Cheerios" box, and instead of "Raggedy Andy," Experimenter Two acted in the role of protagonist. These changes were introduced to minimize the possibility that the participating subjects, who had already taken part in the original Empty Box Task two weeks earlier, would not be reminded of the sequence of events constituting this earlier task. Otherwise the procedure followed the basic outline of the first half of the original Empty Box Task described above, with the exception that Experimenter Two was present at all times. Consequently the procedure consisted of the subject and Experimenter Two's joint discovery that the

Cheerios box unexpectedly turned out to be empty. First the subject, and then Experimenter Two, were asked to comment upon what they believed was in the box, to which they both always replied "Cheerios." Then they were told jointly to open the box and, upon having discovered that it was empty, they were asked to close it again. In a fashion that replicated the usual Own Question in the standard Unexpected Contents Task children were then asked the test question regarding Experimenter Two's previously announced and now false belief ("What did Suzanne think was in the box before you took the top off?") (see Appendix C for the script of this procedure).

Having changed the original Other Question from a prediction into a postdiction task, the present follow-up condition provided the necessary correction to permit a controlled comparison between the alternate Own and Other Questions that have been employed interchangeably as measures with this procedure. This follow-up condition, which was conducted two weeks after completion of all other procedures, was not included in the overall treatment for order effects.

Results

The Empty Box False-Belief Task tested 3-year-olds' understanding of false beliefs by asking such subjects, (a) to comment upon their own false belief (Own Question) and (b) to predict a protagonist's (the puppet figure Raggedy Andy) false belief (Other Question). Finally, in a follow-up condition annexed to Study Two, some ($n = 29$) of the participating children also were administered a third type of false-belief test question (Modified Other Question) that was intended to more closely parallel the Own Question, and assess their ability to comment upon a previously formed false belief. How younger and older 3-year-olds responded to these test questions when the effect of salience distractions was minimized is presented below.

General performance. The responses of subjects to the memory control questions, introduced as a check to assure that the unfolding of the experi-

mental sequence had been followed correctly, showed that children generally understood the task. Only two children (1 young, 1 old) gave incorrect responses on any memory control questions. These children were eliminated, leaving 55 subjects for the final analyses.

The results obtained here with the saliency-reduced versions of the Own Question and the Other Question showed these 3-year-old preschoolers to be remarkably cognizant of internal mental states like beliefs. Performing almost at ceiling on the Own Question, 87% of all 3-year-olds successfully reported upon their own earlier and now false belief. Performance on the Other Question was somewhat lower, with 64% of all children correctly predicting that Andy would falsely believe the box contained candy.

Table 3 provides a listing of performance rates for correct false-belief ascriptions accomplished by 3-year-olds on various standard administrations of the Unexpected Contents Task, as well as on the saliency-reduced version introduced here. Note that the typical rates of 27% to 47% for correct responses to the Own Question and 6% to 50% (both of these figures probably marking extreme values) for the Other Question on standard versions were much improved upon as a consequence of minimizing the constraining effects of event saliency. Such improvement was observed in particular for the Own Question (now 87%), but also for the Other Question (now 64%).

Insert Table 3 about here

Own Question versus Other Question. Interestingly, the salience manipulations of the Empty Box Task seemed to facilitate correct responses to the Own Question and the Other Question in a differential manner. It was much easier for 3-year-olds to state their own previously held and now false belief (Own Question) than it was for them to predict the false belief of the protagonist. Thirteen children passed the Own Question but not the Other

Question, whereas only three children showed the reversed pattern. This difference was significant ($p < .05$) as shown using McNemar's binomial test of sample proportions.

At the early stages of data collection it was considered that the observed performance difference for the Own and Other false-belief test questions might have been due to the difference in the temporal references associated with each of these questions. That is, the Own Question refers backward in time to a previously held false belief, the Other Question refers forward in time to a predicted false belief. The Modified Other Question was intended to remedy this incongruency by asking subjects about someone else's rather than their own previously held false belief.

As predicted, this manipulation led to an increase in the percentages of successful false-belief attributions of both younger and older 3-year-olds. Displayed in Table 4 are the percentages of younger and older 3-year-olds who inferred the correct false belief in response to the three types of false-belief test questions. Correct responses to the Own Question and its analog

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Insert Table 4 about here

Modified Other Question were identical (78%) for young 3-year-olds and nearly identical (96% and 91%, respectively) for old 3-year-olds, and, as reported above, they were significantly higher than those to the Other Question.

Young versus old 3-year-olds. Employing a Fisher's Exact Test showed that there were no significant age-related differences between younger and older 3-year-olds' correct false-belief ascriptions as indicated by any one of the three false-belief test questions employed. Younger as well as older 3-year-olds performed near ceiling on two (Own Question and Modified Other Question) of the three measures of false-belief understanding. Performance

was lower on the third measure (Other Question), yet still a sizeable and comparable majority of younger and older 3-year-olds also passed this test question.

DISCUSSION

Details and implications of the research findings

Overall, the expectations formulated in the introduction to this study sequence were strongly supported. That is, when conditions held to give rise to the operation of saliency biases in standard measures of false-belief understanding were minimized, younger as well as older 3-year-olds were found to demonstrate unambiguous competency in their ability to ascribe false beliefs to themselves and other persons. More specifically, when in the present modified version of the original Unexpected Contents or "Smarties" Task, the standard contents of a familiar box were emptied out, but not replaced, as is usually the case, with some highly anomalous and consequently salient other object, both younger and older 3-year-olds performed near ceiling by consistently appreciating that others would be led to hold false beliefs about the contents of the box. Similarly, in the present version of the familiar Unexpected Change Task, which differed from the standard only in using "pretend" rather than real chocolate, both younger and older 3-year-olds once again outperformed similar-aged subjects in other studies in which saliency effects were not carefully controlled.

This new evidence for an understanding of false beliefs, and consequently a working theory of mind, in 3-year-old children, corroborates similar conclusions drawn from earlier studies by myself and my colleagues (Chandler, Fritz & Hala, 1989; Hala, Chandler & Fritz, 1991), and strongly suggests the conclusion that the poor performances of 3-year-olds reported by other investigators is at least a partial artifact of saliency biases at work in the standard measurement procedures. These findings are further corroborated by the most recent reports of two other independent groups of investigators (Mitchell & Lacohee, in press; Russell & Jarrold, 1991).

Mitchell and Lacohee redesigned the standard Unexpected Contents Task by introducing what they have referred to as a "posting" technique

that served to specially mark subjects' initial belief that the standard stimulus box contained Smarties. These authors argue that young children often base their judgments on currently accessible physical phenomena and that it is necessary to specially mark events if young children are to keep them in mind after the fact. Mitchell and Lacohee's particular way of accomplishing this was to forge a procedural link between their key false belief test question and the corresponding real world event by having subjects "post" or mail out an account of their earlier belief. The consequence of this manipulation was that the majority of 3-year-olds tested demonstrated a working understanding of beliefs. Motivated by similar concerns about the inadvertent saliency effects operative in the other standard measure, the Unexpected Change Task, Russel and Jarrold took steps to redesign this standard procedure in ways that intended to modify the perceptual saliency of the stimulus displays confronting subjects at the time belief judgments were solicited. These investigators accomplished this purpose in two ways. In one of their experimental conditions, the chocolate of the protagonist was made to disappear altogether, after first having been placed in location A. In a second condition the chocolate was broken in half, so that a piece of it ended up in each location. Russel and Jarrold, as well as Mitchell and Lacohee found that 3-year-olds in their respective studies generally succeeded in making false-belief ascriptions.

If any of the findings of the present study sequence were to change in ways that would lead to even stronger support for the hypotheses under study, it would be the responses of the young 3-year-olds on the Pretend Object Task of Study One, where "only" 59% of the young 3-year-olds were able to correctly identify the protagonist's false belief. Although these young subjects were remarkably better at this task than traditionally has been true of 3-year-olds on the standard Unexpected Change Task, they did lag measurably behind the near perfect performance of older 3-year-olds (89%). Because this is perhaps the only minor blotch upon what otherwise appears

to be a near perfect record for these young subjects, the following paragraphs are devoted to showing that there are some obvious procedural reasons for this slightly lower performance.

Soon after having introduced the Unexpected Change Task, Wimmer and Perner (1983) began voicing concerns about various procedural complexities thought to be associated with this task. One expression of this concern was the Unexpected Contents Task introduced by Hogrefe, Wimmer and Perner (1986). According to these authors, the Unexpected Contents Task should be easier than the Unexpected Change Task, for the reason that this second measure was less dependent upon those important, but nevertheless unrelated abilities required to process and remember elaborate narrative materials. To date, no such predicted differences actually have been noted among 3-year-olds, most of whom typically fail both of these procedures. The present administration of the saliency-reduced versions of these tasks however did yield precisely Wimmer and Perner's originally anticipated pattern of findings. That is, while young 3-year-olds did very well overall, they did do better on the saliency-reduced Unexpected Contents Task than they did on the saliency-reduced Unexpected Change Task. On the basis of the above line of reasoning and the present evidence, it may be concluded that the better performance of the present subjects on the saliency-reduced version of the Unexpected Contents Task is traceable to the fact that this measure simply is less dependent upon incidental abilities related to the processing of complex narratives than is the more difficult Unexpected Change Task.

In addition to their less than optimal performance on the criterial false-belief question of the Pretend Object False-Belief Task (i.e., the Look Question), young 3-year-olds also had trouble on the supplementary false-belief test question included on this task (i.e., the Think Question). Here too, the original suspicion that this measure of false belief understanding may present incidental difficulties for young subjects was borne out, adding further support to the argument, that young 3-year-olds performed less well

on the more narratively based and consequently procedurally encumbered Unexpected Change measure.

Again, the best explanation for this result is to be found in the writings of Wimmer and Perner (1983) and other investigators (e.g., Wellman, 1985) who have regularly argued that it may well be more difficult for such young children to formulate the beliefs others hold than to comment upon the belief-based actions of others. On the basis of this shared intuition it seems reasonable to expect that the younger, but not necessarily the older, 3-year-olds in the present Pretend-Object False Belief Task would perform less well on the Think Question. This difference is precisely what was noted in the present results, lending further support to the broadly shared assumption that the Think Question is less appropriate for use with young preschoolers than is the Look Question.

On a slightly different note, one could also argue that the good results arising from the use of the present version of the Unexpected Contents Task represented a more successful attempt to control salience biases than was effected with the Unexpected Change Task. That is, simply emptying out the expected candy of the Smarties box, rather than replacing the Smarties with pencils, as is done in the standard Unexpected Change Task, may have more thoroughly removed any saliency biases than the parallel attempt in Study One to introduce a pretend chocolate bar as a substitute for the real chocolate typically used in the Unexpected Change Task. Although this possibility cannot be ruled out, the central conclusion to be drawn about Study One is that the substitution of a "pretend" for a "real" object did have a measurable effect upon 3-year-olds' abilities to reason about mental life. That is, the most appropriate comparison group for the 59% of young 3-year-olds, who did succeed on the Pretend Object False-Belief Task, is less the likelihood level for random responding, than all those subjects reported by others who consistently fail such Unexpected Change measures. An appropriate comparison group is available from a study carried out my

colleagues and myself in which only 20% of a group of young 3-year-olds passed a standard Unexpected Change Task (e.g., Hala, Chandler, & Fritz, 1991).

If a standard version of the Unexpected Change Task, of the sort described above, also had been administered to the subjects of the present investigation, a direct statistical comparison with the present findings would have been possible. This was not done for two reasons. First, there was no theoretical reason to expect the subjects of the present study sequence to behave any differently on the standard tasks than have similar-aged subjects of those more than a dozen already published studies (for a review of these studies see Perner, 1991; Wellman, 1990). Second, there were good methodological reasons for not wanting to over-burden these same children by administering a third task. Although one could have minimized some of the stress upon the attentional capacities of these young subjects by administering these different procedures on different days, this still would not have eliminated the likely confusion that children would have experienced as a consequence of having been presented with two almost identical versions of the same task.

Because of their general relevance to questions concerning the likely age onset of children's developing theories of mind, the bulk of the findings just discussed may likely be of broad interest. An additional and perhaps more esoteric aspect of these results is likely to have appeal only to those engaged in attempts to measure the more subtle aspects of children's developing knowledge of mental life. This finding concerns the consequence of having manipulated the "tense" of the questions asked about the beliefs of others. Recall that, as part of Study Two, a third false-belief test question was introduced, the so-called Modified Other Question. This question was meant as a "symmetry correction" for the Own and Other Questions in the standard Unexpected Contents Task. It was argued that, because these questions differ in their temporal reference, they might well prove to be of

varying difficulty levels. Other studies in which this possibility might have been evaluated proved to be uninformative simply because most 3-year-olds have failed both of these tasks. In the present Study Two these expectations were exactly borne out. The reduction of saliency biases and consequently better performance accomplished in the present version of the Unexpected Contents Task created the opportunity to monitor any real difference in the difficulty of these two test questions. The actual finding revealed that younger, as well as older, 3-year-olds were less successful in responding to the Other Question than the Own Question. However, on the new Modified Other Question, which inquires about the past beliefs of others, just as the standard Own Question inquires about the subjects' own past beliefs, subjects performed as well as they did on the Own Question which had the same temporal reference. This finding, in revealing a procedural problem which was formerly camouflaged by the equally low success rates typically reported for the Own and Other measures, suggests the following two considerations for future investigations. First, the standard Other Question, which inquires about what someone else will eventually think, is a more demanding way than the Modified Other Question, of asking 3-year-olds' about others' false beliefs, and may therefore not be the best or only way of collecting evidence for false-belief understanding. Second, and relatedly, because of the lack of symmetry between the Own and Other Questions, the Modified Other Question, as introduced in Study Two, constitutes the more appropriate match for the Own Question when true comparisons between children's abilities to ascribe false beliefs to themselves and other persons are of interest.

Having completed the exploration of the details and implications of the saliency findings, the task which remains is that of anticipating and responding to potential criticisms that could be raised about these findings.

Alternative interpretations, limitations and suggestions for future research

Despite the good performance of 3-year-old subjects on the saliency-

reduced measures employed in this study sequence, skeptics still might raise one or more of the following criticisms. Against the findings of the Pretend Object Task employed in Study One such a critic might hold, for example, that false-belief understanding cannot be tested properly using a pretense scenario, because "nothing can really be false in the world of imagination." This claim, it will be argued, may seem to make a certain kind of immediate sense, but upon closer inspection it fails to do so.

There are two matters to draw attention to in response to the potential criticism that false statements are not possible within a world of pretense. Of these, the first and more general concerns the fact that, although any initial premise concerning fictional or pretense matters cannot be assessed in terms of some standard of objective truth or falsity, once "inside" such a fictional mental world, truth conditions certainly do hold. If this were not the case, then any part of our human experience which depends upon the reality of so-called "fictional truths," of the sorts found in the worlds of literature, theater and film, as well as various kind of pretend games, would cease to make the obvious sense that it actually does. This point is well communicated by Bruner in his recent book "Acts of Meaning" (1990), in which he draws attention to how the overall configuration of events that compose a story, that is its plot or "fabula," work to generate an internal environment within which conditions of truth and falsity hold. Although a story may be, and often is, indifferent to extralinguistic reality, it nevertheless requires a structure that is internal to discourse. As Bruner puts it, "the sequence of its [e.g., the story's] sentences, rather than the truth or falsity of any of those sentences, is what determines its overall configuration or plot" (p. 44). DeGelder has taken this point still further by reasoning that false beliefs, and consequently the ability to recognize the possibility of false belief, are actually inherent to any form of authentic dialogue (1987, 1989).

In addition to this more general argument, the potential criticism that falsity does not exist in a world of pretense, also may be addressed in a more

procedural way by drawing attention to the fact that the use of pretend-premises in the measurement of false-belief understanding is by no means limited to the present Pretend Object Task of Study One. Many of the false-belief procedures currently in use actually contain pretend-premises meant to function as integral parts of the story scripts. For example, as part of the unfolding of the procedural narrative of the original version of Wimmer and Perner's Unexpected Change Task, subjects are required to entertain several such pretend-premises. The story begins with the pretend scenario that Maxi and his Mother, who are in fact hand puppets, are described as carrying groceries that do not exist into a kitchen. Later on Mother is said to bake a cake, yet no real cake is present. These examples make clear that the standard Unexpected Change Task, just like the saliency-reduced version of this same task, rests upon certain pretense-based agreements that importantly serve to establish the reality of the protagonists' beliefs.

Despite all of the foregoing, the concern might still be raised though that the pretend-chocolate employed in the saliency-reduced task of Study One, as different from the hypothetical groceries and cake described above, is somehow more vulnerable to the criticism that counterfactual beliefs cannot exist in a fictional realm, because it is directly relevant to Maxi's false belief. Such an argument fails to recognize, however, that the protagonist's belief concerning the whereabouts of his chocolate hinges less upon the "realness" of the chocolate than it does upon the unexpected change of the events which serve to associate the pretend-chocolate with a new and different location. For all the reasons outlined above it is concluded here that the present Pretend Object False-Belief Task is just as legitimate a venue for measuring false-belief understanding as is the standard Unexpected Change procedure.

A related criticism also could be levelled against the Empty Box Task of Study Two. In this case the argument might be made that the present saliency-reduced task is no longer equivalent to the standard Unexpected Contents Task because the novel practice introduced here of having the Smar-

ties box turn out to be empty is somehow substantively different from having it contain some unexpected objects like pencils. That is, it might be argued that subjects' original belief that the box actually contained Smarties, was never really rendered false, in the sense that it actually contained some different set of items, as is the case in the standard version of the task where the Smarties are replaced with pencils or other unexpected contents. Such a line of argument could be brought out as a way of claiming that the Empty Box Task introduced in Study Two is easier than its standard counterpart presumably because it not a true test of false-belief understanding. Ultimately, such a potential line of argument seems untenable for the reason that a subjects' belief that a Smarties box is full, when it is in fact empty, is no less a false belief than is the conviction that it contains candy when, in fact, pencils or some other anomalous objects are inside.

Aside from the procedural criticisms outlined above, other more general criticisms about event saliency and its demonstrated role also might be brought forward. The argument might be made, for example, that the finding that 3-year-olds' minds should be so prone to the influences of saliency biases is simply a direct expression of the realist outlook being attributed to such young children by all those committed to the view that 3-year-olds lack any real theory of mind. By such lights the notion of saliency biases would be seen as simply another name for the errors commonly reported in children's understanding of the possibility of false belief. That is, it could be argued that it is precisely because certain facts have become antiquated by changed circumstances, and are thus appropriately crowded out by some different and more salient immediate reality, that the now false beliefs previously held about them are also rendered less noteworthy, and, consequently, tend to fade quickly from the minds of all those not especially committed to their preservation.

It is certainly the case, as is also suggested by the present experiments, that young children have more trouble disengaging from salient events than

older children or adults. Whether this fact speaks against the overall abilities of such young 3-year-olds to entertain a theory of mind is the critical issue that needs examining.

One reason why it seems problematic to equate susceptibility to saliency bias with not having a theory of mind, or to state that falling victim to such biases is expressive of some general cognitive or epistemic limitation dominating young children's mental lives, is the general prevalence of saliency biases operative across the whole of the human life-span. The evidence reported in studies of those saliency biases said to influence adult cognition (e.g., Kahneman, Slovic, & Tversky, 1982) suggest that saliency biases are frequently operative within our own adult cognitive processes and that we are hardly ever free of their influence. Though the types of saliency biases affecting young children seem to differ somewhat from those influencing adult persons, there is no convincing reason why the erroneous judgments children generate as a consequence of saliency biases should be treated as indicators of some fundamental epistemic deficit, whereas the counterpart errors typically committed by adults generally are not interpreted in this way.

Another reason why it seems very unlikely that the general ability to hold to a theory of mind itself is inextricably tied to or coextensive with being especially susceptible to the effects of event saliency is to be found in the present results. Were young children's susceptibility to salient events the same thing as their general inability to comprehend other minds then the demonstrated competency of the present subjects to make correct false belief ascriptions in the saliency-reduced conditions of these studies would be impossible and the current results difficult to interpret. This is so for the reason that, in the present tasks, 3-year-olds evidenced their understanding of the possibility of false belief under conditions in which the effects of event saliency were better controlled, that is, the ability to appreciate false beliefs and the phenomenon of saliency bias were in fact isolated from one another. Thus to equate 3-year-olds' susceptibility to saliency bias with some general

lack of a theory of mind is basically incompatible with the present saliency findings. Instead, it is much more likely, as has been argued in this thesis, that, at least by three years of age children can entertain false beliefs, but that the ease with which such beliefs are understood or kept in mind is easily influenced by event saliency.

The present series of studies constitutes one of the first systematic attempts to gain experimental control over the hitherto unexplored relationship between event saliency and false-belief understanding. Not only did these studies add further to already existing evidence showing that it is well within the abilities of 3-year-old children to take the mental states of others into account, but they also showed how importantly children's application of such abilities is dependent upon their own state of mind at the time. Although the findings of this study are not meant to suggest that all the difficulties that 3-year-olds have been shown to experience with measures of false-belief understanding reduce to only saliency effects, they do show that when some of the crucial events of standard assesment tasks are portrayed in especially salient ways, then 3-year-olds, who like individuals of any age, easily tend towards preoccupation with especially salient matters, are much less likely to manifest their otherwise apparent understanding of false beliefs. This evidence of the relationship between event saliency and developing theories of mind will hopefully set a precedent for future investigations meant to explore this important and complicated matter. Ultimately a whole series of studies is needed in which children's growing understanding of other minds is investigated in light of the contextual relationship in which the child-as-knower stands relative to the object-to-be-known.

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TABLES

TABLE 1

Percentages of correct false-belief ascriptions by all 3-year-olds in experimental conditions of the Unexpected Change Task

Condition/ *Study*	Age 3–4 yrs.	
	% correct	
Standard/ *Wimmer & Perner (1983)*	15	($N = 10$)
Standard Exp. 1	40	($N = 43$)
Standard Exp. 2/ *Perner, Leekam & Wimmer* (1987)	45	
Standard/ *Hala, Chandler & Fritz* (1991)	45	($N = 20$)
Pretend Object/ *Present Investigation – Study One*	74	($N = 54$)

TABLE 2

Percentages of correct false-belief ascriptions by 3 vs. $3\frac{1}{2}$-year-olds in standard and saliency-reduced conditions of the Unexpected Change Task

Condition/ *Study*	Age Group 3–$3\frac{1}{2}$ yrs.		Age Group $3\frac{1}{2}$–4 yrs.	
	% correct			
Standard/ *Hala, Chandler & Fritz* (1991)	20	($N = 10$)	70	($N = 10$)
Reduced Saliency/ *Pilot, Study One* (1991)	80	($N = 10$)	80	($N = 10$)
Reduced Saliency/ *Pilot, Study One* (1991)	59*	($N = 27$)	89	($N = 27$)

*not different from chance ($p = .10$)[4]

TABLE 3

Percentages of correct false-belief ascriptions by all 3-year-olds in experimental conditions of the Unexpected Contents Task

Condition/ *Study*	Question Type "Own"		"Other"	
	3–4 yrs. % correct			
Standard Study 1	–		6	($N = 18$)
Standard Study 2/ *Hogrefe, Wimmer & Perner* (1986)	–		21	($N = 24$)
Standard Study 1	< 50		50*	($N = 10$)
Standard Study 2/ *Gopnik & Astington* (1987)	27–47		50*	($N = 15$)
Standard/ *Moses* (1990)	–		44	($N = 24$)
Empty Box/ *Present Investigation – Study Two*	87	($N = 46$)	64**	($N = 55$)

* estimated
**not different from chance ($p = .5$)[3]

TABLE 4

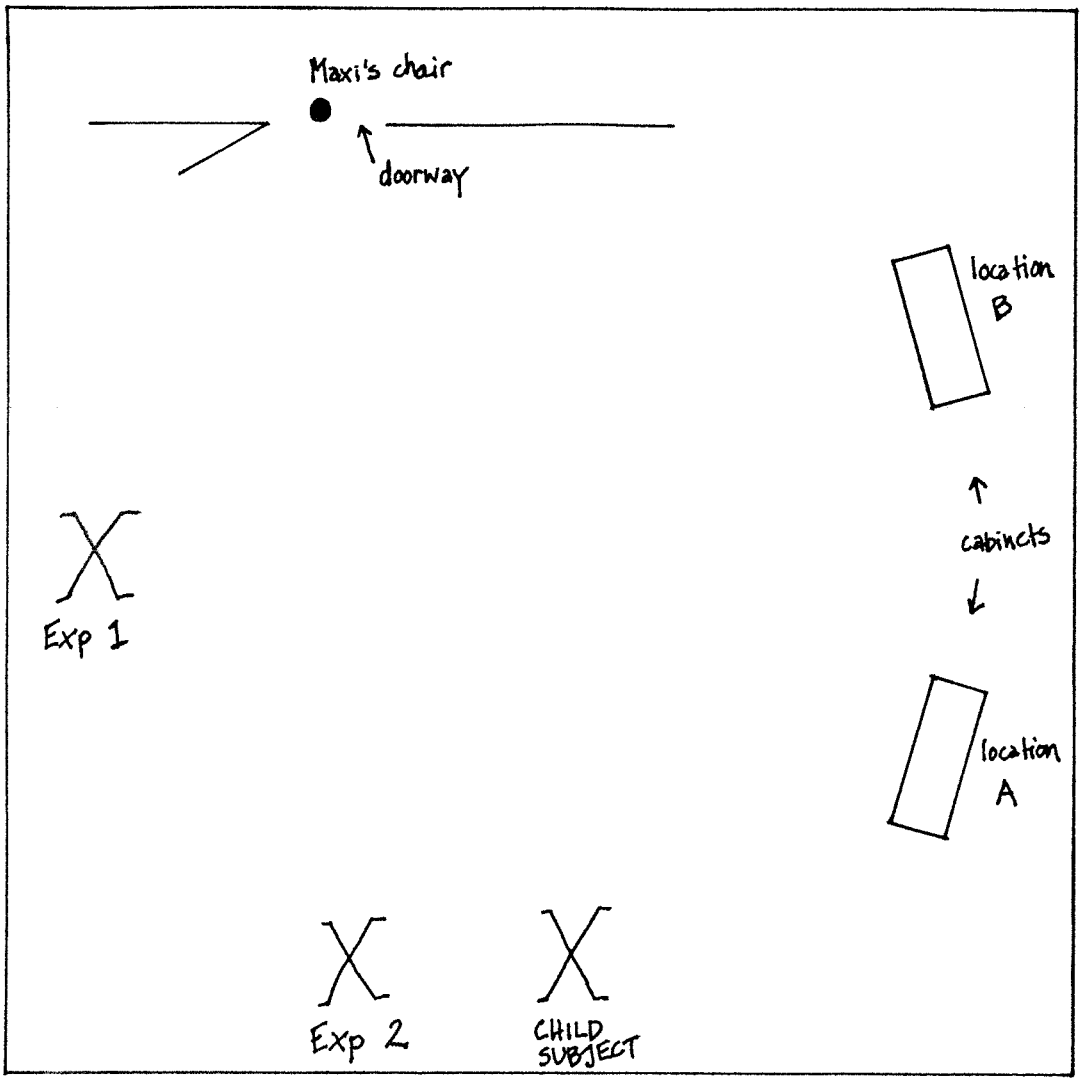
Percentages of correct false-belief ascriptions by 3 vs. $3\frac{1}{2}$-year-olds in response to the test questions in the saliency-reduced conditions of the Unexpected Contents Task

Condition	Age Group			
	3–$3\frac{1}{2}$ yrs.		$3\frac{1}{2}$–4 yrs.	
	% correct			
Own Question	78	($N = 23$)	96	($N = 23$)
Other Question	63	($N = 27$)	64	($N = 28$)
Modified Other Question	78	($N = 18$)	91	($N = 11$)

FIGURES

FIGURE 1

Experimental Setup of Pretend Object False-Belief Task



APPENDICES

APPENDIX A

PROTOCOL FOR PRETEND OBJECT FALSE-BELIEF TASK

Subject is brought into the testing room by Experimenter Two. The "kitchen" materials are set up on an area upon the floor as shown in Figure 1. Experimenter One introduces the child to the two puppets, allows the child to play with them for a moment, and then introduces the procedure:

> *"Now you are going to see a puppet show."*

The puppets are made to walk into the center of the kitchen area.

> *"Maxi and Mother come home from shopping. They have bought some groceries. They are coming into the kitchen with their bags of groceries. They have also bought some chocolate. Look - Maxi is holding the chocolate right here in his hands. Its pretend-chocolate."*

Maxi is made to motion with his hands to mimic his holding the chocolate.

> *"Now Maxi goes to put the chocolate away into the blue cabinet. And then he goes over to his chair by the kitchen door to sit down on the chair."*

Maxi is made to place the chocolate into the blue[1] cabinet in location A, and then to take up his position in doorway.

> *"From his chair Maxi watches Mother do things in the kitchen. Then suddenly Mother goes to close the door because its in her way. Now Maxi can't see anymore what she is doing. Then Mother wants to bake a chocolate cake. So she goes over to the blue cabinet to get the chocolate. She takes it out of the blue cabinet. She uses some for the cake. Then she puts the rest of the chocolate away, but she puts it back into the red cabinet."*

Experimenter One then asks the following memory questions:

[1] Between trials, blue and red cabinets were used alternatingly in location A

Memory Questions

"Where is the chocolate right now? – In the blue or in the red cabinet?"[2]

"Where did Maxi first put the chocolate? - In the blue or in the red cabinet?"

"Did Maxi see that his Mother moved the chocolate from the blue into the red cabinet?"

"And now what's going to happen is that Maxi is going to come back into the kitchen because he wants the chocolate."

Test Question ("Think Question")

"Tell me, where will Maxi think his chocolate is? - In the blue or in the red cabinet?"

Kitchen door is opened. Maxi is made to run into the kitchen.

Test Question ("Look Question")

"Show me, where will Maxi look for the chocolate - in the blue or in the red cabinet?"

[2] Whenever it was necessary to follow-up a question with a forced answer choice the order in which locations A and B were presented as answer choices was alternated between subjects.

APPENDIX B

PROTOCOL FOR EMPTY BOX FALSE-BELIEF TASK

Subject is brought into the testing room by Experimenter Two. The child is introduced to "Raggedy Andy" and is allowed to play with the doll for a few moments. Then Experimenter Two introduces the procedure:

> *"We're going to do something together now. But first I want to show you something that Andy isn't supposed to see right away. So we will send Andy out of the room for a while and then we'll call him back in when we're ready. See you later Andy, – bye."*

Experimenter Two takes Andy out of the room and returns without the doll. Experimenter One continues:

> *"See this box? What do you think is inside this box?"*

Child is shown Smarties[1] box with lid closed. (It is avoided that child holds or touches box so that no clues may be received that the box is in fact empty.) Child presumably states that box contains "Smarties" or "candy." If child says "don't know" or does not answer at all attention is drawn to outside of the container and it is said that it's a Smarties box.

> *"Open it and take a look."*

Child is invited to open the box and discovers that the box is empty. Experimenter One comments with surprise:

> *"Oh, the box is empty. All the Smarties are gone. Somebody must have taken them all. Well, let's close it up again."*

The lid is placed back on and Experimenter One asks the child:

> *Test Question (Own Question)*
>
> *"What did you think was inside this box before you took the top off? – Did you think there was Smarties in the box or nothing in the box?*[2]

---

[1] a familiar candy

[2] Whenever it was necessary to follow-up a question with a forced answer choice the order in which the two answer choices was alternated between subjects.

Memory Question

"And what is really in the box? – Is there really Smarties in the box or nothing in the box?"

"And you know what we're going to do now?

We're going to show this box to Andy.

Now Andy has never looked inside this box before.

We're going to have him come and we're going to show him this box, just like this, all closed up, and we're going to ask him what he thinks is in it, ok?"

Test Question (Other Question)

"But before we do that, you tell me, what will Andy think is inside the box before he takes the top off? – Will he think there is Smarties in the box or nothing in the box?"

Repeat above Memory Question.

APPENDIX C

PROTOCOL FOR EMPTY BOX FALSE-BELIEF TASK (ADJUNCT CONDITION)

Subject is brought into the testing room by Experimenter Two. Then Experimenter One introduces the procedure:

> *"I have something to show to the two of you. See this box? What do you think is inside this box?"*

Experimenter One shows Cheerios box with lid closed. Experimenter Two responds with "Cheerios."

> *"Open it and take a look."*

Child and Experimenter Two open the box to discover that the box is empty. Experimenters both show surprise. Experimenter One comments:

> *"Oh, the box is empty. All the Cheerios are gone. Somebody must have taken them all. Well, let's close it up again."*

The box is closed and Experimenter One asks the child:

> *Test Question (Modified Other Question)*
>
> *"What did Suzanne think was inside this box before you took the top off? – Did she think there was Cheerios in the box or nothing in the box?"*[1]

> *Memory Question*
>
> *"And what is really in the box? – Is there really Cheerios in the box or nothing in the box?"*[2]

---

[1] a familiar breakfast cereal

[2] Whenever it was necessary to follow-up a question with a forced answer choice the order in which the two answer choices was alternated between subjects.

FOOTNOTES

1. It should be noted that our focus upon the abilities of 3-year-olds rather than still younger children stems less from a claim that such younger and largely preverbal children altogether should lack any mental state understanding than it is a necessary feature of the current debate around the question of when already verbal children first demonstrate an understanding of false beliefs. Other researchers, however, have been investigating the possibility of even earlier manifestations of a theory of mind in infancy (see Wellman, in press; for a review of this literature).

2. The notion of constraint is used here and elsewhere in this dissertation in its common or lay meaning. In the developmental literature the term "constraint" has also acquired a more specific meaning, namely that of acting as growth-promoting influence upon the development of abilities. This secondary meaning is not intended in this document.

3. One important exception to this generalization that recently has been noted concerns the role of temporal specificity or its absence in determining solutions to both types of tasks. Siegal and Beattie (1991) as well as Lewis and Osborne (1990) report good performance rates for 3-year-olds in the Unexpected Change and Unexpected Contents Tasks respectively when test questions are corrected to ensure that subjects understand the exact point in time they are expected to comment upon. Other contradictory findings reported by Gopnik and Astington (1987) and more recently by Moses (1990) call the clarity of these results into question. In both of these studies test questions were stated in a temporally specific format without producing positive changes in 3-year-olds' responses.

4. Although these percentages were not observed to differ significantly from chance (using a binomial test of sample proportions) there are reasons to assume that children were not responding in a random fashion to the test

questions. Because random responding has been ruled unlikely in the numerous replications of the standard false-belief findings it has been convention in the literature to chose the typical failure rates of 3-year-olds as the most appropriate comparison for studies employing modifications of these standard procedures. On these grounds it is argued that the 59% of young 3-year-olds who passed Study One as well as the 64% of 3-year-olds who passed Study Two (Other Question) constitute percentages that indicate developmental differences between subjects rather than random responding within subjects.

5. Recently Lewis and Osborne (1990) modified the standard Unexpected Contents Task by employing Gopnik and Astington's (1987) temporally-specified version of the Other and Own false belief test questions and found that 3-year-olds' ability to make correct false belief ascriptions was significantly improved in comparison to their typically poor performances on standard measures. These results contradict Gopnik and Astington's earlier findings that showed no difference between the standard and temporally-specified versions of these test questions. Moses (1990) also found no significant improvement using this same temporally-marked version of the Other Question for a control condition in one of his studies. One possible explanation for Lewis and Osborne's positive, yet unsupported results, may be found in the additional procedural change that these investigators introduced to the standard Unexpected Contents Task. In Lewis and Osborne's study subjects were posed the false belief test question concerning another actor's false belief (i.e., "What will (name of actor) think is in the box before I take the top off?") while the other actor was actually present in the room and was looking at the still closed Smarties box. This arrangement of having the other actor not only physically present in the same room but also directly looking at the Smarties box is different from the standard task and is likely to have facilitated the task of commenting upon the actor's false belief.

Because this additional procedural change was confounded with Lewis and Osborne's intended manipulation, that is the employment of temporally-specified test questions, there is no conclusive evidence to date that such linguistically-marked questions significantly improve young children's performance on standard versions of the standard Unexpected Contents Task.