ON THE DISTINCTION BETWEEN FALSE BELIEF UNDERSTANDING AND THE ACQUISITION OF AN INTERPRETIVE THEORY OF MIND

by

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ABSTRACT

Two groups of 5- to 8-year-olds, and a comparison sample of adults, were examined in an effort to explore the developing relationships between false belief understanding and an awareness of the individualized nature of personal taste, on the one hand, and, on the other, a maturing grasp of the interpretive character of the knowing process. In Study 1, 20 children between 5 and 8, and in Study Two, a group of 15 adults, all behaved in accordance with hypotheses by proving to be indistinguishable in their good grasp of the possibility of false beliefs, and in their common assumption that differences of opinion concerning matters of taste are legitimate expressions of personal preferences. By contrast, only the 7- and 8-year-old children and adults gave evidence of recognizing that ambiguous stimuli allow for warrantable differences of interpretation. Study 3 replicated and extended these findings with a group of 48 5- to 8-year-old subjects, again showing that while 5-year-olds easily pass a standard test of false belief understanding, only children of 7 or 8 ordinarily evidence an appreciation of the interpretative character of the knowing process.
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PREFACE

A few comments are required to explain the organization of this thesis. The main line of argument and presentation of evidence is written in a form that would be suitable for archival treatment in a journal. A thesis, however, should cover a topic in both more depth and more breadth than is permitted by space limitations in a journal. To accomplish this, I have supplemented the main body of the text with additional sections, footnotes and appendices. The main text can stand by itself, but at many points more detail is provided in footnotes, and the first appendix goes into historical and conceptual issues in a broader manner than would be allowed in a standard journal article.
INTRODUCTION

Studies of children's so-called developing "theories of mind" have so far concentrated attention primarily on 3-, 4- and 5-year-olds, focusing almost exclusively on their ability to understand the possibility of false beliefs. One justification for this restricted focus has been the common, but I believe mistaken, assumption that in evidencing a grasp of false beliefs such preschoolers also automatically demonstrate at least a fledgling understanding of the constructive or "interpretive" character of mental life (e.g., Perner, 1991). All such legitimating claims are mistaken, I want to argue, for the reason that standard measures of false belief understanding provide no evidence that is relevant to deciding anything whatsoever about the actual "interpretive" character of knowledge. Rather, as I will seek to show, such "standard" measures of false belief understanding are only about the recognition that people who are more or less poorly informed are entitled to their own more or less ignorant beliefs. That is, tests of false belief understanding simply fail, on close inspection, to concern themselves one way or another with actual matters of interpretation, which are ordinarily understood to turn upon the emerging realization that persons possessing precisely the same information still often come to sharply different views of, or beliefs about, one and the same thing.

If standard tests of false belief do not directly address questions about the interpretive character of knowledge, then all real progress toward some empirical test of this matter must await

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1 Recently, there has been a great deal of interest within developmental psychology in how young children come to understand the talk and action of other people. An especially popular explanation for this developing ability is signaled in the choice of children's "theories of mind" as the name for this new area (e.g., Astington, Harris & Olson, 1988; Butterworth, Harris, Leslie & Wellman, 1991; Frye & Moore, 1991; Whiten, 1991). According to this "theory theory" (Morton, 1980) it is thought that children's ability to understand others is the result of their acquiring a theory-like understanding of their own and other minds—an understanding that they go on to employ in making predictions of human actions and constructing explanations of such actions. A critical moment in the emergence of this so-called "theory theory" occurred in 1983 when Wimmer and Perner published details of a procedure meant to assess an important component of children's theories of mind: the understanding that people may hold to and act upon beliefs that are false. As these authors have convincingly reminded us, the concern with false belief understanding is important because an adequate understanding of belief must include an appreciation that beliefs can be mistaken. Wimmer and Perner also persuasively argued that demonstrated grasp of the possibility of false beliefs is important methodologically for the reason that if children were only asked about their own and others true beliefs then it would not be possible to distinguish between what reality is and is taken to be.
the introduction of assessment procedures that do in fact inquire directly into actual matters of interpretation. Acquiring real knowledge about the respective ages of onset of these conceptually and perhaps developmentally distinct abilities necessarily requires not only results from some standard measure of false belief understanding, but also from some procedurally distinct method of assessing children's appreciation of the fact that one and the same stimulus event can support two or more distinct interpretations. The research to be reported here introduced such measures, and provides a direct test of my own orienting hypothesis that children regularly achieve an understanding of false beliefs several years before they eventually go on to develop a grasp of the more demanding notion of interpretation.

An Approach to the Problem

A subsequent step two in this effort to re-examine and perhaps rewrite the received history of children's emerging understanding of the interpretative nature of the knowing process has been to offer what has proved to be a serious challenge to the usual assumption that the so-called "standard" tests of false belief understanding actually provide unimpeachable evidence for a genuinely interpretive theory of mind. A prior step one, however, requires starting somewhat further back by carefully documenting the claim that, in the views of many key contributors to this literature, passing a standard false belief test is ordinarily thought to provide a sufficient demonstration that mental life is already regarded as interpretive in character. Wellman (1990), for example, does explicitly state that at about the age of four to five years (when they ordinarily begin to pass all standard appearance-reality and false belief measures) children also can be said to have acquired "an interpretational or constructive understanding of representations" (p. 244). Similarly, Flavell, at least in some of his earlier writings, (e.g., 1988, p. 247) has suggested that success on a range of appearance-reality, as well as false belief tasks depends on the development of what he has termed Level 2 understanding—an ability that he claims ordinarily allows children of roughly 4 to already appreciate that "the same object can be represented in different, seemingly
contradictory ways." Interestingly, in some of their more recent writings Flavell and his colleagues (e.g., Flavell, 1995) appear to have reread their own earlier evidence as actually better supporting the view that 4-year-olds have more of a "bottom up" than a "top down" or interpretive view of mental life. As he and his colleagues now reason (Flavell, Green & Flavell, 1993, 1995; Flavell, Miller, & Miller, 1993), the insight that a representation can be false with respect to a real object or event, still leaves room for the acquisition of the more complex concept that one and the same object or event can sometimes afford multiple meanings that are equally legitimate.

Perner (1991) most explicitly claims that success on usual tests of false belief understanding necessarily implies a grasp of the interpretative nature of the knowing process. The presumed equivalence between false belief understanding and an interpretive theory of mind is justified, in Perner's view, because a necessary and sufficient explanation for both is thought to lie in their supposed common dependence upon an emerging "representational" view of mental life. As he puts it, "around 4 years children begin to understand knowledge as representation, with all its essential characteristics. One such characteristic is interpretation" (Perner, 1991, p. 275, italics in original). Ruffman, Olson and Astington (1991) come to a similar conclusion, explicitly dismissing the possibility that there might be a second, more interpretative stage in children's understanding of mind. Instead, they read the results from their own research on visual ambiguity as suggesting the "possibility that there is only one stage and that ambiguity and false belief tasks tap the same underlying development" (Ruffman, Olson & Astington, 1991, p. 101).

Although all the theorists referenced above qualify their strong claims in various places by acknowledging that young preschool children actually may have no more than a "nascent interpretive theory of mind" (Perner & Davies, 1991), whatever differences they do judge to divide the 4-year-olds and the adult's understanding of mind continue to be taken as primarily quantitative and skill driven, rather than qualitative. Wellman and Hickling (1994), for example, have recently suggested that it is not until after their preschool years that children older than 5 or 6 first acquire a "conception of the mind itself as an independent, active entity" (Wellman & Hickling, 1994, p. 1565). At the same time, however, these authors maintain that even
preschoolers see mental contents as being constructed "actively by the person, on the basis of inference and subject to biases, misrepresentations, and active interpretation" (p. 1578).

In contrast to all such "one miracle" views of epistemic development, I and my colleagues (e.g., Carpendale, 1995; Chandler, 1988; Chandler, Carpendale & Lalonde, 1995) have consistently promoted a different reading of the evidence, according to which the development of children's understanding of mind is not thought to begin and end with a grasp of the possibility of false beliefs. In the place of all such either/or accounts is substituted our own better differentiated claim that, while the simple appreciation that ignorance necessarily promotes misunderstanding is, as advertised, an accomplishment of even the very early preschool years, the altogether more complicated task of appreciating the essentially interpretative nature of the knowing process does not occur until substantially later, and is probably best understood as only beginning to get under way by 6 or 7 or 8. That is, it has proven customary within the theory of mind literature to assume that passing a false belief test also counts as an early demonstration that mental life is inherently interpretive in character. I, however, mean to argue the opposite case, beginning with a clear demonstration that succeeding on standard false belief measures actually requires no more than the altogether simpler understanding that persons with different experiential histories regularly end up with different beliefs.

The first part of the argument relies upon the fact that, on close inspection, false belief tests reveal themselves to be all about matters of relative ignorance, and not at all about matters of interpretation. That is, there is nothing about standard false belief tests that could possibly demonstrate an understanding that two persons could differently interpret one and the same thing, because the events portrayed in such tasks are explicitly orchestrated to ensure that the subject and the story protagonist, whose beliefs are inquired into, are actually exposed to different information. Using Wimmer and Perner's (1983) now classic story of Maxi and the missing chocolate as a case in point, it is evident on inspection that the story is carefully and self-consciously stage-managed in such a way as to ensure that Maxi is out of the room, and so is ignorant of the fact that the location of his candy has been changed in his absence. This lack of
crucial information automatically results in Maxi's holding to a now out-dated, and, consequently false, belief that is different from that subscribed to by anyone whose knowledge is somehow more up to date. Although following this story and successfully predicting Maxi's future actions would clearly require an understanding of the possibility that beliefs can be false, nothing about getting this story straight demands any understanding whatsoever of the everyday adult truism that, even after experiencing one and the same event, people may, and regularly do, come away with differing interpretations (Chandler, 1992).

2 This research is, in the broadest sense, an investigation of the development of children's understanding of the concept of interpretation. A good place to begin looking in the investigation of any concept is the dictionary. This is particularly the case when, as in the present research, the investigation concerns children's development of what amounts to the common sense understanding of a concept. According to The Oxford English Dictionary, the meaning of interpret is: "1. To expound the meaning of (something abstruse or mysterious); to render (words, writings, an author, etc.) clear or explicit: to elucidate; to explain.... 2. To give a particular explanation of; to expound or take in a specific manner. Also, to construe (motives, actions, etc.) favorably or adversely" (p. 1131). On close inspection, there can be seen in these definitions two interrelated meanings both of which continue to resurface in different ways throughout the extensive debates over the meaning of interpretation. First, interpretation can and has been taken to involve clarifying something that is otherwise obscure. The second and related meaning is that this process of clarification or explication always involves a construal. That is, understanding always involves taking things in a particular way. This second use of interpretation clearly implies that, at least in some cases, there is room for more than one legitimate interpretation for the same object or message. Any such understanding of mind as interpretive in this second sense should be seen as different from the insight, assessed by false-belief tests, that people who are differently informed are entitled to different conclusions.

The following example may help to illustrate the difference between an understanding of false-belief and holding to an interpretive theory of mind. Imagine that two people watch the same movie but one of them goes to buy popcorn at a critical moment in the film. A child with no more than an understanding of false-beliefs will be able to appreciate that these two people may well reach different conclusions regarding the movie because one of them lacks some key information due to being out of the room at a critical moment. Any such understanding of false-belief would not, in and of itself, be adequate, however, to account for the fact that even if the two people both watch the entire movie they might still arrive at differing conclusions. To explain a case in which two people differently interpret the same object or event requires something like what is referred to here as an "interpretive" theory of mind.

A further common thread between interpretation and false belief understanding is that, in different ways, both can be used to account for what would otherwise be anomalous events, and thus, shore up faults that might threaten children's theories of the world and the mind. For example, the idea of false-belief can be used to rationalize seemingly anomalous behavior by suggesting that two people may react differently because one of them has an out-dated belief that has been rendered false by lack of information. For example, a young child who had not yet achieved an understanding of false-beliefs would be at a loss in attempting to explain why, when returning from playing outside, Wimmer and Perner's Maxi character would look in cabinet A for his chocolate, when the child knows that Maxi's mother had moved the chocolate to cabinet B. However, a child who had achieved the understanding that people may act on beliefs that are false would have no difficulty in explaining Maxi's otherwise apparently irrational action. In other words, we can account for some one's action that is not consistent with our own expectations by invoking a false-belief. Thus, the notion of false-belief can be employed in situations in which two people differ in the amount of information they possess because differential access to information can be assumed. When, by contrast, two people experience the same event yet come away with differing conclusions, the concept of false-belief is no longer adequate for constructing an appropriate explanation, and the concept of interpretation must be invoked. In other words, the notion of interpretation could serve a function similar to that ascribed earlier to the developing notion of false belief and do so with the added advantage that interpretation can be invoked in cases were it is not possible to claim that the two parties to a disputed account of reality actually had access to different information. The capacity of interpretation to play such a role varies with the ambiguity of the
In contrast to mere false belief understanding, a more mature "interpretive" theory of mind must also be understood to include, I argue, the insight that the "mind" influences how the "world" is experienced. This image of a two-way street connecting the mind and world, which Piaget meant to convey with his metaphors of assimilation and accommodation, is perhaps better captured here using Searle's (1983) more contemporary talk of "direction of fit". Under this description, young preschool children are best characterized as beginning their epistemic careers with an exclusive commitment to the unidirectional view that minds do all the changing by beginning to "fit" or conform more and more perfectly to a world over which they have no interpretive control. Although partially correct, this half truth leaves no room for lines of influence running in the opposite direction—what Searle dubbed a "world to mind direction of fit." This shortcoming limits young preschool children to what has previously been termed an "assimilation side" or "copy theory" of knowledge (Chandler & Boyes, 1982; Wellman, 1990). According to this view, objects are assumed to "transmit, in a direct-line-of-sight fashion, faint copies of themselves, which actively assault and impress themselves upon anyone who happens in the path of such 'objective' knowledge" (Chandler & Boyes, 1982, p. 391). Consistent with such a "primitive copy theory," knowledge is first seen "to reside in objective events which telegraph this information to any observer who gets in harm's way" (p. 393), thereby ruling out of court the very possibility that knowledge acquisition necessarily involves a process of active stimulus. The less ambiguous the event, the more difficult it may be to apply the concept of interpretation, and, in some cases, we may have to resort to explanations which invoke some notion of psychopathology.

Searle originally introduced the notion of "direction of fit" in his theory of speech acts (1969). By this account so-called "assertive speech acts" (e.g., statements) are said to "in some way to match an independently existing world" (Searle, 1983, p. 7), whereas, by contrast, "directive speech acts" (e.g., requests) are seen "to bring about changes in the world so that the world matches the propositional content of the speech act" (Searle, 1983, p. 7). Searle (1983) went on to use this notion of "direction of fit" more generally as a way of characterizing the different relationship between the mind and the world for beliefs as compared to desires. Beliefs, according to Searle, can be true or false, and thus they could be said to have a "mind-to-world" direction of fit (i.e., the mind should fit the world). "Desires and intentions, on the other hand, cannot be true or false, but can be complied with, fulfilled, or carried out, and we might say that they have the 'world-to-mind' direction of fit" (Searle, 1983, p. 8).

Searle (1983) acknowledges that fitting is a symmetrical relationship, and, therefore, he clarifies his use of the notion of "direction of fit" by stating that of the two things meant to fit together, one or the other can be taken as given. For example, when Cinderella goes shoe shopping she takes her foot size as given and seeks a shoe to fit her foot ("shoe-to-foot direction of fit"). "But when the prince seeks the owner of the shoe, he takes the shoe as given and seeks a foot to fit the shoe (foot-to-shoe direction of fit)" (Searle, 1983, p. 8).
interpretation. In the present view, something like such an initial "copy theory" of knowledge both characterizes the tacit epistemologies of young persons throughout their preschool years, and adequately accounts for any and all of the evidence so far brought out about preschoolers emerging beliefs about mental life.

On this more fully "developmental" view of the stepwise process involved in gradually coming to an adult-like theory of mind, it typically is not until their early school years that children are thought to initiate anything like a clear "shift from an object-centered or copy theory of knowledge to a subject-orientated or constructivistic epistemology" (Chandler & Boyes, 1982, p. 393). That is, it is only at this relatively late juncture, and some years after first grasping the possibility of false beliefs, that children are hypothesized to begin gradually consolidating a capacity to appreciate, not only that different persons may have access to different information, but also that different persons can and often do attach different meanings to one and the same thing.

Where all this leaves matters is that, in contrast to the view that false belief understanding is equivalent to an interpretive view of mental life, I mean to evaluate the hypothesis that the acquisition of a constructive or interpretive theory of mind is a different and later occurring achievement. The research presented here aims to help arbitrate this controversy by introducing what are argued to be better reasoned measures of interpretive knowledge, and by showing that passing false belief measures is a necessary, but not sufficient condition for success on such tests of an interpretive theory of mind. Before bringing out this new line of evidence, however, it will prove useful to first review a short list of other claims, and other data, that together informed the methods and procedures of the present research.

Evidence for an Early Understanding of Interpretation

Quite apart from the question of whether false belief understanding is or is not the same thing as a genuinely interpretive theory of mind, it still remains the case that there are other lines of
evidence commonly regarded as speaking to the question of whether preschoolers hold to some such interpretive view of mental life. Among the lines of evidence most often read as endorsing the view that 4- and 5-year-olds already subscribe to such an interpretive theory of mind are those data meant to show that preschool children typically solve certain visual perspective taking and appearance-reality problems, or otherwise reveal a beginning appreciation of the diversity of personal tastes, either before or along with their developing ability to pass various tests of false belief. In tallying up lines of evidence meant to support his own early-onset views, Perner (1991), for example, cites approvingly the earlier work of Flavell and his colleagues (Flavell, Everett, Croft, & Flavell, 1981) concerned with "level 2 visual perspective taking." This work, which usefully establishes that even children younger than 4 are ordinarily already well aware that one's angle of regard can dictate "how" a display will look, is, however, perhaps better seen as a useful reminder that questions such as "how do you see that" and "how do you understand or interpret that" ought to be regarded as equivalent only when otherwise simple talk about "see" and "looks like" is understood in especially metaphorical ways. That is, children who answer Flavell's classic question, "how do you see the turtle?" by answering, "standing on his feet," or "lying on his back" did not, in all likelihood, intend, and should not now be understood after the fact as having offered up some juvenile epistemic commentary about how one and the same thing might prove to have different meanings for different people. Rather, all such talk of different angles of regard is most conservatively or carefully heard as talk about whether the visual information about turtles sliding into your retina arrives feet first or back to front. Perner is not alone, of course, in what may be a common but perhaps unacceptably profligate reading of this "level 2 perspective taking" data. Regardless of the company kept, however, any and all such claims about how one person's line of sight is distinct from that of another is perhaps best regarded as no more than a precursor to, and ought to be seen as importantly different from, the altogether more demanding insight that two people can find different interpretative meanings in one and the same thing.
A similar discrimination needs to be drawn between fully fledged matters of interpretation, in the larger epistemic sense being sought after here, and those useful, but different insights that are revealed when children first appreciate that appearances can sometimes be deceiving. Here again Perner (1991), and still earlier, Flavell and his colleagues (Flavell, Green, & Flavell, 1986), suggest that "knowledge about the appearance-reality distinction is but one instance of our more general knowledge that the selfsame object or event can be 'represented' (apprehended, experienced, etc.) in different ways by the same person and by different people" (Flavell, Green, & Flavell, 1986, p. 2). The ability to recognize that one object can have both a mere appearance and a different reality may initially appear to be equivalent to an understanding that some things afford multiple interpretations. Alternatively, however, and as hypothesized here, when children are asked to comment on both the appearance of an object as well as its underlying reality they do not need to relinquish the assumption that it is really only one thing, although it may appear to be something else. Similarly, with false belief tasks it is a question of one reality and another mistaken view of this reality. In contrast, tests of interpretation are seen here to require the ability to recognize that there may be two or more equally valid interpretations of the same message or object. In other words, passing an appearance-reality task requires only the insight that one view of an object is right and another is wrong, whereas dealing with issues of interpretation requires the insight that multiple views of reality may be equally legitimate.4

4 This series of studies is also related to an ongoing philosophical debate over the best way to view the nature of the mind and knowledge. According to traditional epistemology, and this is perhaps the dominant view of knowledge in cognitive science, knowledge consists of forming accurate mental representations that correspond to a pregiven world with properties that can be described prior to any cognitive activity. Since Perner (1991) begins with this assumption that the mind is representational in this strong sense (i.e., beyond the uncontroversial claim that thought involves representing the world), it necessarily follows that "interpretation," according to this view of knowledge, involves a breakdown in the representing process which results in misrepresentation. However, this representational view of the mind is being increasingly questioned (e.g., Overton, 1994a, 1994b; Varela, Thompson, & Rosch, 1991; Furth, 1987; von Glasersfeld, 1979, 1982, 1984, 1988; Lakoff, 1987; Putnam, 1981, 1987, 1988, 1990), and in its place is proposed an anti-representational, embodied, or constructivistic view of knowledge, according to which interpretation is a necessary feature of the knowing process. Although this research is in some sense independent of the debate between these two views of knowledge and the empirical research proposed here will certainly not settle the controversy, this philosophical discussion is relevant because the view of interpretation proposed in this thesis is most comfortably included within a constructivistic position on knowledge, and, thus, would add one more reason for favoring such an epistemology.
A third and final line of evidence that might be brought out in support of the claim that 4-year-olds ordinarily possess an interpretative theory of mind is provided by the data of Flavell, Flavell, Green, and Moses (1990) showing that even 3-year-olds recognize that different individuals are characterized by different "tastes" or preferences. As the work of Flavell and his colleagues clearly shows, children of 3 to 4 seem to appreciate that they and the family cat have sharply different sentiments about just how tasty one and the same bowl of cat food will actually prove to be. Different measures of children's understanding of taste, however, seem to assess different competencies that develop between the ages of 3 to 10 (Mansfield & Clinchy, 1985; Zahn-Waxler, Radke-Yarrow, & Brady-Smith, 1977). Here it simply will not do to object, as was done in the case of false belief and appearance-reality tasks, that the question of different reactions to one and the same thing is simply never brought up. This recognition that two onlookers may differ in their tastes may at first appear to reflect an early insight into the concept of interpretation.

Although the appreciation of differences in taste seems superficially similar to the concept of interpretation, I argue that differences in taste involve personal affective reactions that require no external justification and are orthogonal to alternative interpretations that need to be based on grounded reasons. In other words, an interpretation of something such as a novel can be offered that is independent of the liking versus disliking dimension. What is not clear here, however, just as it remains unclear across several centuries of philosophical debate (Gadamer, 1982), is whether such matters of taste do or do not actually contain any real epistemological content. In the face of these unanswered questions, it seemed appropriate to include in the present study measures of children's understanding of the diversity of taste, all in order to determine if children's responses to such esthetic matters are quantitatively and qualitatively different from their responses to tests of interpretation.
Evidence for a Slow Track Toward an Interpretive Theory of Mind

Just as there are lines of collateral evidence supporting the view that an interpretive theory of mind is an accomplishment of the preschool years, there are also programs of research lending evidence to the contrary view that any genuine appreciation of the interpretive character of the knowing process occurs more slowly, and usually not before the early school years. Far and away the largest among these is that half a century's worth of research devoted to the subjects of childhood egocentrism and the gradual emergence of so-called role- or perspective-taking skills (for reviews of this enormous literature see: Chandler, 1977; Chandler & Boyes, 1982; Shantz, 1983). The existence of certain lethal conceptual and methodological genes lying near the heart of these studies ended up costing them most of their reproductive capacity, and eventually turned them into the "sports" of the theory of mind enterprise (Perner & Astington, 1992). It seems, however, that the poor performance of whole armies of 5- and 6- and 7-year-olds on standard role-taking tests should not be taken too lightly. Any attempt to recount all that went wrong with this once thriving program of social-cognitive research is too big an undertaking to be picked up here. For present purposes it will be enough to point out that many of that literature's most commonly relied upon measures of childhood egocentrism now appear, by present lights, to have relied upon an under specified admixture of probes and procedures, some of which aimed to get at knowledge of false beliefs while others better served to illuminate more interpretive matters. Chandler and Helm's (1984) so-called "droodle" procedure--a methodology usefully extended and clarified by Taylor (1988)--can serve as a representative case in point. Here subjects were required to set aside what they knew of a larger stimulus drawing in order to successfully adopt the perspective of someone else who saw only a small cryptic part of this same stimulus. Clearly, as Perner and Davies (1991) have pointed out, the experimental manipulation employed in this droodles procedure shows much in common with standard false belief tasks that also rely upon the gerrymandering of evidence such that subjects are ordinarily better informed than those whose likely beliefs they are expected to comment on. What divided the original Chandler and Helm
procedure from the stripped down multiple-choice version substituted by Perner and Davies (which 4-year-olds succeeded at nicely) is that, in the original, subjects were required not only to keep what they knew separate from what was known by others less well informed than themselves, but also to imaginatively put themselves in the place of such a partially ignorant bystander in order to successfully guess at how the limited information made available to them might be reasonably interpreted. Burdened with such interpretive demands, it is perhaps not all that surprising that Chandler and Helm's 5- and 6- and even 7-year-olds often failed where Perner and Davies' 4-year-olds succeeded. While none of this is meant as a real substitute for that other much needed attempt to re-read all of the role-taking literature of the 60s and 70s in light of the more painstaking theories of mind literature of the 80s and 90s, it is meant to show that perhaps only some, but by no means all of the many hundreds of those earlier studies of the emerging role-taking competencies of young school-age children can be safely set aside. Rather, many of the 5-, 6-, and 7-year-olds who failed the procedurally complex role-taking tasks often laid out in these studies did so, not because they were blocked from displaying their already secure understanding of the possibility of false beliefs, but rather for the reason that they were still en route toward acquiring a genuinely interpretive theory of mind.

Over and above the broad, but now somewhat moribund, literature on social role-taking there also exists a small number of other distinct research enterprises aimed at also showing that there is more to the development of a mature theory of mind than the accomplishment of simple (i.e., first order) false belief understanding. Almost paradoxically, one of these lines of research was introduced by Perner and Wimmer (1985). A research effort that turned on the common intuition that recognizing someone else's belief to be mistaken is somehow less demanding than the still more recursive, twice removed, insight that is needed to appreciate that someone else's beliefs about someone else's beliefs may also be mistaken. While there would seem to be no reason to doubt that keeping track of two recursions is naturally a bit more complicated than keeping only one in mind, there is also no reason to automatically suppose that the future of increasingly adult like theories of mind necessarily lies down this path of more and more deeply
nested recursive operations. The recent study by Sullivan, Zaitchik, and Tager-Flusberg (1994), for example, showing that, when task demands are held at a minimum, even 4- and 5-year-olds quickly grasp second order recursions involving beliefs about beliefs, offers support to the position that mature views of mental life rest upon a groundwork that is somehow more genuinely interpretive than that required to deal with second order false beliefs.

Even if, as the previous paragraphs are meant to imply, much of the original social role-taking literature now seems flawed because of what, in retrospect, appears to have been too undisciplined a reliance on tests of false belief understanding plus other things, such criticisms hardly apply to a small handful of more contemporary studies that have worked quite self-consciously to avoid confusing matters of interpretation with the simpler consequences of differential ignorance. In particular, the work of both Taylor (1988a, 1988b) and Pillow (1991, in press) seem to fit this new and improved mold. While both of these investigators are matched by their common interest in bringing out the details of young children's growing awareness of the role of bias and prior knowledge in shaping the process of meaning making, there is sufficient overlap in their methods to perhaps excuse focusing only on the details of the recent work by Pillow (see Appendix A, pages 82-91, for a further review of the literature).

Pillow, like Taylor before him, has taken some pains to ensure that both his research subjects, and one or more other stimulus persons whose views were to be inquired into, all ended up being exposed to one and the same stimulus event (e.g., a toy being trod upon or a cartoon figure caught in the frozen moment of either taking a rabbit out of, or returning it to, its cage). What was actively manipulated in these studies was, however, nothing to do with present events, which were conscientiously kept self-same for all comers, but turned instead on past sentiments built up about these stimulus persons, or background details from the past that might reasonably be expected to influence one's reading of present events. Using such procedures, Pillow has found interesting evidence to indicate that preschoolers, all of whom might be expected to pass standard false belief tests, regularly fail to see any relevance to such prior sentiments or background information, and naively assume instead that anyone whose immediate experiences
are the same will end up holding to identical beliefs. Not until the age of 6 or 8 did Pillow's subjects show any clear appreciation that belief and sentiment from the past could influence judgments in the present. Pillow's findings are consistent with those of Taylor, who has likewise reported that only 8-, but not 6-year-olds showed evidence of beginning to shift the locus of the origin of knowledge from the object to the subject, and are closely in line with the expectations that guided the studies reported here.

Despite obvious similarities, there remain, however, important differences that divide Pillow and Taylor's account of epistemic development from the account presented here. Most pointedly, what both of these investigators have done is to expand the horizon of relevant information to include, not just those particular facts available at some frozen epistemic moment, but also various bits of relevant background information that are differentially available to different stimulus persons. While such procedures require a way of thinking about mental life that appears clearly unavailable to most preschoolers, it is also true, as Ruffman, Olson and Astington (1991) point out, that tasks of these sorts are really "false belief tasks at heart." That is, interpretation, in the concrete sense explored by Pillow, is really equivalent to "misrepresentation," in that what such accounts seem to make room for is the prospect that bits of ignorance or prejudice from the past can come forward to shape, or perhaps miss-shape, our readings of the present. This is an improvement over other still more restricted views that seem to make false belief understanding the only possible epistemic achievement, and simple ignorance the only available intellectual crime. What is still needed, in my view, however, is a way of thinking about and empirically investigating matters of interpretation that allows for the possibility that interpretation is more than the effects of cumulative ignorance or bias, but rather the ordinary constructive way in which meanings are always acquired. The studies described below strive to bring out evidence about the development of interpretation in that broader sense.
Assessing an Interpretive Theory of Mind

Although there is a lack of research on the development of children's understanding of interpretation, there is converging evidence from research in several areas, such as humor, irony, linguistic ambiguity, referential communication, and pictorial ambiguity (Keil, 1980).

For example, in the study of humor, McGhee (1979) has described a series of stages in the development of children's sense of humor. It is at McGhee's fourth stage that children's humor begins to resemble the humor of adults, much of which is based on ambiguity in meanings. According to McGhee, children reach this fourth stage about 7 or 8 years of age, because it is at this time that they first begin to appreciate multiple meanings. Puns are a classic example of humor which is based on a key word having more than one meaning. (Consider, for example, the following classic joke: "Hey, did you take a bath?" "No. Why, is one missing?" [McGhee, 1979, p. 76].) Because humor typically involves contrasting a normal situation with an alternative, incongruous situation it does not tend to offer equally compelling evidence for two alternative interpretations, and thus, may not be the most appropriate situation to begin assessing young children's early understanding of interpretation.

Irony is an aspect of communication which also depends on the understanding of multiple meanings. In order to understand irony one must be able to distinguish the speaker's intention from the literal meaning of the utterance. Although irony is common in adults' conversation, young children under the age of approximately 6 to 7 years are typical said to fail to understand ironic utterances (Winner & Leekam, 1991).

Research on children's understanding of referential communication offers a further example of an area that involves children's understanding of ambiguity. It has been shown in a number of studies that young children of 5 to 6 years of age often fail to recognize that ambiguous messages may not sufficiently specify the referent to allow for correct identification. Much of this research has employed variations of referential communication tasks in which children are given directions for making a block building, selecting an item from an array, or finding a hidden object. In a typical referential communication task a speaker must describe a referent object and the task of the listener is to correctly select the referent from among a group of candidate objects. If the message is ambiguous, two or more objects may fit the speaker's description equally well. Of course, older children notice this ambiguity and either request further description or blame the speaker's inadequate message for the failure to select the correct object. However, young children (typically children younger than 5- or 6-years-old) seem relatively unaware of the inadequacies of ambiguous messages and they tend to blame the listener rather than the speaker if a mistake is made because of an ambiguous message. However, these children that judge an ambiguous message to be adequate may still display some verbal or nonverbal signs of uncertainty (Flavell, Sper, Green, & August, 1981).

When young children fail to recognize that ambiguous messages are inadequate they seem to think that receiving the message is equivalent to understanding the speaker's intention. In other words, they do not seem to understand the distinction between the literal meaning of the "very words" of the message and the speaker's intended meaning (Beal, 1988). This difficulty with the distinction between literal and speaker's meaning results in an inability to deal with misinterpretations. "Young children appear to identify one utterance with one interpretation, and therefore they are incapable of dealing with ambiguous sentences in which one utterance may result in two or more interpretations" (Bontatibus, 1988, p. 326). Until about the age of 7 to 8 children do not understand that a message's literal meaning can be somewhat independent of what the speaker intended to mean by the message. This short coming is revealed in first graders' difficulty in detecting ambiguous messages when they were already aware of the speaker's intended meaning. Second graders, on the other hand, were more competent at detecting ambiguous messages even when they had prior knowledge of the speaker's intentions. It seems that they are able to distinguish
that it is not until approximately 7 or 8 years of age that children begin to understand that one object or message may have multiple meanings. The research in these various areas appears to

between what the speaker intended and the literal meaning of the words used in the message, and thus, they were better able to evaluate the adequacy of the message (Beal, 1988).

Robinson and Robinson (1983) found that even when children were made aware of the two possible interpretations of ambiguous referential communication, because they had to make these interpretations for puppets, the subjects were still confident that they themselves had made the correct interpretation. These results from research on children's understanding of communication are generally consistent with the assumption that young children have a copy theory of knowledge and it is not until 7 or 8 years that children acquire the understanding that the same message can have two meanings. Young children overlook problems with messages and assume that if the message is received the listener should possess the speaker's knowledge. Not until they are about 7- or 8-years-old do children seem to consciously recognize ambiguity in messages--i.e., messages can have more than one interpretation. This insight involves a recognition that knowledge is not simply the result of a direct transmission of information from one's environment. Rather, since messages can have more than one meaning the person must have some role in deciding on that meaning. This insight involves a shift in one's understanding of the source of knowledge from the environment to a recognition of the complementary role of the mind in the acquisition of knowledge.

As studied in the psychological literature, ambiguous figures are typically line drawings that can be seen as either of two familiar objects. One ambiguous figure with a long history is a drawing known as the "duck rabbit"--a line drawing that can be seen as either a duck or a rabbit that was used by the psychologist Joseph Jastrow in 1900 (Attnave, 1974). Another example of an ambiguous figure from the psychological literature is Bugelski's "rat-man", which can be seen as either a rat or a man with glasses (Bugelski, 1960; Bugelski & Alampay, 1961). This ambiguous figure was used in earlier research on "perceptual set". When adults are shown this "rat-man" after viewing a series of pictures of animals they tend to see the rat, whereas if they had previously viewed pictures of human figures they were more likely to see the man (Bugelski & Alampay, 1961). Initially, it appeared that this result did not hold for preschool children (Reese, 1963; Reese & Ford, 1962), but later research did reveal evidence of perceptual sets in children of 4 years and under when the children were more actively involved in classifying the members of the classes (West & Abravanel, 1972).

Ambiguous figures have also been used with preschoolers by Rock, Gopnik and Hall (Gopnik, 1995) to test the idea that subjects must be informed about the figure's ambiguity in order to experience reversals when looking at the figure. None of their 3- and 4-year-old subjects experienced reversals when uninformed of the possibility, and even when informed few of the 3-year-olds experienced reversals, but many of the 4-year-olds did. Gopnik attributed the difference between 3- and 4-year-olds, to 4-year-old's grasp of the representational nature of mind.

These well known ambiguous figures survive because they are particularly good examples of drawings that can appear to be two different objects. But ambiguous figures can be thought of as just particularly striking examples of a phenomenon that could conceivably occur between many other images as well. These figures occur at a point of ambiguity at which the lines on the paper could equally well depict two different images. It is possible to transform any image into another image with a computer technique called "morphing", in which one image is transformed into another image in a series of small steps. The resulting image at the mid-point in this process would be ambiguous as to which of the two objects the image depicts, but classic ambiguous figures are especially good examples because of the ingenious choice of shared contours.

Because images in ambiguous figures share contours they are somewhat akin to images involving figure-ground reversal, such as the well known example of the picture that could be a goblet or a pair of faces. However, ambiguous figures do not depend on the reversal of figure and ground (Attnave, 1974). Instead, the various lines must be interpreted in different ways or be given different meanings to construct another image from the same marks on the paper.

The nature of these ambiguous figures can also be illuminated by considering their similarity to some of the cards from the Rorschach test. One of the dimensions on which the Rorschach test is scored involves the frequency of particular responses to a card. A response is considered "popular" if over twenty percent of the people taking the test make this response to a particular card, and some cards have two responses that are classified as popular (Rapaport, 1946). Ambiguous figures can be thought of as stronger examples of this bimodality of "popular" responses because they have been intentionally designed to elicit two common responses.
reveal separate manifestations of the underlying development of children's insight into the interpretive nature of knowledge.\(^{10}\)

The present program of research is predicated on the assumption that a useful way of trying to get at young children's earliest understanding of the interpretive character of the knowing process is to begin by confronting them with instances of that special class of interpretation problems characterized by stimulus situations that seem to especially call out for two and only two different readings. That is, I judged it reasonable to suppose that some of the best chances for witnessing early instances of a view of mental life as interpretive in character were to be found in testing situations that require subjects to consider circumstances in which available evidence support each of two interpretations of one and the same thing to approximately the same degree. Under such circumstances, at least, it would be possible to avoid the chance that young children who are already well aware of the interpretive nature of knowing might still choose to discount, and thus fail to mention, what they choose to regard as remote and unlikely interpretations.

With such prospects in mind, I choose a set of six measurement problems: two each drawn from the areas of lexical ambiguity, ambiguous referential communication, and ambiguous figures. In all of those problem cases I worked to introduce stimulus materials that could be fairly

\(^{10}\) Much of this research on the development of an understanding of humor, irony, and communication, has been concerned with the development of the ability to detect ambiguity or, in some cases, to intentionally construct ambiguous messages (e.g., Sodian, 1990). Although this is all part of an understanding of interpretation, the purpose of the present research is to address the question of how children make sense of such ambiguities once they recognize them, and whether or not they understand the implications of ambiguity for predictions (i.e., that given an ambiguous stimulus it is not possible to know in confidence how someone else will interpret it) and the limitations of interpretation (i.e., interpretations are not just made up, they must be grounded in evidence and good reasons). Understanding the nature of interpretation involves understanding the epistemic implications of ambiguity, such as the fact that an ambiguous stimuli can often be legitimately interpreted in more than one way. There are several problems with using only children's ability to detect ambiguity as a measure of their understanding of ambiguity and its implications for multiple interpretations. First, tests of the ability to detect ambiguity may be tests of creativity or flexibility in thinking rather than tests of a particular understanding of the nature of knowledge. Even adults may have some difficulty seeing the second entity in an ambiguous figure, recognizing the alternative meaning in an ambiguous statement, or getting a joke based on multiple meanings, yet we would not argue that these adults lack an understanding of the problems of interpretation that ambiguity can lead to. Thus, in some cases employing the ability to detect ambiguity may underestimate children's understanding of interpretation. Alternatively, in other cases this measure may overestimate children's understanding because the mere capacity to notice the possibility for multiple interpretations does not indicate whether or not these children believe that the other interpretation is in any sense legitimate, or if one is right and the other is completely wrong.
said to provide equal support for both of two distinctive interpretations.11 These same stimulus materials were used in each of the three studies reported below.

11 A reason for choosing three types of problems and not more or less is that, on one hand, this research is not meant to be an exploration of a particular ability to understand interpretation in one specific domain; rather, these abilities in various domains are thought to be a manifestation of an underlying conception of knowledge. For this reason it is important to include a range of different types of tasks in this study. But, on the other hand, this research cannot consist of an exhaustive cataloguing of all the ways in which children's understanding of mind and knowledge is reflected across all domains of action and interaction. Such an extensive investigation would, at a minimum, include, in addition to ambiguous referential communication, pictorial ambiguities, and various forms of linguistic ambiguity either lexical or at the level of the sentence, such other areas as, humor, irony, indirect speech acts, politeness (Brown & Levinson, 1988), and ambiguities in narratives.

Since these problems are drawn from what have been considered separate areas of research, it is important to consider the similarities between these problems as well as the differences. All three types of tasks involve ambiguous stimuli that afford two approximately equally likely interpretations. In the lexical task this ambiguity is at the level of words that have two meanings. The ambiguity is at the level of the message in the referential communication task. And the third type of task involves pictorial ambiguities that could depict two images with approximate equal likelihood.

In the case of the ambiguous referential communication task there is a hidden object, although its location is unclear because of the ambiguous message. Thus, there is a right and a wrong interpretation of the ambiguous message and there is a fact of the matter that could be appealed to in order to arbitrate between the two interpretations (even though it is not possible to decide which one is right on the basis of the message). In the case of the lexical ambiguity task there may be one interpretation that the speaker intended, but it depends on the speaker's intentions and there is no simple fact of the matter that can be checked. With the ambiguous figures there is no fact of the matter about which interpretation is correct (unless features of the drawings are argued about) and the artist's intentions were to create an image that make both interpretations equally likely.

Both the lexical ambiguities and the ambiguous referential communication task concern ambiguities involving communication. However, in the case of the lexical ambiguities the words have two meanings and it is the context and the speaker's use that normally disambiguates the terms. On the other hand, in the case of the referential communication task the words in the message are normally unambiguous and it is the context that renders the message ambiguous (i.e., the fact that there are, for example, two "red blocks"). It is not clear whether or not these differences between the tasks will translate into different levels of difficulty for the children.
STUDY 1

In this first study, young children's understanding of the interpretive nature of knowledge was assessed by presenting them with situations in which each of two characters (represented by puppets) were shown to have interpreted one and the same object or message in sharply different ways. Making proper sense of these competing knowledge claims requires, I reasoned, some fledgling appreciation of the concept of interpretation in order to formulate what an adult would take to be a reasonable explanation for these multiple readings. More particularly, the early school age subjects of this study were asked not only to explain how such different interpretations might arise, but also whether or not they thought it possible to correctly predict how some third person might go on to interpret these same objects or messages. As a control question, subjects were also asked to evaluate a "deviant" interpretation of the same stimulus materials in order to assess their ability to appreciate that the very idea of interpretation necessitates that there always be limits to what can count as a warrantable reading of ambiguous matters. To assess children's understanding that people's tastes differ, subjects were also presented with situations in which the two characters again disagreed about something, but in this case the disagreement involved liking or disliking the stimulus in question. Finally, because a central purpose for this research was to evaluate the distinction between false belief understanding and the concept of interpretation, a standard the false-belief task involving both explanation and prediction questions was also administered.

12 Puppets have generally been employed in research on children's understanding of mind and no differences have been found when these tasks have been compared to tasks involving real people (e.g., Hala, 1994; Russell, et al., 1991).

13 The series of tasks introduced above are primarily explanation tasks, this is in contrast to the standard false belief tasks which are generally in the form of a prediction task. Both prediction and explanation are presumably based on the child's understanding of the mind. Prediction involves reasoning forward based on beliefs and desires, whereas explanation involves reasoning backwards (i.e., accounting for action in terms of the actor's beliefs and desires) (Wellman, 1990). It might be argued that these two abilities are separate competencies that may appear at different points in the child's development. And if explanation requires more in the way of verbal abilities it may appear later in the child's development for this reason alone. However, Bartsch and Wellman (1988; Wellman, 1990) found that when presented with an explanation task, even 3-year-old children, who would not normally be
In brief, then, the primary purposes of Study 1 were: a) to help identify the developmental point at which young children first begin to show clear evidence of understanding the interpretive nature of the knowing process; b) to evaluate the competing claim that children who appreciate the possibility of false beliefs also automatically understand the process of interpretation; and c) to assess the relationship between children's understanding of taste and their concept of interpretation.

Method

The 8 boys and 12 girls (ten 5- to 6-year-olds [M=5.6 years, range 60 to 72 months] and ten 7- to 8-year-olds [M= 7.5 years, range 82 to 104 months]) who served as subjects in this first study were given: a) a standard false-belief task; b) a task featuring an example of personal taste (i.e., a drawing depicting either a painting or a bowl of soup said to be liked by one puppet character and disliked by another), and c) at least three tasks involving matters of interpretation. In brief, the problems of interpretation consist of an object or message that is viewed in different ways by two people (represented by puppets). The three types of problems involve: (1) problems prompted by ambiguous figures (the classic "duck-rabbit" and "rat-man" drawings, see Figures 1 and 2); (2) matters of lexical ambiguity (i.e., the homophones "pear/pair" and "ring"); and (3) ambiguous referential communication tasks (i.e., an object said to be hidden under one or the other of two equally "large" or "red" blocks). The three response measures collected with regard to these tasks included: a) questions used to elicit subjects' explanations of the multiple interpretations presented, (b) questions intended to get at the implications of these discrepant interpretations for future efforts to predict how some third person might view the same object or

expected to pass standard false belief tasks, did talk about false beliefs in their explanations of behavior. However, Moses and Flavell (1990) did not replicate this result.

Wellman (1990) argued that explanations could be very revealing because they can potentially provide information about the child's spontaneous use of various ideas. Similarly, children's explanations of events that involve interpretation may also reveal their spontaneous use of the idea of interpretation. In Bartsch and Wellman's (1988) study they followed up children's spontaneous explanations with further probes.
message, and (c) a final question aimed at bringing out possible limitations on the range of legitimate, as opposed to "deviant" interpretations of these same stimulus materials. More concretely, subjects were first asked to explain the difference in interpretation offered by two puppets figures. Next, subjects were queried regarding their understanding of the implications of such divergent views for any future predictions they might make by asking them to predict how some third person would interpret the self-same message or picture. Finally, in all but the problems involving matters of taste, each subject’s understanding of the limitations of interpretation (i.e., the fact that legitimate interpretations are not just made up, but must be grounded in evidence and good reasons) was assessed by presenting them with a "deviant" interpretation offered by a third puppet figure. This control question focused on how subjects undertook to explain their views about whether some extravagant interpretation did or did not "make sense."

False-belief test

The false-belief test was modeled on Wimmer and Perner's (1983) classic “Maxi task.” Subjects were introduced to two puppets (Mary and Maxi). In this version of the task, Maxi was shown to be playing with a toy which he then placed in a blue container before going outside to play. While Maxi was out (actually under the table) Mary took the toy out and played with it. Before leaving she put the toy away, not, however, in the original resting place, but in a second, yellow container. Maxi was then shown to return and the subjects were told that he wanted his toy. They were then asked the following prediction questions: "Where will Maxi look for his toy when he first comes in?" ("look" question), and "Where will Maxi think his toy is when he first comes in?" ("think" question). Next, they were asked the following explanation question: "Why do you think Maxi looked in the blue/yellow box?" These "explanation" questions, while not a routine part of this so-called "unexpected change" task, were asked in an effort to ensure a close parallel between the false belief test and the tests of interpretation detailed below.
Problems of Interpretation

1) Lexical Ambiguity. In one instance of the task involving lexical ambiguity the experimenter told the subject about another game in which the puppets have to "wait for a ring." Then the experimenter asked Maxi and Mary what they were waiting for. Each was made to report one of the common meanings of "ring," illustrated with pictures of a ringing telephone and a "diamond" ring. In the second instance of this task the puppets were told to "wait for a pear/pair." Again, Maxi and Mary were made to assume different meanings of "pear/pair," and each meaning was again illustrated with a picture on a card (i.e., "a pear to eat," and "a pair of shoes"). This procedure was loosely based on related test problems earlier employed by Shultz and Pilon (1973).

2) Ambiguous referential communication. The referential communication task used in this study was based on a hiding game previously introduced by Sodian (1990). A penny was hidden under one of three cards, the backs of which were distinctively marked by either a large red block, a large blue block, or a small red block. Two test trials using these ambiguous referential materials were administered to subjects. These consisted of showing these materials to the two puppets and explaining: "The penny is under the card with a big block," or "The penny is under the card with a red block." In each of the two trials one puppet was made to endorse one of the two equally reasonable interpretations of the ambiguous message and the other puppet endorsed the other interpretation.

3) Ambiguous Figures. Subjects were shown one of two ambiguous line drawings: a) Jastrow's (1900) "duck-rabbit"; and b) Bugelski's (1960) "rat-man" (See Figures 1 and 2). Maxi and Mary were again each made to endorsed one of the two readily available interpretations of these classic ambiguous figures.

Matters of taste

The subjects were presented with two vignettes involving: a) a disagreement about whether a particular soup tastes "good" or "bad," and b) a disagreement about whether a given
picture was "nice" or "ugly" (each problem was illustrated with a single picture). Again, the Mary and Maxi puppets each took up opposite sides in the disputes.

Order of the Tasks

The false belief task was always presented first because, given the age of the subjects in this study, it was anticipated that they would have no difficulty in successfully passing this test. The children's enjoyment of their easy success on the false belief test was meant to serve to interest them the subsequent series of tests of interpretation and taste. The remaining four tasks involving interpretation and matters of taste were randomized in their order of presentation.

Procedure

Subjects were presented with one of the problems of interpretation or taste, and then asked a series of explanation and prediction questions, and a control question involving improbable or "deviant" interpretations (see Appendix B for a complete protocol for Study 1).

Explanation Questions. First, the experimenter ensured that the child understood both interpretations. For example, in the case of the ambiguous figures the experimenter confirmed that the child could see both the duck and the rabbit, or the rat and the man. Then the experimenter restated the problem in the form of the following questions:

"Is it okay for Mary to say ... and for Maxi to say ... ?"

"Why is it okay ...? Why isn't it okay ... ?"

Prediction Questions. After the explanation questions the children were asked a series of prediction questions. This was done in order to assess their understanding that one implication of such ambiguous messages and objects is that it is not possible to confidently predict which of the two equally reasonable interpretations any given person might choose to give. Specifically, the subjects were asked if they could predict how a child from another school would interpret the problems. If the subject took a decisive position by saying, for example, that the other person
would think that the "duck-rabbit" is a rabbit, the experimenter then asked: "How can you tell what they will think?"; and "How sure are you that they will think that?" If the subject said "I don't know," then the experimenter asked: "Why is it hard to tell what they will think?"

**Deviant interpretations.** After the prediction questions the subjects were told that a third puppet, Josef, held an improbable or deviant interpretation as to what the picture or message was (e.g., when told to "wait for a pair/pear," Josef says he is waiting for an apple). The children were asked if it "makes sense" for Josef to give the deviant answer, and why or why not. There was no opportunity to ask questions of this sort on the tasks involving matters of taste.

**Scoring the False Belief test**

Following scoring conventions common in the literature, subjects were scored as passing the "look" and "think" questions on the false belief test if they accurately stated that Maxi would mistakenly "believe" that his toy was in the container in which he had originally placed it. Failing these questions was indexed by wrongly concluding that Maxi would somehow know that the toy was in its new location, a fact which he had no legitimate way of appreciating. Subjects were judged to have passed the explanation question on the false belief test if they correctly explained the source of Maxi's false belief (e.g., "because that's where he left it and he didn't know that Mary moved it").

**Scoring the Problems of Interpretation**

For all problems involving two trials subjects were assigned the highest score they received on either trial. This strategy avoids discounting any fledgling understanding of interpretation and is regarded as conservative in that it works against the present hypothesis that the concept of interpretation is achieved later than false belief understanding.

**Explanation questions.** Children were scored as failing the explanation question if they wrongly stated that it was not possible or reasonable for the two puppets to offer different
interpretations because one of them was wrong, or if they considered both interpretations to be
"okay," but could not justify this judgment, or justified it purely in terms of internal individual
differences without noting the ambiguous nature of the stimulus (e.g., "because they have
different thoughts. She has purple eyes and he has brown eyes so they see different things").
Children's responses were scored as passing if they judged both interpretations to be legitimate
and explained the reported difference in interpretation as due to the ambiguous nature of the
message or object (e.g., "because you said it's under the red block and there are two red blocks, a
bigger one and a smaller one," or "because you didn't say what kind of ring you mean," or
"because it looks like both of those things [a duck and a rabbit]").

Prediction questions. Children were scored as failing the prediction questions if they
made a clear and specific prediction on behalf of a third person, or if they failed to make a
prediction but could not explain why it would be impossible to do so with any degree of certainty.
Children were scored as passing if they refused to make a prediction and explained why it would
be difficult to do so (e.g., "I don't know. There are lots of different kinds of rings"), or indicated
that some people might endorse one interpretation while other people would endorse the other
interpretation (e.g., "a little bit [of the people] will say it looks like a duck and a little bit more will
say it looks like a rabbit").

Deviant interpretation questions. Children were scored as failing these test questions if
they alleged that the deviant interpretation makes sense, or if they indicated that the deviant
interpretation does not make sense, but could not explain why. Children were scored as passing
if they claimed that the deviant interpretation does not make sense, and justified this judgment by
referring to the ambiguous nature of the stimulus and the lack of good reasons for such an
interpretation (e.g., "No. [it doesn't make sense] because the card that Josef showed isn't a big
block," or "because it [a necklace] has nothing to do with a ring," or "because it doesn't look like
one [a dog]", or "because, for one, a dog's head goes like that ... [the subject points at the picture]"

**Scoring the Matters of Taste**

*Explanation questions.* Children were scored as failing the explanation question on the problems involving matters of taste if they believed that one of the puppets was correct and the other one was wrong (e.g., "I think she's [Mary] right"), or if they showed some recognition that people have different tastes by correctly judging that it was okay for Mary and Maxi to disagree about the soup or the painting, but were unable to justify or explain this judgment in any way, or took the question in a moral sense (e.g., it is not okay for Maxi to express his dislike for the soup because, "everyone should try new things," or "it would hurt people's feelings," or because he "won't grow into a healthy boy"). Subjects were scored as passing if they were offered some justification for the disagreements involving taste (e.g., "Yeah it's okay because she likes different things than he likes," or "that's fine, different people like different things").

*Prediction question:* Subjects were scored as failing the prediction question on the tests of matters of taste if they made an unqualified prediction with a high degree of certainty regarding whether another person would like or dislike the soup or painting, or if they correctly stated that they could not predict whether or not another person would like or dislike the soup or painting, but they could not explain why. Children were scored as passing if they stated that they could not predict another person's tastes (e.g., "I wouldn't know because I wouldn't know if he likes vegetables," or "because he never told us before", or "I can't read his mind").

**Reliability**

The responses from six subjects were rescored by another rater. There was 91% agreement between the raters on the tests of interpretation, Cohen's kappa = .82. On the problems involving matters of taste there was 91% agreement, Cohen's kappa = .82.
Results

The primary hypotheses to be evaluated in this study are: a) passing recognized measures of false belief understanding is not the same thing as succeeding on tasks tapping an understanding of the interpretive character of the knowing process; b) that children develop an initial understanding of interpretation some years after they acquire an understanding of false belief; and c) that a recognition of the diversity of tastes is earlier developing and distinct from the concept of interpretation. The alternative hypothesis, supported by Perner (1991), Flavell (1988), and others (e.g., Ruffman et al., 1991), is that false belief understanding already presupposes an understanding of the mind as "interpretive," and so children will succeed at problems requiring an understanding of interpretation as soon as they can pass standard measures of false belief.

The clear result of this study regarding the first two hypotheses concerning interpretation is that all the subjects passed the false belief test with no difficulty, but virtually none of the 5- to 6-year-old subjects passed the interpretation tasks. This summary conclusion can be seen to be supported by the results even without the benefits of inferential statistics, but to further specify this observation it is possible to compare the 5- to 6-year-old subjects' performance on the explanation question on the false belief test with their performance on the comparable explanation question on the interpretation tasks. Whereas all the subjects passed the explanation question on the false belief test (100%), none of the younger subjects passed the explanation question on the lexical ambiguity test (0%), one of the 5- to 6-year-old subjects correctly answered this question on the referential communication task (10%), and only two of these same subjects passed the ambiguous figures task (20%), binomial tests, p < .01. Thus, even though children in the 5- to 6-years-old age group had no difficulty with the false belief test, and presumably had acquired this understanding some years earlier, they had still not developed equivalent competence with tasks requiring an understanding of interpretation.
On the control question in which subjects were presented with a "deviant" interpretation, 47% of the 5- to 6-year-olds and 77% of the 7- to 8-year-olds were judged to have passed. Many of the subjects could reject the deviant interpretations because they were not based on the stimulus in question, but this does not tell us whether or not these subjects can understand that two different interpretations of one and the same stimulus can be legitimate. To address this question, the explanation and prediction questions on the tests of interpretation must be considered. There was no significant difference between the explanation and prediction questions, $t < 1$. Therefore, these questions were combined and a mean score across both questions was used in further analyses.

Next, the subjects' performance on the tests involving interpretation and taste was compared across the two age-groups. The mean score across both the explanation and prediction questions on each task was used as the dependent variable in a 2 x 4 (Age Group x Task: lexical ambiguity, referential communication, ambiguous figures, and matters of taste) repeated measures analysis of variance with repeated measures on the last factor. This analysis revealed a significant main effect for age-group, $F(1, 18) = 21.06, p < .001$. As expected, the proportion of test questions passed by the 7- to 8-year-old subjects (.61) was significantly higher than the proportion passed by the 5- to 6-year-old subjects (.19). There was a significant main effect for task, $F(3, 54) = 8.16, p < .001$, with no significant task by age-group interaction, $F < 1$. Follow-up t-tests revealed that only the test of children's understanding of taste differed significantly from the other tests, involving lexical ambiguity, referential communication, and ambiguous figures, $t_{(19)} = 3.68, 4.27$, and 2.98, respectively, $p < .05$, corrected for familywise error rate. In addition, there was no significant difference between the proportion of questions across all the tests passed by the boys and the proportion passed by the girls, $t < 1$.

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Insert Figure 3 about here
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Discussion

The results of this study are consistent with the hypothesis that the understanding of interpretation is not equivalent to the understanding of false beliefs. Rather, interpretation would appear to involve a more complex understanding of knowledge and the mind than is implied in a grasp of the simpler possibility of mere ignorance, as evidenced by the fact that success on tests of interpretation typically occurs a number of years after children can pass a standard false belief test.

The subjects were also significantly more competent at explaining the source of disagreement on the matters of taste than they were on the tests of interpretation. And there was also a significant improvement in performance with age for the matters of taste. The fact that subjects' performance on these tests concerning differences in taste was less than perfect does not contradict Flavell et al.'s research (1990), and the findings of other investigators (e.g., Hart & Goldin-Meadow, 1984; Zahn-Waxler, Radke-Yarrow, & Brady-Smith, 1977), showing that well before the age of 5, children have an understanding that people can and do differ in their tastes. Flavell et al. (1990) showed that even 3-year-olds enjoy some success in tasks requiring only that they keep track of another person's "non normative value beliefs" (e.g., the fact that an experimenter disliked a cookie that tasted good to the child subject), but it should be noted that in the clearest of those several experiments the children were reminded of the other person's distinct preferences just before they were asked to report on these same preferences. Flavell et al. (1990, p. 927), comment that whether their subjects also sensed that "there need be no definite right or wrong in such differences of opinion is not known, but would be worth finding out." On the tests involving matters of taste employed in the present study subjects were required to first acknowledge that it is "okay" that the two puppet characters disagree over whether they like or dislike a type of soup or a particular painting (essentially the question posed by Flavell et al.) before going on to attempt to offer an explanation for this state of affairs. Thus, the majority of the subjects in Study 1 (90%) revealed an understanding that people legitimately differ in their tastes by acknowledging that it was "okay" for Mary and Maxi to disagreed about whether the
soup tasted good or bad. Many of these subjects, however, were unable to go on and offer reasons for these differences in taste. (The two 5-years-old subjects who did not agree that it was "okay" that the puppet characters expressed different tastes did not offer an explanation, and as a consequence it is difficult to know how to interpret their failures.) This recognition that the two puppets have acceptable different tastes is clearly more demanding than the criteria required for passing Flavell et al.'s tasks.

Subjects in the present study were required to provide counterpart explanations in order to pass the tests featuring differences in taste, just as they also were required to provide explanations on the false belief task, and the tests of interpretation. In contrast to those testing situations involving matters of belief, it is difficult to know what ought to count as an adequate explanation for differences in taste. In this study, the solution strategy adopted by many of the 5- to 6-year-olds (45%), and significantly more of the 7- to 8-year-olds (80%), consisted of simply announcing as a matter of fact that people differ among themselves in this way. That is, people simply prove to have different tastes. These results are comparable with a study conducted by Mansfield and Clinchy (1985) in which they found that 35% of 4-year-olds, 60% of 7-year-olds, and 97% of 10-year-olds explained differences in taste in terms of individual personal preferences. Similarly, on a somewhat simplified perspective-taking task, Zahn-Waxler, Radke-Yarrow, and Brady-Smith (1977) found that 61% of 3-year-olds and 100% of 6-year-olds correctly selected the appropriate food choice for a confederate with different tastes from their own. Explanations of these sorts are, of course, really just a way of restating the problem. Nevertheless, it is a form of explanation that both children and adults seem to count as acceptable.

As noted above, subjects' responses to tests of interpretation, on the one hand, and tests based on matters of taste, on the other, are different in quantitative ways, but they also differ in qualitative ways. In their responses to questions concerning matters of taste the subjects did not, for example, attempt to locate the source of the difference in opinions in the nature of the stimulus. Rather, they undertook to locate responsibility for such differences in esthetic judgements entirely within the person making the judgement. Conversely, the subjects who passed the tests of
interpretation did so almost exclusively by referring to the ambiguous nature of the message or picture itself. Thus, there was some clear evidence on the part of at least the older subjects of some recognition that, whereas tastes require no extrinsic justification, differences in interpretations must be warranted by an appeal to grounded evidence in the material world. That is, interpretations, unlike esthetic preferences, must be based on evidence and reasons grounded in the stimulus in question. This qualitative difference in the way children responded to the problems of interpretation as compared to the tasks involving matters of taste is consistent with the argument outlined above that the domain of taste may rest primarily on affective evaluations that are distinct from the epistemic matters underpinning interpretation. This attempt to drive a wedge between matters of taste and interpretation is consistent with Flavell et al.'s argument that beliefs direct one's attention outward, toward the world, whereas preferences direct one's attention inward, and goes some distance toward walling off the early arising ability to process individual differences in taste, without otherwise threatening the conclusion that children are slow to move toward a realization of the interpretive nature of knowing.

Further research regarding the development of various forms of children's understanding of taste is obviously required. Nevertheless, the data of this initial study seem to offer compelling empirical support for the theory driven conclusion that matters of taste have a developmental course that is different from the distinct nature of maturing thoughts about matters of interpretation.

In search for further support for a developmental difference between matters of taste and interpretation, plans were made to undertake a second study of interpretation, this time involving only adults. That is, even though it seemed appropriate to assume that the kinds of justifications adults typically employ for differences in taste would be comparable to those of intermediate school-aged children in that they would differ in a qualitative way from their justifications for differences in interpretation, it nonetheless seemed worthwhile to confirm this intuition before going on. This issue was addressed in Study 2.
STUDY 2

In Study 2, a group of 15 adults was presented with a subset of the questions concerning matters of taste and problems of interpretation already employed in Study 1. The purpose of this study was to evaluate the strong expectation that adults will respond, as did especially the older children in Study 1, in a qualitatively different manner when justifying differences in taste, on the one hand, and differences in interpretation, on the other hand.

Method

Subjects

The 15 adults who participated in this quick check upon what adults take to be the distinction between epistemic matters and matters of personal taste represent diverse educational backgrounds, and were selected on the basis of convenience from groups of students, graduate students and their spouses (8 women and 7 men). Their ages ranged from 18 to 43, and their educational backgrounds ranged from not having completed high school to undergraduate and graduate degrees in such diverse topics as computer science, medicine, history, psychology, geography, and social work.

Procedure

The subjects were presented with the two problems turning on matters of taste and two of the problems of interpretation previously employed in Study 1 (i.e., a problem based on ambiguous referential communication and an ambiguous figure) (see Appendix C for a complete protocol for Study 2). The order of these two types of tasks was counterbalanced, and these brief interviews were audio-taped and later transcribed. The general adequacy of these subjects' responses were classified according to the scoring system used in Study 1. More to the present point, however, these same responses were also divided into those explanations that located
responsibility for the different conclusions reached by the different stimulus characters either in the stimulus environment or these story characters themselves. That is, responses were either classified as accounting for the characters' disagreements predominately in terms of something about the person (internal source) or something about the stimulus event in question (external source). The subjects' responses were rescored by a second rater with 100% agreement between raters on both the pass/fail scoring system and on the types of explanation.

Results

The results of this study are simple and straightforward. All the adult subjects without exception (100%) passed both the tests of interpretation and taste. Similarly, each and every one of these adult subjects (100%) explained the differences in taste as justifiable differences in personal preference, and uniformly located the source of these differences within the persons expressing these conflicting opinions. These responses were generally indistinguishable from the responses offered by the children in Study 1 in that they simply acknowledged the differences in tastes that were reported and treated such differences as endemic to the different individuals who expressed such distinctive preferences. For example, subjects justified the puppets' likes and dislikes of a certain food item and a particular picture with statements such as: "everybody has different tastes..."; "personal preferences"; and "different people like different things." In direct contrast to their way of understanding differences in personal tastes, all the adult subjects justified differences in interpretation in terms of the ambiguity of the message or the picture presented. For example, when subjects were attempting to explain the fact that the two puppets had differently interpreted the ambiguous message that the experimenter was thinking of "the card with the red block," they said, "there are two red blocks." When subjects were justifying the disagreement between the puppets over whether the ambiguous figure was a duck or a rabbit, they stated, for example: "there are two things, or images in this picture"; " because it can be two things"; "Mary is seeing this as being the ears and Maxi is seeing it as being the bill. So they are seeing the same
thing differently." The point of interest here is that in their responses these adult subjects, like their child counterparts in Study 1, consistently located the source of the difference in interpretation in the ambiguity of the message or the picture, not in the personal attributes of the puppet characters.

Discussion

In brief, this short study provides further evidence of a difference between understanding matters of taste and the concept of interpretation, and, consequently, works to help justify a decision, taken up in Study 3, to focus attention more exclusively on the concept of interpretation. Thus, in Study 3 children's understanding of taste was not further explored and, instead, attention was focused exclusively on epistemic matters and the development of children's understanding of interpretation and its implications.

A number of issues, nevertheless, were raised in Studies 1 and 2 that are still in need of discussion. It seems clear, for example, that the stark distinction between subjects' explanations of matters of disputed taste in terms of internal personal preferences, and their explanations of conflicting beliefs on the tests of interpretation by making reference to the ambiguity of the stimuli is in some part an artifact of the assessment method employed. As defined here, "passing" a test of interpretation turned upon the subjects having made some reference to the ambiguous nature of the stimulus. This follows for the straightforward reason that the test questions posed concerned how multiple interpretations are in fact possible. Having uniformly met this simple standard, some subjects (27% of the adults), however, went on to speculate about why the puppet characters endorsed those particular interpretations, and in doing so proceeded to discuss the puppets' possible internal attributes. This mention of internal factors when discussing differences in interpretation is not taken here to imply that the internal versus external distinction should be discarded. Rather, it seems evident from their responses that when subjects mentioned internal factors they were considering the related question of why the puppets voiced those particular
interpretations, which goes beyond the question of how it is that two interpretations were possible to begin with. In other words, the possibility of multiple interpretations depends on the ambiguity of the stimulus in question. The further, although related question of why particular interpretations are endorsed by different characters, given the already mentioned stimulus ambiguity, may require speculation about the internal attributes of these characters.

Although further research into the question of how children and adults view the relation between matters of taste and matters of belief is clearly needed, the results of this study add to the findings of Study 1 and suggest that an understanding of the diversity of taste differs qualitatively from a grasp of the concept of interpretation. Since young children's recognition that people's tastes differ does not reflect an early understanding of interpretation, attention in Study 3 will be focused on the development of children's understanding of interpretation. At the top of any list of critical next steps beyond studies 1 and 2 is the need to replicate these findings and to test the conclusions drawn against other more reductive interpretations. The results of Study 1 needed to be replicated for two reasons. First, improvements in the procedure and questions needed to be introduced to rule out the possibility that the 5-year-old subjects' poor performance might have been due to a simple lack of proper understanding of the test questions posed. Second, a larger sample size was judged to be required for assessing the possibility of gender differences and interactions between age and type of question, further assessing possible differences between the types of questions concerning interpretation, and counterbalancing the order of the tests.
STUDY 3

A possible objection that could be raised to Study 1 is that the emphasis placed on matters of justification gave undue importance to issues of linguistic sophistication, rather than to real differences in the complexity of subjects' understanding of the knowing process. This common dilemma in developmental psychology has its roots in the distinction between competence and performance, and there are a number of ways to respond to this potential criticism. The relevant results from Study 1 that engage this problem need to be summarized briefly, however, before considering how Study 3 was designed to address these concerns.

All the subjects in the first study proved themselves to be competent at explaining the source of false beliefs in the false belief task, but failed similar questions that inquired into matters of interpretation. Thus, the subjects' problems with the tests of interpretation employed do not seem to be simply due to problems in constructing explanations in general. It is only when such explanations require an understanding of interpretation that younger subjects encounter difficulty. Still, it is possible to suppose that there was something obfuscating or otherwise "tricky" about the particular wording of these interpretation questions that worked as a stumbling block to artificially trip up the younger subjects in Study 1. This alternative reading of the results of Study 1 was evaluated in Study 3 by modifying the explanation question on the false belief test in order to make it almost identical in structure to the explanation question on one of the tests of interpretation. This procedural modification would allow a more direct comparison of children's explanations of the two types of task. In the false belief task already employed in Study 1, Maxi and Mary disagree about the location of an object, and this difference of opinion (i.e., Maxi's false belief) is due to the differential degree to which they are informed about the whereabouts of the toy. There is a similar disagreement between Maxi and Mary regarding the location of an object in the referential communication task originally employed in Study 1, but this difference in opinion is due this time to a difference in interpretation of an ambiguous message. In other words, on the referential communication task both Mary and Maxi possess the same information,
but they interpret it differently. Even without additional modifications similar levels of linguistic skill would already seem to be required to answer both questions, while at the same time a different conception of knowledge would be needed to appropriately answer the question concerning interpretation. This discussion underscores and helps bring out the fact that whereas Ruffman et al. (1991) claim that the type of ambiguity tasks employed in their own study are really "false belief tasks at heart," the problems of interpretation employed in the present research are fundamentally different from false belief tasks because the differences in beliefs being featured here arise due to different readings of precisely the same information, rather than the possession of different amounts of available information.

For the purposes of Study 3, a further modification was made in the false belief test to make it more similar to one of the tests of interpretation employed. In the explanation question on the false belief test used in Study 1 the subjects were asked only about the source of Maxi's false belief (i.e., "why does Maxi think his toy is in ... ?"). In Study 3 the subjects were asked what to an adult would seem a fuller version of the same thing, "Why does Maxi think his toy is in X and Mary think it's in Y?" This modification of the explanation question makes it closer (in fact almost identical) in structure to the explanation question on the ambiguous referential communication task already employed in Study 1. Thus, the subjects are required to give explanations to similar questions concerning a difference in beliefs. In the case of the false belief task this difference in beliefs arises because of Maxi's partial ignorance. In the referential communication task, by contrast, the difference in belief concerning the location of an object is due to different interpretations of the same ambiguous message.

The foregoing methodological nicety is in response to the potential criticism that the poor performance of the young subjects in Study 1 on questions about interpretation might be due to task complexity (performance factors), rather than lack of competence, and illustrates one strategy for dealing with this ubiquitous line of criticism (i.e., make the false belief test similar to the interpretation tests). Although criticisms of this sort can never be completely countered, one
additional defensive strategy is to simplify and clarify the questions on the interpretation tests. This solution strategy was taken up, as follows, in Study 3.

In the primary explanation question in Study 1 the children were asked "Is it okay for Mary to say ... and Maxi to say ... ?" One problem with using this form of question to elicit explanations is that some subjects took these questions in a moral or normative sense, by hearing them as equivalent to, "is it right or good for Mary and Maxi to think different things?" What we want to know in the place of such a reading is if children believe that it is legitimate (i.e., supportable with good reasons) for Mary and Maxi to disagree in this case. A more natural question might appear to be, for example, "Why is Mary waiting for a ring for her finger and Maxi waiting for a telephone to ring?" Pilot testing indicated that such questions caused some children to construct reasons for those specific interpretations. Therefore, the critical test question in Study 3 was phrased in a more general way to avoid the focus on those specific interpretations and to elicit instead the reasons that two different interpretations are possible. The form adopted for this question was, "Why does Mary say she's waiting for one thing and at the same time Maxi say he's waiting for another thing?" A probe question read as follows, "Does is make sense for Mary to say one thing and Maxi to say something else?", and "Why does (doesn't) it make sense?"

The subjects in Study 1 were also questioned concerning the possibility of making a prediction about how another child might interpret the ambiguous stimuli. In order to make the prediction question as parallel as possible to the explanation question, subjects were asked to make predictions about a third puppet character rather than a real person. In Study 1, all those subjects who did make predictions about how someone else would interpret the ambiguous message or picture were also asked how sure they were about their predictions. It is important to record subjects' level of certainty regarding such predictions because some children may feel inclined to make a prediction even though they may recognize that the circumstances permit only a simple guess. To improve the assessment of children's degree of certainty about their predictions, in Study 3 subjects were asked to use a pointer (see Robinson & Robinson, 1983; Robinson &
Whittaker, 1985) to select one of three categories of certainty: 1) "really sure"; 2) "not quite sure"; and 3) "don't know at all."  

Finally, none of the subjects in Study 1 had any difficulty with either the "look" or the "think" questions on the false belief test. In general, previous research has not found consistent differences between these questions, although there is some possibility that the "think" question may be slightly more difficult for 3-year-old subjects (Hala, 1994). Since the youngest subjects in Study 3 were to be 5 years old, only the more difficult "think" question was retained in order to shorten the task.

The procedure used in Study 3 was then quite similar to that employed in Study 1 except that problems involving matters of taste were not presented to the subjects.

Method

Subjects

A total of 48 boys and girls between the ages of 5 and 8 participated in this study. There were equal numbers of boys and girls at each of the four ages (5, 6, 7, and 8 years). There were 12 5-year-old children (mean age, 5 years 6 months, with a range of 58 to 71 months), 12 6-year-olds (mean age, 6 years 5 months, with a range of 72 to 83 months), 12 7-year-olds (mean age, 7 years 5 months with a range of 84 to 94 months), and 12 8-year-olds (mean age 8 years 4 months, with a range of 96 to 107 months). This was a predominantly middle-class, although racially and ethnically diverse, group of children drawn from day-cares and after-school-cares.

14 As discussed above, one difference between the referential communication tasks and the lexical ambiguity tasks is that in the hiding game used as a referential communication task in this study (from Sodian, 1990) there is a fact of the matter about where the object is hidden that could be checked to decide which of the two alternative interpretations of the ambiguous message is correct. On the other hand, in the lexical ambiguity tasks (talk of rings and pears/pairs), if there is a correct interpretation it depends on the speaker's intentions. In Study 3 one of the two referential communication tasks was a hiding game, as in Study 1. The other task, however, was a selection task in which the experimenter gave the puppets an ambiguous clue about which one of the cards he is "thinking of." This type of selection task is often employed in research on referential communication, and in this type of task, like the lexical ambiguity tasks, there is no "objective" fact of the matter. This modification of one of the referential communication tasks allows for a comparison between tasks in which there either is or is not an "objective" fact of the matter.
Procedure

The subjects were first presented with a standard false belief test, and then with six problems involving interpretation slightly modified from those used in Study 1. These six tasks consisted of two examples of each of the following types of problems: lexical ambiguity, ambiguous referential communication, and ambiguous figures (see Appendix D for a complete protocol for Study 3). The three types of problems of interpretation were completely counterbalanced in six different orders. The order of the two examples of each type of task was alternated within these six orders. The interviews were taped and later transcribed in order to score the subjects' responses.

Reliability

All the subjects' responses were rescored by a second rater who was blind to the subjects' ages and sex. Disagreements were resolved by a third rater. Overall (on a total of 864 responses) the agreement between raters was 92%; Cohen's kappa = .81. The agreement between raters on the individual questions: explanation, prediction, and deviant interpretation, was 91%, 88%, and 95%, respectively; Cohen's kappas = .81, .75, and .81, respectively.

Results and Discussion

As in Study 1, the central hypothesis to be evaluated was that there is an important distinction between the understanding of false beliefs and an insight into the interpretative nature of mind and the knowing process. In contrast to this view, other theorists (e.g., Perner, 1991) claim that false belief understanding entails understanding interpretation. Were this true it would follow that all subjects passing the false belief test should also pass the tests of interpretation. In this study, although all the subjects easily passed the false belief test, on average the 5-year-old subjects passed only 36% of the explanation of interpretation questions, and 13% of the prediction
of interpretation questions. The 8-year-olds, in contrast, passed 92% of the explanation of interpretation questions, and 67% of the prediction questions. This evidence offers good support for the claim that, although children at the age of 5 easily deal with problems concerning false beliefs, acquiring an insight into the interpretative nature of mind is a development that does not occur until some years later.

Twenty-seven of the 48 subjects passed both the false belief test and the tests of interpretation (i.e., passed more than 50% of the explanation questions on the tests of interpretation). The remaining 21 subjects who responded differently on the two tests all passed the false belief test while failing the interpretation tests, McNemar's $X^2$ (Siegel & Castellan, 1988) $(1, N = 48) = 19.05, p < .001$. This difference in level of difficulty between the two tests is also significant when only the 5-year-old subjects are considered, McNemar's $X^2$ $(1, N = 12) = 7.11, p < .01$.

The mean performance on the control question concerning deviant interpretations was close to the ceiling. On average the percentage of these questions passed by the 5-, 6-, 7-, and 8-year-olds, was 76%, 78%, 82%, and 96%. As expected, children of all ages in this study were fairly competent at recognizing and rejecting deviant interpretations, and justifying this rejection based on a lack of support for the deviant interpretation in the stimulus materials. The fact that the subjects passed these control questions demonstrates that they knew the deviant interpretations were wrong because they could not be warranted on the basis of the stimulus material in question. However, this result leaves unanswered the question of whether these subjects did or did not conceive of the possibility that two interpretations of the same stimulus could both be right. To address this issue we must turn to a more detailed examination of the subjects' responses to the explanation and prediction questions.

Preliminary analyses were first done to check for possible effects of order and sex. A $6 \times 3$ (Order x Task) repeated measures analysis of variance with repeated measures on the last factor revealed no significant effects, $F < 1$. A similar analysis with sex as the between subject factor revealed no significant main effect for sex, or task by sex interaction, $F_s < 1$. To check for the
effect of the order of presentation of the three types of tasks (i.e., first, second, third) on performance, a 4 x 3 (Age: 5, 6, 7, and 8 years x Order of Task: First, Second, and Third) repeated measures analysis of variance with repeated measures on the last factor and number of correct explanations as the dependent variable was conducted. This analysis revealed a main effect for age, $F(3, 44) = 5.60, p < .002$, and a main effect for order, $F(2, 88) = 6.39, p < .003$, which was qualified by an age x order interaction, $F(6, 88) = 2.82, p < .02$. An analysis of simple effects revealed that the improvement in performance with order was significant only for the 6-year-old subjects, $F(2, 88) = 10.73, p < .001$ (see Figure 4). This effect of the order of presentation on the explanation question did not extend to the prediction question. A similar analysis for the prediction question revealed no main effect for order, or interaction with age, $F s < 1$.

Binomial tests revealed that subjects' performance on the two instances of each type of ambiguity (lexical, communicative, and pictorial) did not differ significantly. Therefore, subjects' scores on the two instances of each type of task (e.g., the "duck-rabbit" and the "rat-man") were combined and mean scores across both instances were used for further analysis.

The next step in the analysis of these results was to compare the subjects' performance on the tests of interpretations across age. To address this question a 4 x 3 x 2 (Age x Task x Question: Explanation vs. Prediction) repeated measures analysis of variance was conducted with repeated measures on the last two factors and mean correct responses as the dependent variable. This analysis revealed significant main effects for age, $F(3, 44) = 6.80, p < .001$, and type of question, $F(1, 44) = 18.35, p < .001$, with no other significant main or interaction effects, $F s < 1$. Performance on the prediction question was significantly lower than performance on the explanation question. Follow-up trend analysis showed that there was a significant linear increase in performance from 5 years of age to 8, for both the explanation questions, $F(1, 44) = 15.9, p <$
.001, and for the prediction questions, F(1, 44) = 13.9, p < .001, with no significant departures from linearity. These results are further strengthened by significant positive correlations between subjects' total correct scores on the explanation and prediction questions (scores ranged from 0 to 6, combined across all six tasks) and the subjects' ages in months, r = .59, p < .01, and .58, p < .01, respectively.

Insert Figure 5 about here

It is not surprising that the prediction questions were harder for the subjects, even the older subjects, than the explanation questions. Understanding the difficulty of predicting how someone else would interpret an ambiguous message or picture seems to require first an ability to explain the basis for such multiple interpretations, plus the ability to make use of an implication of this interpretive diversity. (There also was no practice effect for the prediction questions.) It should be noted, in passing, that subjects who failed this question did not do so merely by attempting to make a prediction. Some of the subjects did make a prediction as to how another puppet might interpret the message or picture, but went on to justify what would seem, at first blush, to be an inappropriate response by answering in ways that were meant to go more deeply into the factors responsible for such differences in interpretation. For example, one subject argued that it is more likely that someone told to wait for a pear/pair would be waiting for a pear to eat "because you didn't say a pair of something, so it makes sense for it to be a pear." Thus, although some subjects did make a prediction, their argument in support of such predictions revealed an understanding of the interpretive nature of the problem in that they reflected a search for differences in the stimuli that could warrant the diverse interpretations assigned to the puppet figures.¹⁵

¹⁵ When they were presented with the ambiguous figures, the last 36 subjects were asked what they thought it was before the two images were pointed out. In response to the "rat-man" figure, 25% first saw the rat, 44% saw the man, 28% saw something else (e.g., "frog," "fish," "baby chick"?), and one subject saw both the rat and the man. In response to the "duck-rabbit" figure, 61% saw the duck, 36% saw the rabbit, and one subject saw both.
The results reported above clearly show that whereas the 5-year-old subjects pass the false belief test, children generally do not develop competence with tests of interpretation until several years later. As mentioned above, a potential criticism to which conclusions of this sort are open is that the assessment of children's understanding of interpretation is too dependent on their ability to provide the verbal explanations required. Thus, it could be argued that the failure of the young subjects in this study to provide explanations merely reflects imperfect performance due to task complexity, and does not adequately assess the subjects' underlying competence. In other words, it could be argued that children's conceptual competence may not be revealed because of performance factors such as difficulties in understanding the questions or in an inability to verbally construct appropriate explanations.

With respect to the ability of these young subjects' to verbally construct appropriate explanations regarding the problems of interpretation, it should be noted that all the subjects in the present study (and in Study 1) had no difficulty in providing explanations of the source of differing beliefs in the false belief task. It was only when the difference in the puppets' beliefs was the result of different interpretations of the same ambiguous stimuli that the young subjects in this study failed to provide coherent explanations. Study 3 also incorporated minor modifications of the questions used in Study 1 intended to make the false belief and one of the interpretation questions very similar in structure. In Study 3 the false belief question was: "Why does Maxi think his toy is in the yellow (blue) container and Mary think it's in the blue (yellow) container?" And the question on one of the referential communication tasks was: "Why does Maxi think the sticker is under the card with the big red block and Mary think it's under the card with the big blue block?" A typical 5-year-old subject's response to the false belief question was: "Because Maxi went outside and he put it away, and then Mary wanted to play with it and she put it away in the yellow container." A response typical of the 8-year-olds who were scored as passing the similar question on the interpretation problem is: "Cause there's two big blocks." The point to be made here is that a typical and perfectly adequate explanation for interpretive diversity can be shorter and simpler than an equally adequate explanation for a similar difference in beliefs that arise due to the
puppets' access to differential information. The mean number of words actually used by the 26 subjects who passed the interpretation test ($M = 19, SD = 18.3$), while smaller, did not differ significantly from the mean number of words used by these subjects in their explanations on the false belief test ($M = 24, SD = 14.6$). In framing their answers to questions about differences in interpretation some subjects went on to speculate about why the puppets had endorsed those particular interpretations (e.g., "maybe Mary likes the colour red"). If attention is directed only to the number of words actually required to pass the two tests, then the mean number of words on the test of interpretation ($M = 9, SD = 5.8$) is actually significantly lower than the mean number of words required to pass the false belief test ($M = 24, SD = 14.6$), $t(25) = 4.90, p < .001$.

With respect to the issue of the younger subjects' ability to even understand the questions on the problems of interpretation, note should be taken of the fact that the questions in Study 3 were changed from the questions employed in Study 1 in order to make them easier for the children to understand. As discussed above, the general form of the primary explanation question in Study 1 was, "Is it okay for Mary to say ... and Maxi to say ...?" The subjects of Study 1 generally seemed to have understood this question, but because some of them tended to take this query in a moral sense, it was changed in Study 3 to "Why does Mary say she is waiting for one thing and at the same time Maxi say he's waiting for another thing?" The question was phrased in this general way because it was found in pilot testing that when children were asked a more specific question such as, "Why is Mary waiting for a ring for her finger and Maxi waiting for a telephone to ring?" some children attempted to offer reasons for those specific interpretations. Although these modifications served to better clarify the question in Study 3, some subjects still gave specific answers for those particular interpretations (e.g., "Cause she wants a ring and he wants a telephone to ring," or "probably their favourite colours"). Younger subjects seemed to assume that they were really being asked two separate questions (i.e., "Why is Mary...?" and "Why is Maxi ...?") to which they responded by offering explanations such as "she's probably hungry and he needs a new pair of shoes." Such responses would be perfectly adequate for matters of taste because they concern individual differences in preference, but they do not
constitute an adequate explanation for problems involving multiple interpretation because no mention is made of the ambiguous nature of the stimulus being responded to. Thus, the younger subjects did not tend to recognize that the real problem to be explained was the conjunction of different answers to one and the same interpretive problem.

In Study 3, however, two primary explanation questions were employed in order to give subjects a second chance and offer them every opportunity to reveal an understanding of interpretation. If subjects failed to give an adequate answer to the first question they were asked the follow-up question (i.e., "Does it make sense for Mary to say one thing and Maxi to say something else?" and "Why does it (doesn't it) make sense?"). In response to this second explanation question some subjects went on to mention the ambiguity of the message or the picture and were scored as having passed the test item, but many of the younger subjects were not able to go beyond their initial explanation of the difference in interpretation in terms of the puppets' personal preferences.
CONCLUSIONS

The results of this program of research are consistent with the hypothesis that the understanding that knowledge is interpretive in nature is not equivalent to the understanding of the possibility of false beliefs. Rather, as anticipated, the concept of interpretation would appear to involve a more complex and significantly later arriving understanding of the constructive nature of the knowing process than is implied by the altogether simpler insight that persons who are differently informed may legitimately hold different beliefs. The understanding of interpretation is also distinct from the superficially similar issue of differences in taste. When subjects of any age so far tested discussed matters of taste, they assumed that the locus of responsibility for such differences was to be found within the persons making such different judgments. By contrast, when older subjects of 7 or 8 discussed contrasting matters of interpretation they laid responsibility for such differences on the ambiguous nature of the message or picture in question. These same qualitative differences between matters of taste and interpretation were confirmed in a second study with 15 adults. Like the children, these adults tended to treat matters of taste as different in kind from problems of interpretation, locating responsibility for differences in taste within persons, while seeing differences in interpretation as supported by the inherently ambiguous nature of the stimulus environment. Altogether, then, this program of research shows that an initial grasp of the notion of personal taste is both different from and significantly earlier arriving than is an appreciation of the possibility that one and the same thing can be assigned different meanings by different persons.

One possible criticism of the results of this series of studies is that the 5-year-old subjects may have failed the problems of interpretation just because they are not as articulate as the older children. That is, they may possess, but not be able to reveal that they possess, the concept of interpretation because they lack the words to properly explain themselves. Several lines of evidence speak against this dismissive reading of the results presented here. First, even the youngest subjects tested here were perfectly competent at constructing elaborate explanations to
account for counterpart differences in beliefs on the false belief task. Rather, the 5-year-olds only had difficulty offering up explanations when the stimulus characters' different beliefs were based on the same information. Second, it is important to note that the primary purpose of this research is to contrast what were hypothesized to be two distinct forms of understanding knowledge: false belief understanding versus understanding the interpretive nature of mind and knowledge. As the evidence presented here shows, the 5-year-old subjects' understanding of false beliefs was not in the least vague or inarticulate. Rather, their grip on the notion of false belief seemed crystal clear, implying, as the literature on children's developing theories of mind would suggest, that these children had most likely developed this insight some years before. That is, it was clear from their response to the false belief story that even the youngest of these subjects was easily able to anticipate the outcome of the story (e.g., when Mary moved the toy while Maxi was outside, the children often laughed or smiled in anticipation). Nothing like this was true, however, of the younger subjects' general puzzlement over the fact that, against all reason, two different puppet characters were shown giving different responses to one and the same stimulus event.

The fact that the 8-year-old subjects in the studies reported above had largely mastered the simple problems of interpretation employed in this research does not, however, necessarily imply that these same children have a mature or adult-like understanding of the complex issue of interpretation. Even though the 8-year-old subjects in these studies were competent at explaining differences in interpretation on these very simple tasks, they were still not equally competent at drawing the implication that it is difficult to predict how another person will interpret an ambiguous stimulus. The competence demonstrated in this research is seen, then, to indicate only a fledgling insight into the interpretative nature of the knowing process--a developmental process that very likely continues through adolescence, and probably early adulthood as well (Chandler, 1987; Kuhn, Pennington, & Leadbeater, 1983; Kuhn, Amsel, & O'Loughlin, 1988; Perry, 1970, 1981).16

16 A key issue to explore in future research in coming to a fuller appreciation of children's developing understanding of the concept of interpretation is the matter of their knowledge regarding the limitations of this concept. That is, as children are beginning to develop an understanding of when they can appropriately invoke the
Limitations and Suggestions for Future Research

In demonstrating a distinction between false belief understanding and a beginning grasp of the more complex notion of interpretation, and in so doing providing evidence of a more differentiated view of the development of children's understanding of mind than is commonly assumed in the theories of mind literature, this thesis also brings to light a number of interesting potential directions for future research. In what follows I will discuss several of these possible avenues of future study as well as return to some of the issues raised in the Introduction.

In an attempt to demonstrate the early appearance of a concept, one available methodology is to determine whether or not training can improve young children's performance on these tests of interpretation. Although such a training study would be an important advance in future efforts to better map the transition between false belief understanding, on one hand, and an achievement of an interpretive theory of mind, on the other, the present study sequence already provides some notion of interpretation as a explanation for disagreement, do they also recognize that there are situations in which this possibility can not be made to fit? If a knowledge claim is to be accorded the status of a legitimate "interpretation" it must be understandably based on the object or event in question, and thus, interpretations can be evaluated in terms of whether or not they are justifiable. This question of the evaluation of interpretations is unavoidable once the issue of interpretation has been raised (Bernstein, 1988), and adolescents' attempts to deal with the implications of this problem and the potential for relativism has already been explored by a number of authors (e.g., Chandler, 1987; Kuhn & Leadbeater, 1983). Young school-age children would not be expected to grasp, as do adolescents, the potentially relativistic implications of the interpretative character of the knowing process, but they may still recognize that some interpretations may be harder to judge or defend than others and that there are limitations as to what can count as a legitimate or warrantable interpretation.

One aspect of this matter of "legitimacy" that has been explored in a handful of studies is that of children's developing understanding of deviance, disorder and defense mechanisms (Chandler, Paget, & Koch, 1978; Cole & Pennington, 1976; Dollinger & McGuire, 1981; Roberts, Beidelman, & Wurtele, 1981). In these studies children's potential understanding of deviance typically has been assessed by presenting them with vignettes involving instances of abnormal behavior, some of which evidently turn on the deviant interpretations of these story protagonists. The broad conclusions arising from these studies is that there are clear age-graded changes in the readiness or ability of children to identify certain behaviors as falling outside the bounds of normalcy. None of these studies, however, has involved preschool children. In future research subjects could be asked more questions about "deviant" interpretations of the problems presented to them. Interpretations can be deviant in at least two ways. First, they may not be sufficiently based on the stimulus in question, and, therefore, could be thought of as just wrong. Second, interpretations could be partially based on the stimulus in question but clearly draw conclusions that go beyond what can be justified in terms of the stimulus, that is, they involve confabulation. Subjects could also be questioned about their perception of the individual offering such an abnormal interpretation. The subjects' responses to these questions will serve as an indication of the degree to which they have begun to recognize the limitations of interpretation and the possibility that interpretations that fall outside of some acceptable range may suggest something is seriously amiss about the person offering up such a view.
evidence relevant to this matter of plasticity. As indicated, the significant interaction between age and order of presentation of the tests of interpretation in Study 3, suggest that while training might be effective for 6-year-olds, and perhaps, to a lesser extent, 7-year-olds, who are already beginning to acquire some insight into the interpretive nature of knowledge, the 5-year-old subjects, by contrast, showed no improvement across the trials. Clearly, there is some support here for the prospect that a carefully designed training study could advance our understanding of this transitional period.

A second line along which future research might be carried out with profit is suggested by certain of the methodological choices adopted in the present study sequence. A defensible, but necessarily limiting choice made here involved presenting children with situations in which one object or message affords two interpretations that are both equally well supported by the available evidence. As argued in the Introduction, the basis for this methodological choice was that, in contrast to situations involving two unequally supported alternatives, where young children might well discount, and thus fail to mention, interpretations that are only weakly supported by the available evidence, the present strategy would be less likely to produce false negative results. An alternative strategy, however, would be to employ situations that hold the potential for many different interpretations, such as the Rorschach test, or situations in which the prospects for some alternative interpretations are slim, but potentially devastating in their consequences. These types of situations may be fairly commonly encountered in children's everyday life. Another such promising prospect is afforded by the study of humor. It is common, for example, for jokes to turn on the fact that a single word can have two or more meanings. The listener is set up to interpret the word in one way, and then, when the punch line is delivered, must search for a second meaning of the ambiguous word in order to make sense of the punch line. As mentioned in footnotes to the Introduction, earlier research on the development of children's humor and understanding of riddles tends to support the conclusions of this thesis. That is, children begin to appreciate the potential for such multiple meanings at about 7 or 8 years of age. A further type of commonly experienced situation in which children might realize the potential for multiple readings
of one and the same events are those social occasions on which it becomes apparent that all the
evidence points to an interpretation of a situation that presents oneself in a particularly bad light.
In order to save face, one is then obliged to take steps to ward off the possibility of being wrongly
suspected or accused (see, for example, Austin, 1961; Backman, 1985; Scott & Lyman, 1966).

A third major opportunity for future research is suggested by comments made earlier in
reporting on the social role-taking literature. The distinction between false belief understanding
and the more complex concept of interpretation that is demonstrated in this thesis should prove to
be a useful tool in the task of re-examining the older role-taking literature. As suggested in the
Introduction, some of the role-taking tasks that dominated the research literature in the 1970s may
prove, on analysis, to be essentially false belief tasks plus something else, whereas other
counterpart measures may come closer to being true measures of an interpretive theory of mind.
The work presented here has the potential, then, to serve as a bridge between the earlier literature
on social role-taking and the more recent research on children's theories of mind. There are, I
believe, important insights to be salvaged from this earlier and massive research effort directed
toward coming to a better understanding of children's developing social intelligence. In support
of the possible benefits of such efforts, some investigators working in the area of children's
developing theories of mind are now turning new attention to development in children's
conception of the mind after the age of four (Flavell, Green, & Flavell, 1995; Wellman &
Hickling, 1994).

An additional area of concern raised by, but not followed up in this thesis is the prospect
that young children's understanding that different people are entitled to their differences in opinion
regarding matters of taste, might be an early indication of their beginning insight into the
interpretive nature of knowledge. In the first two studies reported above some evidence was
presented to show that both children and adults treat matters of taste as being qualitatively different
from issues of interpretation. These findings are relevant to, but go no distance toward helping to
resolve, the long-standing philosophical debate concerning whether or not there is anything
foundational or "epistemic" that would allow for an objective arbitration of differences in matters
of taste (e.g., Gadamer, 1982; Herrnstein-Smith, 1988). This research has demonstrated a distinction between beliefs about matters of fact and matters of value by showing that they develop at different points in the ontogenetic course. The possibility, however, of a genetic relationship between an insight into the individualized nature of differences in taste and the subsequent appreciation of the possibility of interpretation remains to be explored. Although, after Hume and Moore, many philosophers have tended to assume that the distinction between values and facts is unbridgeable (Doeser, 1986), others, such as Putnam (1987), reject a simple dichotomy and argue instead for a continuum between values and facts. There is some suggestive evidence from children's responses to the present tests of interpretation that before such concepts are achieved, children may attempt to account for interpretational differences by resorting to explanations that are really only appropriate for differences in taste. For example, some subjects in these studies attempted to account for different interpretations of the ambiguous messages in terms of the puppets' personal preferences (e.g., "that's his favourite colour"). With further probe questions the older subjects would go on to point out the ambiguous nature of the message as the likely source of these different interpretations, but the younger subjects were unable to offer these or any other additional explanation.

One final aspect of the present results that tends to be overlooked when attention is focused, as it was in the present study sequence, only on the mean performance of age-groups, is the great deal of variability evident in the 6- to 7-year-old subjects' performance on the tests of interpretation. This variability, which is consistent with earlier studies on children's understanding of riddles that also rely on an appreciation of multiple meanings (Fowles & Glanz, 1977), suggests two additional directions for future research. First, this more complex insight into the interpretive nature of knowledge should make a difference for children in their attempts to navigate their social world. Presumably a more mature understanding of other people would lead to success in relations with both peers and parents, teachers and other adults. This hypothesis, while given indirect support by the old literature connecting social role-taking ability to various measures of interpersonal competence, still remains to be evaluated. Second, it would be
important to determine what this variability is related to in children's background (e.g., intelligence, parental style, number of siblings). This approach is beginning to be applied in the case of children's understanding of false beliefs. For example, Perner, Ruffman and Leekam (1994) have reported finding that the more siblings their young subjects had the better their performance on false belief tests. This suggests that social interaction is important in the development of social intelligence, but, of course, children may experience social interaction from sources other than their siblings, such as parents or day-cares and schools. All of this research would be interesting and important in its own right, and could, perhaps have applied implications, but it could also be used in the service of answering more fundamental questions concerning the best way to evaluate competing explanations of children's knowledge of the mind. This thesis is primarily a description of the development of children's understanding of knowledge, but it also raises questions about what it is that changes with development that enables children to understand the possibility and implications of multiple interpretations. One possibility is that rather than merely sequentially recognizing the possibility of alternative readings of the same stimulus, children must develop the ability to simultaneously hold two perspectives in mind in order to coordinate these perspectives.

Although many potential avenues of further exploration are raised by this thesis, the research presented here does clearly suggest a more differentiated view of children's epistemic development than the view commonly endorsed in the theories of mind literature. This thesis, it is hoped, will help serve to shift the attention of the field away from a continued preoccupation with the counterintuitive results of standard false belief tests, and promote instead a fresh line of research into what preschoolers have yet to learn about the mind (Flavell, Green, & Flavell, 1995), and what new insights develop during the early school years and beyond.
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FIGURE 1. The "Duck-Rabbit"
FIGURE 2. The "Rat-Man"
FIGURE 3. Study 1. Proportion Correct Responses to the tests of Taste and Interpretation by Age-Group.
FIGURE 4. Study 3. Proportion Correct Responses by Age and Order of Presentation.
FIGURE 5. Study 3. Proportion Correct Responses by Age and Question Type.
APPENDIX A: Conceptual and Theoretical Background, and Empirical Evidence for the Study of
Children's Understanding of Interpretation

Interpretation and Representation

Perner (1991) concludes that passing a false-belief test is a demonstration of an interpretive understanding of mind. This conclusion is reached, it would seem, because Perner begins with the assumption that the mind is necessarily representational in nature. That is, knowledge is seen by him to consist of mentally representing objects in a pregiven external world. From this assumption about the nature of the mind and the process of knowledge acquisition, the problem simply becomes a matter of charting young children's developing insight into the nature of the representational process. The end-point of this development is the possession of a "representational theory of mind". Since the false belief test is read as a clear demonstration of an understanding of the process of representation, children who pass this test are assumed to have demonstrated an understanding of metarepresentation. That is, they demonstrate that they understand the nature of the representing process, and thus, they must also understand interpretation (Perner, 1991).

According to Perner (1991), "a representation represents something as being a certain way" (p. 19). Further characteristics of the representing relation between medium and content follow from this definition, and one of these characteristics is misrepresentation. Perner states that "for any representation it is possible to misrepresent. For instance, using a flash often produces photos in which people have red eyes. Such a photo would misrepresent your beautiful blue eyes as being red" (p. 20). To illustrate the idea that a false belief is a misrepresentation, Perner uses an example of a general who falsely believes that a soldier is on duty. This belief "misrepresents the real situation in the field, and ... is characterized by the divergence between the real situation it represents (referent) and how it represents that situation as being (sense)" (p. 30). For Perner, an essential characteristic of representation is interpretation, and when young children
demonstrate their metarepresentational competence by showing their understanding of false belief, it necessarily follows that they must also understand interpretation. Once a child has achieved an understanding of metarepresentation the "child can understand cases of misrepresentation by separating sense (interpretation) from referent" (Perner, 1991, p. 284). Thus, for Perner interpretation is just misrepresentation.

Although misrepresentation may be an aspect of some uses of the concept of interpretation, it is really just about different ways of getting it wrong. Implicit in the assumption that the mind is representational is the assumption of a pregiven external world, and the mind's task is to accurately represent it internally. Of course, there may be mistakes in the process of representing the world, and these mistakes constitute misrepresentation or interpretation. Since false beliefs are misrepresentation it would appear to follow logically that if a child demonstrates an insight into the representing process, by passing a false belief test, this child must also understand interpretation.

There are two interrelated aspects that I wish to question about this line of argument. First, Perner equates interpretation with misinterpretation. That is, by his reckoning there are many ways to get things wrong but there is only one way to get it right. This is because, in his account, there is a pregiven reality which one is trying to accurately represent. Second, this understanding of interpretation is tied to an understanding of the nature of the mind and the knowing process as representational. There are two senses of representation at work here. First there is the notion of representation as construal. This is the relatively uncontroversial claim that "cognition always consists in construing or representing the world a certain way" (Varela, Thompson, & Rosch, 1991, p. 134). Although Perner sometimes uses representation in this way he also relies upon a second stronger sense of representation in which we assume that "the world is pregiven, that its features can be specified prior to any cognitive activity. Then to explain the relation between this cognitive activity and a pregiven world, we hypothesize the existence of mental representations inside the cognitive system" (Varela, Thompson, & Rosch, 1991, p. 135).
Furth (1969) showed that this is the "crux of the empiricist position: knowledge has its adequate source in external reality or external actions and resides in internal re-presentations" (p. 81).

Although the assumption that the mind is representational in the second sense outlined above, is clearly the dominant view in cognitive science it is not above question, and Perner (1991, chapter 5) acknowledges that whether or not the mind is best thought of as representational is controversial. This representational or computational view of the mind is being increasingly questioned (e.g., Overton, 1994a, b; Varela et al., 1991; Furth, 1987; Glasersfeld, 1979, 1982, 1984, 1988; Lakoff, 1987). For example, Overton (in press) claims that "interpretation is a necessary feature of all human activity from the reflex of the infant to the reflective abstract categories of the epistemologist" (in press, p. 8). This position on interpretation from embodiment theory or constructivist epistemology converges with the approach to interpretation and the rejection of the correspondence theory of truth and the representational theory of knowledge in recent philosophy (e.g., Putnam, 1987, 1988; Rorty, 1979, 1991).

While the difference of opinion outlined above will not be decided by empirical research reported in this thesis, I have introduced the idea of interpretation and the argument that the mind is constructivistic rather than representational in nature in order to show its relationship to the claim that a commonsense understanding of the mind includes some notion that knowledge is interpretive. Although I have presented arguments for a constructivistic view of knowledge, it should not be necessary to resolve this ongoing debate before empirically exploring the possibility of locating a commonsense understanding of the interpretive nature of knowledge in children's and adults' understanding of the mind. I do not mean to argue that most adults hold to an explicit constructivistic theory of mind in which insight into the constructivistic nature of knowledge is consistently applied. But I do propose that most adults achieve some commonsense understanding that the same object or event can be legitimately interpreted in different ways, and that this insight is different from and later developing than the understanding that beliefs can be mistaken.
In the next section I will turn to a brief review of some of the literature on the theory of interpretation in order to provide some intellectual context for this thesis.

The Concept of Interpretation

Bernstein (1988), in a discussion of Freud, remarked that the 20th century could be labeled "The Age of Interpretation" (p. 88). The importance of the concept of interpretation in the current intellectual climate is reflected in the fact that a simple computer search for books with "interpretation" or "interpretive" as a title word revealed over 3,000 such books in the University of British Columbia's library collection (not including older titles still in the card catalogue). Yet even this large number of volumes concerned with the concept of interpretation significantly underestimates the importance of this concept in the current intellectual climate because it does not include book chapters, articles or titles referring to hermeneutics. And, of course, many of the important works on interpretation do not include the word in the book's title. Perhaps the most significant example of this is Gadamer's (1982) magnum opus, "Truth and method", which is one of the most important books on interpretation. However, this crude measure of the interest in the concept of interpretation does reveal how, in one form or another, the notion of interpretation permeates almost all fields of inquiry. A sample of the topics collected in this library search include justice and legal theory, music, literary studies, architecture, culture, religion, environmental studies, politics, history, film, geology, medicine, sociology, anthropology, psychology, psychoanalysis, astronomy, translation, poetry, and, of course, philosophy.

A discipline that has been greatly influenced by the "epistemology of interpretation" is anthropology. Crapanzano (1992), in a series of essays, frequently characterizes the anthropologist as Hermes, in Greek mythology the messenger of the gods. Hermes, when he agreed to be Zeus' messenger, promised not to lie, but he did not promise to tell the whole truth (Crapanzano, 1992, p. 45). The anthropologist, as a messenger sharing in "Hermes' dilemma", must make the message "relevant" to the listener, yet this will change the message. Carrying the
message necessarily involves interpretation because the anthropologist cannot simply repeat what she has heard, she must understand it, and thus, must translate and interpret it.

Interpretation is, of course, a central concern in literary criticism, and an important debate in the philosophy of literary theory concerns the relevance of the author's intentions for the interpretation of literary texts (Iseminger, 1992). From the traditional intentionalist position it is assumed that the text means what its author intended. In opposition to intentionalism, Barthes (1960/1992) has proclaimed "the death of the author", and Beardsley has argued for "the authority of the text", by which he means that an interpretation may be independent of what the author meant when composing the text. In what Beardsley (1970/1992) termed an "intentionalist backlash", Hirsch (1967/1992) has argued, "in defense of the author", that the meaning of a text is determined by the author's intentions, and Knapp and Michaels (1985/1992) maintain that it is impossible to have intentionless meaning. Shusterman (1992) acknowledges that intention is necessary for meaning, but he points out that this intention is not necessarily the author's, it could also be on the part of the reader.

In an inquiry concerned with interpretation I must consider, if only briefly, the extensive history of this concept in many diverse fields, and especially in modern philosophy. In the next section I will briefly review the history of the concept of interpretation in philosophy.

"The Interpretive Turn": Interpretation in Modern Philosophy

In an introduction to a collection of papers on the "interpretive turn" in philosophy, Bohman, Hiley and Shusterman (1991) acknowledge that the more "philosophy and the interpretive disciplines proclaim the importance of interpretation in all inquiry, the less there is agreement about what it is, what interpretive practices presuppose, and how to judge interpretive successes and failures" (p. 1). To understand these disagreements it will be helpful to approach the concept of interpretation in philosophy from an historical perspective.

Originally, hermeneutics referred to the interpretive discipline that emerged in the 17th century concerned with the proper interpretation of biblical scripture. The goal of this discipline
was to interpret these biblical texts in order to uncover the message from God that was assumed to be contained in the Bible (Meichenbaum, 1988; Solomon, 1985). The term "hermeneutics" comes from Hermes, the messenger of the Greek gods. To accomplish his task of carrying messages from the gods to mortals, Hermes had to be able to understand and interpret the gods' messages so that he could translate them and convey the messages to the mortals (Mueller-Vollmer, 1985). The term was brought into philosophy by Dilthey and it now has a much broader meaning.

Dilthey, who brought the hermeneutic tradition to the interpretation of texts in general, maintained that historical events must be interpreted in their context (Meichenbaum, 1988). Hermeneutics now has a much broader meaning than the practice of interpreting religious texts, and it has been described as the art of interpretation. This approach is largely based on the work of Heidegger and his student Gadamer. Hermeneutics was first applied in the social sciences because it was assumed that understanding human action required interpretation, whereas the natural sciences were thought to be in the business of explanation. The hermeneutical approach is in clear opposition to the positivist philosophy of science that has dominated the natural sciences for much of this century. Dilthey, and others, resisted the imperialistic spread of positivism to the human sciences and advocated hermeneutics instead (Woolfolk, Sass & Messer, 1988).

It was thought that the distinction in philosophy between explanation and interpretation formed a clear demarcation between the natural sciences and the human sciences. The goal of the natural sciences was assumed to be explanation, that is, achieving an explanation of the natural, pre-given world. The human sciences, on the other hand, were thought to be based on interpretation because meaning must be attributed to human action. The rejection of this demarcation between the natural and human sciences came from within the philosophy of the natural sciences. Hanson (1958), Kuhn (1962), Feyerabend (1988) and others rejected the positivistic claim of the "neutrality of observation" and the "giveness" of experience--i.e., the independence of data from theory. Instead they argued that "data is theory laden". With the claim that data is already theory laden, even the natural sciences are now seen to involve interpretation.
and the distinction between explanation and interpretation as a way to separate the natural and human sciences no longer holds.

If there is no longer a clear demarcation between the natural and human sciences, and if interpretation is involved in all inquiry, then "is interpretation the only game in town?" (Bohman, Hiley, & Shusterman, 1991). This "hermeneutic universalism" (Shusterman, 1991) is assumed by some philosophers, such as Gadamer who claimed that "all understanding is interpretation" (1982, p. 350), and Nietzsche (1968, para 481) who wrote that "facts are precisely what there is not, only interpretations". In response to this claim of "hermeneutic universalism", Taylor (1980) remarked that he and other "old-guard Diltheyeans, their shoulders hunched from years-long resistance against the encroaching pressures of positivist natural science, [will now] suddenly pitch forward on their faces as all opposition ceases to the reign of universal hermeneutics" (p. 26).

However, others, such as Shusterman (1991), believe that interpretation is a deliberate or reflective activity that is only required when we are faced with a problem situation. Similarly, Kuhn believes that interpretation is called for only when we are "confronted with texts or practices that are unfamiliar or puzzling" (Rouse, 1991, p. 45). Shusterman (1991), in his attempt to argue that there is something "beneath interpretation", used the concept of interpretation in a way that may be closer to a commonsense understanding than the current claim in philosophy that it is "interpretation all the way down". Shusterman argues that interpretation implies some "deliberate or at least conscious thinking, whereas understanding does not" (p. 114). Interpretation, according to Shusterman, also characteristically involves a problem-situation (p. 126).

Historically, a major division has been assumed between the natural and the human sciences (Naturwissenschaften and Geisteswissenschaften). Interpretation was thought to apply only to the human sciences, whereas the natural sciences were assumed to be in the business of explanation because natural science deals with empirically verifiable fact. Historically, hermeneutics was applied to the human or interpretive disciplines, and this demarcation between the scientific enterprise and the interpretive disciplines has been reinforced by positivistic
philosophy of science for much of this century (Bohman, Hiley & Shusterman, 1991). It has only been in the last 20 or 30 years that philosophers of the natural sciences, such as Hanson (1958), Kuhn (1962) and others, have begun to argue that even the domain of what was once thought to be the cold, hard, objective facts of the natural sciences are also interpretive.

Even though it is now generally acknowledged that knowledge in the natural sciences also involves interpretation the issue of whether or not Geisteswissenschaften and Naturwissenschaften are different kinds is still debated. Rorty (1980) believes that "the demise of logical empiricism means that there is no interesting split between the Natur- and Geisteswissenschaften" (p. 39). On the other hand, Dreyfus (1980) and Taylor (1980) argue that important differences remain between the human and natural sciences. Kuhn (1991) agrees with Taylor that the natural and the human sciences are different and that a line can be drawn between them, but he differs in how that line should be drawn. Kuhn (1991) argues that interpretation applies in the natural sciences just as in the human sciences, because "no more in the natural than in the human sciences is there some neutral, culture-independent, set of categories within which the population--whether of objects or of actions--can be described" (p. 21). Thus, the "normal science" of a particular period is based on a hermeneutic framework, or a "paradigm", a term that Kuhn introduced but now seldom uses, "having totally lost control of it" (Kuhn, 1991, p. 22). However, Kuhn argues that what practitioners of natural science do seldom involves hermeneutics because most of their work is "normal science" within a "paradigm" that has been passed on to them from their teachers. Thus, according to Kuhn (1991), the natural sciences require a hermeneutic base, but they "are not themselves hermeneutic enterprises" (p. 23). In contrast to the natural sciences, Kuhn argues that in the social sciences "new and deeper interpretations are the recognized object of the game" (p. 23).

Thus, although the interpretive nature of the subject matter of the human sciences (i.e., human action) is recognized, the question of whether or not this applies to the facts of natural science is still debated by experts. It is possible that the development of children's growing
awareness of what domains of knowledge are open to interpretation parallels, in some rough fashion, the course of this awareness in the history of philosophy.

One implication of an understanding of interpretation is that interpretations must be warranted. That is, to count as legitimate, an interpretation must be based on evidence and good reasons. It is to this issue of the evaluation of interpretations that I turn to in the next section.

**Deviant interpretations**

Bernstein (1988) points out that the present concern with interpretation raises a question that "resonates throughout most of modern philosophy" (p. 89), that is, how are interpretations to be evaluated? Bernstein rejects the possibility of any rigorous set of standards or rules with which to judge interpretations. But he does not believe that this rejection of any permanent "legitimizing matrix of cognitive evaluations " (p. 90) leads inevitably to the conclusion that all interpretation, and thus all knowledge, is trapped in relativism. Rather, Bernstein (1988) argues for an elaborate "choreography of critique"; a "logic of argumentation and counter argumentation" (p. 90) with which it is possible to critically evaluate interpretations, because these interpretations must be supported with evidence and good reasons. Thus, he concludes that the refutation of objectivism does not necessarily lead to relativism (Bernstein, 1983).

It is beyond the scope of this thesis to further explore the moral and political implications of this fundamentally important question of if or how alternative interpretations can be evaluated that is at the centre of many debates in modern philosophy, such as the modern-postmodern debate (Bernstein, 1985, 1991). But I raise this issue because, as Bernstein (1988) points out, it is a question that cannot be avoided. And, also, because even in a common sense understanding of interpretation there must be some understanding of the limitations of interpretation--i.e., some insight that not all interpretations are equally valid.

The necessity for some insight into the limits of interpretation in order to be judged as understanding interpretation can be illustrated with reference to the understanding of belief. An adequate understanding of the concept of belief includes the understanding that beliefs can be
mistaken. If it is evident that someone assumes that beliefs always and necessarily match the state of the world we would have to say that he or she fails to understands the nature of belief. Just as a complete understanding of belief entails the idea that beliefs are sometimes false, an adequate understanding of interpretation includes the idea that interpretations can be more or less adequate. That is, interpretations are not just made up, they are not equivalent to guesses, and they must be grounded in evidence and good reasons. Thus, in order to be judged as having achieved some beginning understanding of interpretation children should be able to evaluate interpretations and state which interpretations are good and which are "silly". That is, they should have the ability to determine if interpretations could potentially be supported with evidence and reasons if the claim to validity is challenged.

How do people evaluate alternative interpretations? How do people judge whether two alternative interpretations are both legitimate or whether one of them is deviant? To address this question I will appeal to Bernstein's (1988) discussion of this issue in philosophy. As noted above, Bernstein argued that although there may be no set of rules for judging interpretations, it is nonetheless possible to evaluate alternative interpretations through a process of logical argumentation and counter argumentation, or a "choreography of critique". That is, it should be possible to support interpretations with good reasons or evidence. Of course, Bernstein shares this insight with Habermas. In Habermas' (1981/184) theory of communicative rationality he distinguishes communicative rationality from cognitive-instrumental rationality. In instrumental rationality the relationship between the subject and the object is of primary importance and this form of rationality refers to the instrumental mastery of the environment. This form of rationality tends to dominate modern life and Habermas has referred to this domination as the pathology of modern life. But he argues that this is not all there is to rationality. In a communicative context we regard someone as rational if they are able to support an assertion, if it is challenged, with evidence and good reasons. When people make assertions they implicitly make a claim to validity, and if that claim is challenged they would be expected to justify their statement with a chain of good reasons.
It is this process through which the validity of interpretations can be evaluated that allows us to distinguish legitimate interpretations from deviant interpretations. A deviant interpretation cannot be supported with good reasons and evidence. The distance between the interpretation offered and the object being interpreted is simply too far, that is, the interpretation lacks sufficient grounds. And, if challenged, its validity cannot be supported through a "choreography of critique". This shows that the difference between valid interpretations and deviant interpretations is qualitative rather than quantitative because the difference concerns the process of reasoning rather than the content of reasoning.

A similar conclusion can be reached with Searle's language of "direction of fit" or with the older Piagetian concepts of assimilation and accommodation. A deviant interpretation involves too much assimilation, there are just not enough grounds for the interpretation. There is no basis for a "choreography of critique", no way to support a validity claim if it is challenged. Just as a balance between assimilation and accommodation is necessary, so too is a balance required in terms of "direction of fit". If a statement is based completely on a "world to mind direction of fit" (i.e., the world is made to fit the mind) then it cannot form part of a rational discourse with other people because there are not sufficient grounds for others to recognize that interpretation as legitimate.

**Theories of Mind and Social Perspective-Taking**

The recent interest in children's "theories of mind" appears to be addressing similar questions to that addressed in the earlier literature on social perspective taking. This earlier literature was also concerned with the development of children's understanding of persons and relationships (e.g., Chandler, 1977; Selman, 1976, 1980). Social perspective-taking generated a great deal of interest and research in the early 1970s, yet it is now almost totally eclipsed by the recent work on children's "theories of mind". What happened to this earlier research tradition, and what is its relationship with the theories of mind research? For some developmental psychologists the theories of mind bandwagon is an industry that is founded on repackaging earlier research on perspective-taking, and it is sometimes suggested that this "old wine in new
bottles" has little to offer in the way of fresh insights regarding the development of children's social intelligence. However, for some commentators there is a continuity between the literatures on perspective-taking and children's theories of mind. Since Flavell's career spans the intervening decades between the 1960s and the early 1990s, he tells a fairly continuous story from perspective taking research in the 1960s, and 1970s to the theories of mind work in the 1980s and 1990s (Flavell, 1992). And Flavell asks the question that, given the fact that the recent research on theories of mind and the work on metacognitive and social-cognitive development all concern the child's folk psychology, how are we to integrate the three literatures?

On the other hand, Perner (1991; Perner & Astington, 1992) is far more dismissive of the earlier Piagetian inspired research. He makes a sharp distinction between an explanation of children's social intelligence in terms of the possession of a theory of mind versus the notions of egocentrism and role-taking. Perner and Astington (1992) characterize the Piagetian position as Cartesian in orientation, that is, it is assumed that the mind is transparent to itself and we understand our mental states through direct introspection. Thus, "children should have little difficulty understanding their own minds [and] the principal developmental difficulty should lie in trying to figure out other people's minds" (p. 151). Empirical evidence it then offered that favors the theory view rather than the Cartesian view (Gopnik, 1990, 1993; Perner, 1991; Perner & Astington, 1992; Wimmer & Hartl, 1991).

Some background is needed to provide a context for this discussion. The research on role-taking was largely inspired by Piaget's theory, and in particular his concept of "egocentrism". However, Chandler and Boyes (1982) suggest that "Piaget's theory appears to have functioned more as a springboard to, than a solid theoretical foundation for" (p. 389) most of the role-taking research. The concept of egocentrism was often taken as a "fact" of childhood that could be studied in a theory-neutral way, rather than as a theoretical characterization of children's thinking (Chandler & Boyes, 1982). The construct of "egocentrism" refers to a lack of differentiation between the self and other people (Shantz, 1983). And, as Shantz (1983) points out, egocentrism tended to be equated with a lack of role-taking ability. However, the ability to differentiate
between self and other may be only one of the abilities required to take other people's roles (Shantz, 1983).

The social perspective-taking approach encountered difficulties when it became apparent that different measures of perspective taking did not correlate well and it seemed that different measures were assessing different competencies (e.g., Borke, 1971, 1972; Chandler & Greenspan, 1972; Urberg & Docherty, 1976). Although one proposed solution to this empirical problem of a lack of correlation between different measures of role-taking was the suggestion that this problem could be solved by more rigorous measurement procedures (Enright & Lapsley, 1980), others believed that the problem could be traced to a lack of theoretical clarity concerning the concept of egocentrism (Shantz, 1983). The assumption that egocentrism is a unitary construct is usually attributed to Piaget. And Piaget did not distinguish different types of egocentrism, but he did use the term in varying ways in different contexts, and a reading of the multiple uses of egocentrism can convey some of the complexity packed into this single concept. Piaget (1923/1955) first used the term egocentrism in his book, The language and thought of the child. In the studies reported in this early book, Piaget categorized children's speech as either egocentric or socialized. According to Piaget, "this talk is ego-centric, partly because the child speaks only about himself, but chiefly because he does not attempt to place himself at the point of view of his hearer" (Piaget, 1923/1955, p. 32). Piaget found that about 45% of the language of the 6-year-old children in his sample was egocentric, and this percentage declined after about the age of 7 or 8. However, it is not clear that these children completely lacked the ability to adapt their speech to the needs of others because 55% of their speech was socialized in this way. A second clue that what Piaget was referring to was not just a lack of ability, but also a lack of effort on the child's part, is Piaget's perhaps humorous or cynical suggestion that this form of speech also occurs in adults. The child "feels no desire to influence his hearer nor to tell him anything: not unlike a certain type of drawing-room conversation where every one talks about himself and no one listens" (Piaget, 1923/1955, p. 32).
Piaget (1932/1965) also discussed egocentrism in his study of moral thought. Here egocentrism occurs in the context of a morality of constraint between children and adults because the inequality between them leads to a unilateral respect which prevents the children from taking the adults' perspective, and the children effectively "remain imprisoned in their own perspective" (Chapman, 1988, p. 62). On the other hand, with peers, the child is able to take another child's perspective, and thus, is able to achieve a morality of cooperation. Here the use of egocentric thought appears to be influenced by the social context, and, perhaps, the child's rights in particular social situations. The age norms for the decline of egocentric thought in the context of morality are later than for the egocentric speech reported earlier (Piaget, 1923/1955).

Yet another example of Piaget's use of the concept of egocentrism can be found in his discussion of adolescent thought. Piaget used the term "Messianism" to characterize adolescent thought, because, according to Piaget, "the adolescent in all modesty attributes to himself an essential role in the salvation of humanity and organizes his life plan accordingly" (Piaget, 1964/1967, pp. 66-67). These three examples of Piaget's use of the concept of egocentrism, while not even considering the far more common use of this concept in the context of concrete-operational reasoning such as solving the "three-mountain" task, give some indication of the complexities that are packed into one concept. However, this discussion is not meant to suggest that we can look to Piaget to unravel these complexities. I merely suggest that even in Piaget's intuitive use of the concept of egocentrism it may not have been the unitary construct that is was taken for in the role-taking literature. It remains to be a task inherited by the theories of mind literature to more clearly specify the nature of the knowledge or abilities that underlie these various manifestations of role-taking.

It is hoped that this thesis may serve as a bridge between the earlier research on social perspective-taking and the more recent work on children's theories of mind, because both of these literatures have much to offer. The theories of mind work offers a more differentiated approach to the abilities required to pass various measures of perspective taking. On the other hand, the social perspective-taking literature offers a far richer and more complex description of the development
that awaits children after they have achieved the insight that beliefs can be false than can be found in most work on theories of mind (Chandler, 1988).

The focus of the theory of mind approach seems to have been captured by the very compelling empirical demonstration that young preschoolers seem to lack a concept of false belief. As mentioned above, this is read as a clear demonstration of an understanding that the mind is representational in nature, which is taken to entail an understanding of interpretation, even at the age of 4 years. Yet theorists working within the social perspective-taking approach did not attribute an understanding that two people may interpret the same thing in different ways to children at this young age. And theorists such as Chandler and Selman described many other insights into the nature of persons and relationships that are achieved by children after the age of four. Selman (1976, 1980) described five levels of social perspective taking competence, and Chandler (1987, 1988) discussed the development of children's understanding of the nature of knowledge in terms of a movement from "retail doubt" to "wholesale doubt", with several stations beyond this in efforts to deal with the insight that doubt permeates knowledge.

However, it would be fair to say that the great interest generated by both the role-taking and the theories of mind literatures reflects the intuition that the question of children's understanding of other people is of fundamental importance. One source of this interest in children's developing social intelligence can be found in Piaget's (1923/1955, 1924/1928, 1932/1965) early work. From another perspective it could be argued that since humans live together in social groups, the ability to successfully navigate one's social environment may have been a more powerful selection factor in the evolution of intelligence than the physical environment (Byrne & Whiten, 1988). This is not to imply that social knowledge of persons is in any way innate, as Fodor (1992) would have it, rather that humans must have the ability to develop this knowledge if they are to be successful, because our environment is so fundamentally social in nature. This just reinforces the intuition that may be responsible for the great popularity in developmental psychology of both the social perspective taking and the theories of mind
literature, that we cannot underestimate the importance of children's ability to understand the talk and action of other people.

In the research reported here, I am attempting to assess only a first insight into interpretation, and not the more developed insights that are achieved by older children and adolescents. Thus, I will be exploring the point at which children first begin to appreciate the possibility of "retail doubt" (Chandler, 1987, 1988), or in Selman's (1976, 1980) terms this would be the difference between level 0 and level 1.

Evidence Regarding Children's Understanding of Interpretation

It is now clear that there are conflicting claims regarding the age at which children first begin to show an understanding of the notion of interpretation. Chandler (1988, 1992) argues that it is not until 6 or 7 years of age that children develop the insight that two people may interpret the same thing in different ways, and Taylor (1988a, 1988b) has interpreted her research as support for Chandler's position. Pillow (1991) has also conducted research showing that it is not until approximately 6 or 7 years of age that children begin to understand that a person's prior expectations will influence their interpretation of events. Fabricius and his colleagues, beginning with a very different approach and methodology, similarly reached the conclusion that it is not until 8 or 10 years of age that children begin to develop a "constructivistic theory of mind" (e.g., Fabricius & Schwanenflugel, in press). In contrast, Perner and Davies (1991) and Ruffman, Olson and Astington (1991) disagreed with these conclusions, and instead claim that already by the age of 4 children understand the need for interpretation. Perner (1991) also cites Flavell's research on visual perspective taking as evidence that 4-year-old children understand that the same picture can be interpreted in different ways. I will now turn to the evidence that has been offered in support of these various claims regarding the age of onset of an interpretive "theory of mind."

To sort out these conflicting claims and the evidence offered in support for these positions it is necessary to examine these studies in some detail.
While examining the empirical evidence supporting these conflicting claims regarding the onset of an interpretive understanding of mind it is also important to be aware of the different ways in which the concept of interpretation is used. What we see in this debate over young children's understanding of interpretation is a replay of a common theme in developmental psychology, that is, the issue of what criteria should be used to assess a particular form of competence (Chandler & Chapman, 1991). As is often the case in these debates, different investigators use different criteria in deciding when to assign competence. This is an example of the "conceptual confusion" that Wittgenstein described in psychology, because although the same word is used by different investigators it takes on different meanings in different contexts (Chapman, 1987). Thus, we need to examine the ways in which these various theorists use the notion of interpretation.

Interpretation and Visual Perspective-Taking

A line of research that appears relevant to the issue of children's understanding of interpretation is Flavell and his colleagues' (Favell, 1978; Flavell, Everett, Croft, & Flavell, 1981; Masangkay, McCluskey, McIntyre, Sims-Knight, Vaughn, & Ravell, 1974) studies of Level 1 and Level 2 visual perspective-taking. In these studies, when 3- and 4-year-old subjects were presented with a picture of a turtle in front of them on the table, they were able to correctly state whether it was standing on its feet or lying on its back. The subjects were then asked how the turtle would seem to someone sitting opposite to them across the table. Four-year-old children responded correctly that the other person would see the turtle lying on its back, but 3-year-old children could not correctly answer this question. Perner (1991) cites this research as evidence that at 4 years of age children already understand that the same picture can be interpreted in different ways.

Children's competence at stating how other people would see a picture of a turtle is a demonstration that they understand that people will have different visual experiences of the same object from different perspectives, but this simpler meaning of interpretation is conflated with
interpretation as meaning an appreciation of the fact that different people may attach different meanings to the same object or event. Thus, level 2 visual perspective taking is not equivalent to an understanding of interpretation (Chandler, 1992).

**Interpretation and Visual Ambiguity**

Most of the studies addressing the issue of approximately when children begin to understand that knowledge is interpretive have been based on a methodology that was originally employed in the study of role-taking (Chandler & Boyes, 1982; Chandler & Helm, 1984). Chandler and Helm (1984) used a series drawings, called "droodles", based on a cartooning style popularized by Roger Price (1953). This procedure involves a series of line drawings over which can be placed a cardboard overlay in which a small rectangular viewing window has been cut out, allowing a restricted view of the larger drawing. This view is intentionally ambiguous regarding the nature of the drawing of which it is a fractional part. The droodle's caption allows one to make sense of the ambiguous keyhole view in a way that would not be possible without such contextualization. For example, one droodle consists of two triangles extending into the window, one from the side and the other from the bottom. The caption, "a ship arriving too late to save a drowning witch", allows the viewer to infer that the triangles are the bow of a ship and the top of a witch's hat.

Chandler and Helm (1984) showed 4-, 7-, and 11-year-old children a set of expanded drawings and then the subjects were asked how another child might interpret only the portion of the drawing that was visible through the viewing window. The subjects, because they had seen the whole drawing, had more knowledge that was available to someone who could merely see the restricted view, and this knowledge would have to be set aside to accurately predict the experience of a naive observer. Chandler and Helm found that 4-year-old children consistently attributed their own knowledge to the naive observer. Thus, they would assume that another child viewing the droodle would know that the triangles were the bow of a ship and the top of a witch's hat, and state that the other child would say it was a ship and a witch. The 7-year-old subjects were more
competent at realizing the another child, lacking their own behind-the-scenes knowledge, would not be able to guess the nature of the larger drawing. However, it was only the 11-year-old subjects who were fairly consistent in their ability to predict that someone viewing just the droodle portion would have no chance of correctly guessing what the larger drawing depicted, unless they had prior knowledge of the larger drawing.

These results are consistent with the description of young preschool children as "copy theorists". That is, at this age children associate knowledge with things themselves, without the insight that the subject also has an interpretive role in knowledge acquisition. Not until early school age and school age do children shift from this object-centered understanding to a subject-centered position regarding the location of the origins of knowledge.

Taylor (1988a, 1998b) described two levels of conceptual perspective-taking based on Chandler and Boyes' (1982) ideas about a copy theory of knowledge. At Taylor's first level of conceptual perspective-taking children equate seeing with knowing, and children have difficulty separating their knowledge of a shared visual event from the interpretation of someone who has less background knowledge than they possess. Children at this level tend to assume that if two people view an object or an event, their knowledge or interpretation will be identical. That is, they will not consider the effect of their own background information on their understanding of an object or an event, and they will attribute their own knowledge to the other person. With a copy theory of knowledge children think of knowledge as originating in things themselves, and thus, if two people see the same things they should acquire the same knowledge. At Taylor's proposed level 2 of conceptual perspective-taking children make a shift in the locus of the origin of knowledge from the object to the subject. Children now become able to take background information that is not shared into account when deciding how someone else would interpret a perceptual display.

Taylor used a modified version of Chandler and Helm's (1984) droodle procedure to test this "seeing = knowing" hypothesis. In this version of the droodle procedure several partial views of a series of pictures were used that varied in informativeness. In addition to the identity
of the animals in the picture (e.g., a giraffe), children were also told what the animal was doing (e.g., the giraffe was sitting down) and personal information about the giraffe (e.g., the giraffe's name was George). Children were then asked if a naive observer who just saw small, nondescript parts of the animals through a small viewing window would know what the animals were, what they were doing and the personal information.

When nothing was visible through the window 4-year-old children reported that an observer would not be able to identify the object, but they "tended to claim that seeing a small nondescript part, or sometimes even a tiny edge, was sufficient to allow the observer to identify the object" (Taylor, 1988a, p. 711). These level 1 errors were still often made by the 6-year-old subjects, but the 8-year-old children had developed a level 2 understanding that seeing a nondescript part would not enable an observer with no previous knowledge to correctly identify the object. Although children did tend to attribute knowledge of the identity of the animal to the naive observer, they were less likely to assume that the observer would also know what the animal was doing and personal information (e.g., the giraffe was sitting down and his name was George).

Taylor's (1988a) second experiment was a training study in which children watched a puppet having difficulty guessing the identity of ambiguous portions of drawings. Apparently, being made aware that multiple interpretations of the same picture are possible enabled 4-year-old children to perform almost at the level of the 6-year-old subjects who lacked the training. Training had less effect on the 6-year-old children, probably because they were already fairly competent at this task.

Pillow (1991) sought to extend the research on children's understanding of visual ambiguity (e.g., Taylor, 1988) and verbal ambiguity (e.g., Sodian, 1988), to consider children's understanding of ambiguous actions. Rather than ask children to make judgments about a naive observer's knowledge, Pillow asked children about an observer with prior beliefs that would bias the observer's interpretation of the action in question. In the first experiment children were told a series of stories in which one character disliked another character, who committed an act of
ambiguous intention (e.g., a character bumped into a desk and knocked a toy airplane onto the floor). This study was designed to investigate whether or not children could use an observer's prior bias (positive or negative attitude) toward the actor to judge whether the observer would decide whether the ambiguous action was intentional or accidental. Pillow found that second graders (approximately 8 years of age) were competent at using an observer's bias and previous beliefs when predicting the observer's judgment. This is a demonstration of their understanding that prior expectations can influence the interpretation of action. On the other hand, kindergartners (approximately 6 years of age) were inconsistent in their correct use of an observer's bias and prior expectations to predict a judgment. They tended to be correct in some situations but not in others.

In a second experiment, Pillow (1991) attempted to simplify the task. Instead of requiring children to consider the intentional vs. accidental distinction, the ambiguous event was the act an actor was performing (i.e., putting something into a container or taking it out). In addition, the stories in this experiment all involved two observers with contrasting perspectives. For example, two children see a child holding a rabbit in front of its cage. The subjects must decide, based on the two children's prior expectations whether the children will believe the child is taking the rabbit out of the cage, as they have been told not to, or if the child found that the rabbit had escaped and is returning it to the cage. In this experiment, kindergartners (approximately 6 years of age) proved to be able to correctly predict how an observer with prior expectations would interpret the scene, but preschoolers performed near chance levels on these questions. Only the second graders were able to appropriately justify their answers.

Schwanenflugel, Fabricius, and Alexander, (1994; Fabricius & Schwanenflugel, in press) studied the development of children's understanding of mind by studying children's knowledge of the relations among various mental activities. They argue that this reveals children's understanding of the nature of the mind. From their studies with 8 and 10 year old children, and adults, they suggest that at 8 years of age children think of the mind as a sort of information processor, and at 10 years they are beginning to develop the constructivistic theory of mind that
adults possess. They use a very different approach and methodology than has been used in most research on children's theories of mind and it is interesting that they reach a similar conclusion.

In contrast to the position that an understanding of interpretation is not achieved by children until they reach the age of 6 or 7, several other investigators claim that this insight is already in place by most children's fourth birthday. Perner and Davies (1991) claim that 4-year-old children understand that the mind has an active role in evaluating the truth of verbal information. Perner (1991) claims that 4-year-old children "start to understand the need for interpretation. What is lacking is adult accuracy in judging how much and what needs to be visible before the depicted object can be identified" (p. 274). Perner and Davies' (1991) goal was to investigate the age at which children acquire a "notion of mind as an active information processor". They take this to be equivalent to an understanding of interpretation, but what Perner and Davies mean by an understanding of mind as involving the active processing of information is the insight that the truth or falsity of statements must be evaluated in terms of previously held beliefs, or background knowledge. The question they addressed in their first experiment was "whether children understand that belief formation is not a passive copying of the most recent information received but involves active evaluation of that information in view of existing beliefs" (Perner & Davies, 1991, p. 56).

In this first experiment, Perner and Davies (1991) questioned 3- and 4-year-old children about the likely response of a character, portrayed by a puppet, when presented with information regarding the location of a football or the identity of an object (i.e., whether a brick was real or fake). The puppet either had no opinion about these matters or already held firm beliefs. Perner and Davies found that most 4-year-old children were competent at predicting that a naive person without a previously held firm belief would accept as true a message from someone claiming to have relevant knowledge. But these children also expected that a person with already firm preconceptions regarding the location of a football or the identity of a brick would reject, as misguided, a statement that conflicted with his or her pre-existing beliefs. This, according to Perner and Davies, is clear evidence that even 4-year-old children understand the active role of
existing beliefs in evaluating new information. Furthermore, Perner and Davies (1991) argue that "even children at this early age cannot be described as entertaining a copy theory of mind in which the mind is seen as a passive recorder of information" (p. 58). Although Perner and Davies qualify their claims somewhat by acknowledging that this "nascent interpretive theory of mind is, of course, not very accurate" (p. 65), they advocate a quantitative difference between a 4-year-old child's understanding of mind and an adult's understanding rather than a qualitative difference.

There are two aspects to unpack in these conclusions. First, Perner and Davies' (1991) use of the idea of interpretation is somewhat liberal, because there is no construal of experience, there is only an evaluation of the truth or falsity of information. Second, Perner and Davies misconstrue the idea of a copy theory. Perner and Davies (1991) state that "Chandler and Boyes put the emphasis on direct informational contact with reality" (p. 53, italics in original). Although there are certainly grounds for this interpretation from Chandler and Boyes' (1982) vivid metaphors of "projectile firings from things themselves" (p. 391), and facts as being the "epistemological equivalent of a bullet in the brain", the important part of the idea of a copy theory is that knowledge comes from things, rather than being an interpretive product. The important achievement is a shift in the locus of knowledge from objects to subjects, and "knowing begins to be recognized as a constructive, meaning-generating, human activity" (Chandler & Boyes, 1982, p. 395). Thus, while Perner and Davies' research is of interest, it is not a demonstration of what I mean by an interpretive understanding of mind, nor is it evidence against Chandler's notion of a copy theory.

Ruffman, Olson and Astington (1991) reach a similar conclusion to Perner. They believe that their results "show that an understanding of visual ambiguity begins around age 4 and is firmly in place by age 5" (p. 100). Ruffman et al. take this as evidence that instead of interpretation being a stage that is reached after false-belief understanding, there is only one stage and this is reached when children acquire an understanding of false-belief. Further, Ruffman et al. argued that the reason that "ambiguity tasks are solved around age 4 is that they are false belief
tasks at heart—in recognizing that the other would not know, children were required to recognize that the other could hold a false belief* (p. 101).

However, Pillow (in press) points out that Ruffman et al.'s 4-year-old subjects performed above chance only when both they and the doll, acting as the observer, were uninformed about the identity of the objects, and they could correctly respond in this condition merely by attributing their own ignorance to the doll. Ruffman et al. claim that their procedure assesses young children's understanding of the need for interpretation, and there is a sense in which it is appropriate to use the term "interpretation" in regard to Ruffman et al.'s task, because they were asking the children if the stimulus was "interpretable". That is, the children had to evaluate whether or not there was enough information presented for a naive observer to correctly identify the object. However, in this use of interpretation there is something that the object really is. Whereas when Chandler uses the idea of interpretation he is referring to the understanding that there may be no single fact of the matter, but rather there are situations in which there may be two interpretations of an object that may both be legitimate. The achievement that we are interested in is a shift in the locus of knowledge from objects to subjects.

The studies by Perner and Davies (1991) and Ruffman et al. (1991) are about children's understanding of whether or not another person will have enough information to correctly identify an ambiguous object. Most of the studies of ambiguity have been based on a methodology employed by Chandler and Helm (1984) in which subjects are given restricted informational access to a drawing. With this methodology there really is some fact of the matter, although it is hidden behind a screen, and subjects must decide if the portion visible in the restricted view is sufficient to correctly judge the identity of the drawing or object. Although this procedure may assess a form of understanding of interpretation, what is really need is a procedure in which everyone is presented with the same information.

Most of the studies described above on children's understanding of interpretation or assimilation have involved asking children to infer the knowledge of either a naive observer, or an informed or biased observer, after the observer has been exposed to incomplete or ambiguous
information (Pillow, in press). The logic behind this research is that if children understand the role of prior information in the assimilation of new information, then they should be able to accurately predict the conclusions that an observer will draw from ambiguous information when the observer either lacks or possesses certain key bits of information. Children's understanding of the role of prior expectations or knowledge on the conclusions drawn from ambiguous information has been studied in the area of visual ambiguity and ambiguity in human action and communication (Pillow, 1991).

An important exception to this line of research is a study that was conducted by Lalonde, Chandler and Moses (1992). Lalonde et al. conducted a series of experiments using the droodle procedure and found that 7-year-old and some 6-year-old children, but not 5-year-old children, are able to come up with different interpretations of the same ambiguous restricted portion of a line drawing. This could be read as an understanding that the object is ambiguous, since it allows different interpretations, but it is different from evaluating whether or not a character has enough information to correctly identify an ambiguous object. This is a demonstration of a form of understanding of interpretation because the children must understand that the picture can be interpreted in multiple ways since they have just done so, but it is not yet a demonstration of the children's ability to use this idea of interpretation in predicting or explaining people's action.

Another relevant study was conducted by Mansfield and Clinchy (1985). They presented 3-, 4-, 7- and 10-year-old children with vignettes in which two people disagreed about something. For the 3- and 4-year-old children, the source of the disagreement involved either matters of immediately verifiable fact or subjective opinion. The 7- and 10-year-old children were also presented with versions of these vignettes, as well as stories involving more points on the "continuum from the most objective to the most subjective" (p. 6). The stories involved four domains: verifiable fact, debatable fact, interpretation, and taste or value. However, the example that they give of a vignette involving interpretation consists of a mother and her son disagreeing about whether another child is "yucky" or "nice." This seems similar to their story involving matters of taste in which a father and his son disagree about whether or not a new soup is "gross."
These short stories were presented to the children with one picture and then the subjects were asked a series of questions: "Why do you think they would disagree about this?"; "Who do you think is right?"; "Why?"; "Why do you think that he said [whatever he said]?"; "Can they find out for sure who is right?"; "How?"; "Can they come to an agreement?"; "Does one have to be right and one wrong?"

One of the ways Mansfield and Clinchy (1985) coded the children's responses to these questions was whether the children believed that there was a single answer ("Absolutism"), or whether they believed that both positions were legitimate ("Multiplism"). The 3- and 4-year-old children were almost completely absolutist in their responses, that is, they believed that only one of the protagonists could be right (although 24% of the time they said they did not know). This held even in matters of taste where the preschoolers maintained that experience would prove one of the protagonists right.

Mansfield and Clinchy (1985) created a category they called "objective multiplism" in which the children suggested that the "disputants were referring to different aspects of the same phenomenon" (p. 12). The multiplism is "objective" because it is located in different aspects of the same phenomenon. The examples from this category involve the ingenious stretching of the concept of "absolutism" to account for occasions involving disagreement, while still maintaining their faith in absolute empirically-derived truth. The category of "subjective multiplism" originates in the subject rather than the object, and they found that this type of response increased with age.

These results from the Mansfield and Clinchy (1985) study are similar to what I would predict, except that I would expect 4-year-olds to be more successful on matters of taste. However, it seems that in Mansfield and Clinchy's vignettes involving taste the opinions were expressed before the food was actually tasted, so the preschoolers claimed that the issue could be decided by actually tasting the food. If this was corrected I would expect 4- and 5-year-old children to be successful in this domain. This prediction is consistent with a study by Flavell, Flavell, Green, and Moses (1990) in which they also examined the "fact to value" continuum. Flavell et al. were interested in whether young children would have less difficulty inferring that
someone else holds an odd, nonnormative belief about a matter of taste or value than they do in inferring a false belief about a matter of fact. As predicted, Flavell and his colleagues found that young children do have more success when the beliefs refer to values rather than matters of fact.

*Epistemological Development in Adolescence*

Adults' understanding of interpretation has been studied by Kuhn, Pennington, and Leadbeater (1983) under the rubric of "cognitive relativism." Following Perry's (1970, 1981) pioneering work on the developmental progression from absolutist to relativist thought in college students, Kuhn et al. developed a measure with which they could observe subjects applying their implicit assumptions about knowledge rather than asking them to describe these epistemologies. This measure consists of presenting subjects with two discrepant accounts of a fictitious historical event. The subjects were asked to evaluate the conflicting accounts of the "Fifth Livian War" from a "South Livian" historian and a "North Livian" historian. Kuhn et al. described a sequence of developmental levels in the understanding of knowledge, and they found these levels to be strongly age-linked in a sample of school children in grades 6 to 12 (Kuhn, Amsel, & O'Loughlin, 1988, Chapter 12).

The work of Enright and his colleagues (Enright, Lapsley, Franklin, & Steuck, 1984) on "belief-discrepancy" reasoning has some relevance for the present research. They presented children with dilemmas, asked them to resolve the dilemmas, and then presented the subjects with a statement from another child who had resolved the dilemma in the opposite way. They were interested in how children of different ages dealt with differences of opinion, in particular they were interested in how the children evaluated or judged another person who had expressed an opinion that differed from their own. They were studying the development of tolerant views towards disagreeing others, and their dilemmas involved moral considerations. In contrast, the research reported here is concerned with how children account for the fact that people can reach differing interpretations of the same event or object. That is, it is concerned with the development
of children's conceptions of knowledge, but I would argue that one source of tolerance may be an appreciation of the interpretive nature of knowledge.
False-belief test:
The false-belief test is modeled on the Maxi task. The experimenter will introduce the subjects to two puppets (Mary and Maxi). Maxi is playing with a toy and he places it in a red box when he goes out to play. While Maxi is out (under the table) Mary takes the toy out and plays with it. Then she puts it away in the blue box and goes out. Maxi comes back in:

"When Maxi comes in he will want his toy."

The subjects will be asked the following prediction questions:

"Where will Maxi think his toy is when he first comes in?"

"Where will Maxi look for his toy when he first comes in?"

[These questions will be counterbalanced.]

"And where is the toy really?"

"You're right, Maxi did look in the red box."

If the subjects do not answer the questions correctly, they will be told that, in fact, Maxi did look for his toy in the red box:

"Well, Maxi actually looked in the red box."

All the subjects will then be asked the following explanation question:

"Why do you think Maxi looked in the red box?"

If the subjects are overly brief they will be asked the follow-up, probe question:

"Tell me more about that."
1) **Matters of taste:** (first example)

The experimenter will show the subjects a picture of a bowl of soup:

"*(Subject's name)* this is a picture of a bowl of soup that Mary and Maxi's mothers make sometimes. Mary do you like this soup?"

[with Maxi under the table]

"Yes, it tastes good. I like it."

[Mary goes under the table and Maxi comes out.]

"Maxi, do you like this soup?"

"No. it tastes bad. I don't like it."

**Explanation Questions**

"Is it okay for Mary to say the soup tastes good and Maxi to say it tastes bad?"

"Why is it okay .../Why isn't it okay ... ?"

Standard probe if the subject is vague.

"You said .... Can you tell me more about that?"

**Prediction Questions**

"Now, Mary likes the soup, but Maxi doesn't like it. If we tell children in another school about the soup do you think that they will like the soup or not like it, or wouldn't you know what they would think?"

If the subject takes a position the experimenter will ask:

"How can you tell what someone else will think about the soup?"

"How sure are you that they will say that?"

If the subject says "I don't know", then ask

"Why is it hard to tell what someone else will think?"
Matters of taste: (2nd example)
The experimenter will show the subjects and the puppets a picture of a painting, and ask:
"(Subject's name) here is a picture of a painting. Maxi do you like this picture?" [with Mary under the table]
"Yes, I like it. I think it's nice. I would like to have it in my room." [Maxi goes under the table and Mary comes out]
"Mary do you like this picture?"
"No. I don't like it I think it's ugly. I wouldn't like to have it in my room."

Explanation Questions
"Is it okay for Maxi to say he would like to have the picture in his room and Mary to say she wouldn't like to have it in her room?"
"Why is it okay ... /Why isn't it okay ... ?"
Standard probe if the subject is vague.
"You said .... Can you tell me more about that?"

Prediction Questions
"Now, Maxi likes the picture, but Mary doesn't like the picture. If we show this picture to children in another school do you think they will like the picture or not like, or don't you know what they would say?"

If the subject takes a position the experimenter will ask:
"How can you tell what they will say?"

"How sure are you that they will say that?"

If the subject says, "I don't know", then ask
"Why is it hard to tell what they will say?"
2) **Ambiguous referential communication:** (first example)

"Now we are going to play another game with Maxi and Mary. While they are under the table and can't see I will hide a penny under one of these cards. Then they can come out and I will give them a clue about where to look for the penny."

The experimenter will hide the penny under the card with a large red block.

"Okay, Maxi and Mary, the clue is; the penny is under the card with the big block."

"Mary show us where you think the penny is." [with Maxi under the table]

"I think it's under the card with the big red block." [Mary goes under the table and Maxi comes out]

"Now Maxi, show us where you think the penny is."

"I think it's under the card with the big blue block."

**Explanation Questions**

The experimenter must ensure that the subject understands both of the possible locations allowed by the ambiguous message.

"I told them that the penny is under the card with the big block. Is it okay for Mary to say the penny is under the card with the big red block and for Maxi to say it's under the card with the big blue block?"

"Why is it okay ...? Why isn't it okay ...?"

Standard probe if the subject is vague.

"You said .... Can you tell me more about that?"

**Prediction Questions**

"Now, Mary thinks it's under the card with the big red block, and Maxi thinks it's under the card with the big blue block. If we told children in another school that the penny is under the card with the big block would they think it's under the card with the big blue block or the card with the big red block, or wouldn't they know what to think? [counterbalance]

If the subject takes a position then ask

"How can you tell what they will think?"

"How sure are you that they will think that?"

If the subject says "I don't know", then ask:

"Why is it hard to tell what they will think?"

**Deviant interpretation:**

"Well, Josef says it's under the card with the small red block. Does it make sense for Josef to say that or does it not make sense?"

"Why ...?"
Referential Ambiguity: (2nd example)
The procedure described above will be repeated for a second ambiguous message:
"Now we are going to play the game again. We will put Maxi and Mary under the table and I will hide the penny. Then they can come out I will give them a clue about where to look for the penny."
The experimenter will hide the penny under the card with a small red block.
"Okay, Maxi and Mary, the clue is; the penny is under the card with the picture of a red block."
"Maxi show us where you think the penny is. [with Mary under the table] I think it's under the card with the big red block.
[Maxi goes under the table and Mary comes out]
"Now Mary show us where you think the penny is. I think it's under the card with the little red block."

Explanation Questions
The experimenter must ensure that the subject understands both of the possible locations allowed by the ambiguous message. Then the experimenter will restate the problem in the question:
"I told them the penny is under the card with the red block. Is it okay for Maxi to say the penny is under the card with the big red block, and for Mary to say it's under the card with the little red block?"

"Why is it okay ...? Why isn't it okay ...?"
Standard probe if the subject is vague.
"You said .... Can you tell me more about that?"

Prediction Questions
"Now, Mary thinks it's under the card with the big red block, and Maxi thinks it's under the card with the little red block. If we told children in another school that the penny is under the card with the red block would they think it's under the card with the big red block or the card with the little red block, or wouldn't they know what to think?
If the subject takes a position ask:
"How can you tell what they will think?"

"How sure are you that they will think that?"
If the subject says "I don't know", then ask
"Why is it hard to tell what they will think?"

Deviant interpretation:
"Well, Josef says the penny is under the card with the big blue block. Does it make sense for Josef to say that or does it not make sense?"

"Why . . . ?"
3) **Lexical Ambiguity**: (first example, homonym)

"Now we are going to play another kind of game with the puppets. Mary and Maxi, in this game you both need to wait here for a ring. Now Mary, tell us what you are waiting for."

"I'm waiting for a ring for my finger." [Show illustration; with Maxi under the table. Mary goes under and Maxi comes out] "Okay, Maxi, tell us what you are waiting for."

"I'm waiting for a telephone to ring." [Show illustration]

The experimenter will show the subject illustrations of the two possible meanings of "ring" to ensure that the subject understands both meanings.

**Explanation Questions**

"I told them to wait for a ring. Is it okay for Mary to say she is waiting for a ring for her ringer, and Maxi to say he is waiting for the telephone to ring?"

"Why is it okay .../Why isn't it okay ... ?"

Standard probe if the subject is vague.

"You said .... Can you tell me more about that?"

**Prediction Questions**

"Now, Mary says she is waiting for a ring for her finger, but Maxi says he is waiting for the telephone to ring. If we told children in another school to wait for a ring would they be waiting for a ring for their finger or the telephone to ring, or wouldn't they know what to think?" [counterbalance]

If the subject takes a position, ask:

"How can you tell what they would think?"

"How sure are you that they would think that?"

If the subject says "I don't know", ask:

"Why is it hard to tell what they would think?"

**Deviant interpretation:**

"Well, Josef says he is waiting for a necklace. Does it make sense for Josef to say that or does it not make sense?"

"Why ... ?"
Lexical Ambiguity: (Second example, homophone).

"Now we are going to play another game with the puppets. Mary and Maxi, in this game you both need to wait here for a pear/pair. Now Maxi, tell us what you are waiting for."

"I'm waiting for a pear to eat" [Show illustration, with Mary under the table. Then Maxi goes under and Mary comes out]

"Okay, Mary tell us what you are waiting for."

"I'm waiting for a pair of shoes." [Show illustration]

The experimenter will show the subject illustrations of the two possible meanings of pear/pair to ensure that the subject understands both meanings.

Explanation Questions

"I told them to wait for a pear/pair. Is it okay for Maxi to say he is waiting for a pear to eat, and Mary to say she's waiting for a pair of shoes?"

"Why is it okay ...? Why isn't it okay ... ?"

Standard probe if the subject is vague.

"You said .... Can you tell me more about that?"

Prediction Questions

"Now, Maxi says he's waiting for a pear to eat, but Mary says she's waiting for a pair of shoes. If we told children in another school about waiting for a pear/pair would they wait for a pear to eat or for a pair of shoes, or wouldn't they know what to think?" [counterbalance]

If the subject takes a position, ask:

"How can you tell what they will think?"

"How sure are you that they will think that?"

If the subject says, "I don't know", ask:

"Why is it hard to tell what they will think?"

Deviant interpretation:

"Well, Josef says he's waiting for an apple. Does it not make sense for Josef to say that or does it make sense?"

"Why ... ?"
4) **Ambiguous Figures:** (first example)
   a) The subjects will be shown the "duck-rabbit".
   "Now we will show Mary and Maxi a picture. Mary what do you think this is?" [with Maxi under the table]
   "I think that it's a duck" [Mary goes under and Maxi comes out]
   "Okay, Maxi, what do you think it is?"
   "I think that it's a rabbit."

**Explanation Questions**

The experimenter must ensure that the subject sees both entities.
"Is it okay for Mary to say it's a duck and Maxi to say it's a rabbit?"

"Why is it okay ...? Why isn't it okay ...?"

Standard probe if the subject is vague.
"You said .... Can you tell me more about that?"

**Prediction Questions**

"Now, Mary says it's a duck and Maxi says it's a rabbit. If we showed this picture to children in another school would they think it's a duck or a rabbit, or wouldn't they know what to think?" [counterbalance]

If the subject takes a position, ask:
"How can you tell what they will think?"

"How sure are you that they will think that?"

If the subject says, "I don't know", then ask
"Why is it hard to what they will think?"

**Deviant interpretations:**

"Well, Josef says it's an elephant. Does it make sense for Josef to say that, or does it not make sense?"

"Why . . . ?"
Ambiguous Figure: 2nd example.
The subjects will be shown the "rat-man":
"Now we will show Mary and Maxi another picture. Maxi what do you think this is?"
[with Mary under the table]
"I think that it's a rat" [Maxi goes under and Mary comes out]
"Okay, Mary, what do you think it is?"
"I think that it's a man with glasses."

Explanation Questions
The experimenter must ensure that the child sees both entities. Then the experimenter will restate the problem in the question:
"Is it okay for Maxi to say it's a rat and Mary to say it's a man with glasses?"
"Why is it okay .../Why isn't it okay ... ?"
Standard probe if the subject is vague.
"You said .... Can you tell me more about that?"

Prediction Questions
"Now, Maxi says it's a rat and Mary says it's a man with glasses. If we showed this picture to children in another school would they think that it's a rat or a man with glasses, or wouldn't they know what to think?"
If the subject takes a position, ask:
"How can you tell what they will think?"
"How sure are you that they will think that?"
If the subject says, "I don't know", then ask
"Why is it hard to tell what they will think?"

Deviant interpretations:
"Well, Josef says it's really a dog. Does it not make sense for Josef to say that, or does it make sense?"
"Why . . . ?"
APPENDIX C: Protocol for Study 2

**Matters of taste: (Example 1)**
The experimenter will show the subjects a picture of a bowl of soup:
"(Subject's name) this is a picture of a bowl of soup that Mary and Maxi's mothers make sometimes. Mary do you like this soup?"
[with Maxi under the table]
"Yes, it tastes good. I like it."
[Mary goes under the table and Maxi comes out.]
"Maxi, do you like this soup?"
"No, it tastes bad. I don't like it."

**Explanation Questions**
"Does it make sense that one of them likes the soup and the other one doesn't like it?"
"Why does it (doesn't it) make sense?"

Probe questions:
"Is it okay for Mary to say the soup tastes good and Maxi to say it tastes bad?"
"Why is it okay ...? Why isn't it okay ...?"

Standard probe if the subject is vague: "You said .... Can you tell me more about that?"

**Matters of taste: (Example 2)**
The experimenter will show the subjects and the puppets a picture of a painting, and ask:
"(Subject's name) here is a picture of a painting. Maxi do you like this picture?" [with Mary under the table]
"Yes, I like it. I think it's nice. I would like to have it in my room." [Maxi goes under the table and Mary comes out]
"Mary do you like this picture?"
"No. I don't like it. I think it's ugly. I wouldn't like to have it in my room."

**Explanation Questions**
"Does it make sense that one of them likes the picture and the other one doesn't like it?"
"Why does it (doesn't it) make sense?"

Probe questions:
"Is it okay for Maxi to say he would like to have the picture in his room and Mary to say she wouldn't like to have it in her room?"
"Why is it okay ...? Why isn't it okay ...?"

Standard probe if the subject is vague: "You said .... Can you tell me more about that?"
Referential Communication: (Example 2: Selection task)

The procedure described above will be repeated for a second ambiguous message for a selection task:

"Now we are going to play a different game. I will think of a card, and then I will give the puppets a clue about which card I'm thinking about." [The experimenter selects the card with a small red block.]

"Okay, Maxi and Mary, the clue is; I'm thinking of the card with the picture of a red block."

"Maxi show us which card you think I chose [with Mary under the table] I think it's the card with the big red block.

[Maxi goes under the table and Mary comes out]

"Now Mary show us which card you think I chose. I think it's the card with the little red block."

Explanation Questions

The experimenter must ensure that the subject understands both of the possible meanings of the ambiguous message. Then the experimenter will restate the problem in the question:

"I told them that I was thinking of the card with the red block. "Does is make sense for Mary to say one thing and Maxi to say something else?"

"Why does it (doesn't it) make sense?"

Probe questions:

"Is it okay for Mary to say one thing and Maxi to say something else?"

"Why does Mary think it's one card and Maxi think it's another card?"

Standard probe if the subject is vague.

"You said .... Can you tell me more about that?"

Ambiguous Figure: (Example 1: "Duck-Rabbit")

a) The subjects will be shown the "duck-rabbit".

"Now we will show Mary and Maxi a picture. Mary what do you think this is?" [with Maxi under the table]

"I think that it's a duck" [Mary goes under and Maxi comes out]

"Okay, Maxi, what do you think it is?"

"I think that it's a rabbit."

Explanation Questions

The experimenter must ensure that the subject sees both entities.

"Does is make sense for Mary to say one thing and Maxi to say something else?"

"Why does it (doesn't it) make sense?"

Probe questions:

"Is it okay for Mary to say one thing and Maxi to say something else?"

"Why does Maxi think it's one thing and Mary think it's another thing?"

Standard probe if the subject is vague.

"You said .... Can you tell me more about that?"
False-belief test:
The false-belief test is modeled on the Maxi task. The experimenter will introduce the subjects to two puppets (Mary and Maxi). Maxi is playing with a toy and he places it in a yellow container when he goes out to play. While Maxi is out (under the table) Mary takes the toy out and plays with it. Then she puts it away in the blue container and goes out. Maxi comes back in:
"When Maxi comes in he will want his toy."

The subjects will be asked the following prediction question:

"Where will Maxi think his toy is when he first comes in?"

"And where is the toy really?"

"You're right, Maxi did look in the yellow container."

If the subjects do not answer the questions correctly, they will be told that, in fact, Maxi did look for his toy in the yellow container:
"Well, Maxi actually looked in the yellow container."

All the subjects will then be asked the following explanation question:

"Why does Maxi think his toy is in the yellow container and Mary think it's in the blue container?"

If the subjects are overly brief they will be asked the follow-up, probe question:

"Tell me more about that."
Referential Communication: (Example 1: Hiding task)

"Now we are going to play another game with Maxi and Mary. While they are under the table and can't see and you look away I will hide a sticker under one of these cards. Then they can come out and I will give them a clue about where to look for the sticker."

The experimenter will hide the sticker under the card with a large red block.

"Okay, Maxi and Mary, the clue is; the sticker is under the card with the big block."

"Mary show us where you think the sticker is." [with Maxi under the table]

"I think it's under the card with the big red block." [Mary goes under the table and Maxi comes out]

"Now Maxi, show us where you think the sticker is."

"I think it's under the card with the big blue block."

Explanation Questions

The experimenter must ensure that the subject understands both of the possible locations allowed by the ambiguous message.

"I told them that the sticker is under the card with the big block. Why does Mary think the sticker is under the card with the big red block and at the same time Maxi think it's under the card with the big blue block?"

"Does is make sense for Mary to say one thing and Maxi to say something else?"

"Why does it (doesn't it) make sense?"

Standard probe if the subject is vague.

"You said .... Can you tell me more about that?"

Prediction Questions

"Mary thinks it's under the card with the big red block, and Maxi thinks it's under the card with the big blue block. Now we will tell Josef and Ann that the sticker is under the card with the big block.

Ask about the two puppets' predictions consecutively.

"Do you think Josef(Ann) will say it's under the card with the big blue block or the card with the big red block, or wouldn't you know what he would say?" [counterbalance]

If the subject takes a position then ask

"How can you tell what they will think?"

"How sure are you that they would think that?" [use pointer]

"Would they both think the same thing?"

If the subject says "I don't know", then ask:

"Why is it hard to tell what they will think?"

Repeat for the second puppet, alternate order of puppets.

Deviant interpretation:

"Well, Josef says the sticker is under the card with the small red block. Does it make sense for Josef to say that or does it not make sense?"

"Why does it (doesn't it) make sense?"

If this question needs to be repeated rephrase it with "... is that silly or not silly ...

[counterbalance]."
Referential Communication: (Example 2: Selection task)

The procedure described above will be repeated for a second ambiguous message for a selection task:

"Now we are going to play a different game. I will think of a card, and then I will give the puppets a clue about which card I'm thinking about." [The experimenter selects the card with a small red block.]

"Okay, Maxi and Mary, the clue is; I'm thinking of the card with the picture of a red block."

"Maxi show us which card you think I chose [with Mary under the table] I think it's the card with the big red block.

[Maxi goes under the table and Mary comes out] "Now Mary show us which card you think I chose. I think it's the card with the little red block."

Explanation Questions

The experimenter must ensure that the subject understands both of the possible meanings of the ambiguous message. Then the experimenter will restate the problem in the question:

"I told them that I was thinking of the card with the red block. Why does Mary say it's one card and at the same time Maxi say it's another card?"

"Does is make sense for Mary to say one thing and Maxi to say something else?"

"Why does it (doesn't it) make sense?"

Standard probe if the subject is vague.

"You said .... Can you tell me more about that?"

Prediction Questions

"Mary thinks it's the card with the big red block, and Maxi thinks it's the card with the little red block. Now we will tell Josef and Ann that I was thinking of the card with the red block."

Ask about the two puppets' predictions consecutively.

"Do you think Josef (Ann) will say it's the card with the big red block or the card with the little red block, or wouldn't you know what he would say?" [counterbalance]

If the subject takes a position ask:

"How can you tell what they will think?"

"How sure are you that they would think that?" [use pointer]

"Would they both think the same thing?"

If the subject says "I don't know", then ask

"Why is it hard to tell what they will think?"

Repeat for second puppet.

Deviant interpretation:

"Well, Josef says it's the card with the big blue block. Does it make sense for Josef to say that or does it not make sense?"

"Why does it (doesn't it) make sense?"

If this question needs to be repeated rephrase it with "... is that silly or not silly ..." [counterbalance].
Lexical Ambiguity: (Example 1: "Ring", homonym)

"Now we are going to play another kind of game with the puppets. Mary and Maxi, in this game you both need to wait here for a ring."
"Now Mary, tell us what you are waiting for."
"I'm waiting for a ring for my finger." [Show illustration; with Maxi under the table.]
Mary goes under and Maxi comes out
"Okay, Maxi, tell us what you are waiting for."
"I'm waiting for a telephone to ring." [Show illustration]

The experimenter will show the subject illustrations of the two possible meanings of "ring" to ensure that the subject understands both meanings.

**Explanation Questions**

"I told them to wait for a ring. Why does Mary say she's waiting for one thing and at the same time Maxi say he's waiting for another thing?"

"Does is make sense for Mary to say one thing and Maxi to say something else?"
"Why does it (doesn't it) make sense?"

Standard probe if the subject is vague.
"You said .... Can you tell me more about that?"

**Prediction Questions**

"Mary says she is waiting for a ring for her finger and Maxi says he is waiting for the telephone to ring. Now we will tell Ann and Josef to wait for a ring."
Ask about the two puppets' predictions consecutively.
"Do you think Josef (Ann) will be waiting for a ring for his finger or the telephone to ring, or wouldn't you know what he would say?" [counterbalance]

If the subject takes a position, ask:
"How can you tell what they would think?"

"How sure are you that they would think that?" [use pointer]

"Would they both think the same thing?"

If the subject says "I don't know", ask:
"Why is it hard to tell what they would think?"

Repeat for second puppet.

**Deviant interpretation:**

"Well, Josef says he is waiting for a necklace Does it make sense for Josef to say that or does it not make sense?"
"Why does it (doesn't it) make sense?"

If this question needs to be repeated rephrase it with "... is that silly or not silly ..." [counterbalance].
Lexical Ambiguity: (Example 2: "Pear/Pair", homophone).

"Now we are going to play another game with the puppets. Mary and Maxi, in this game you both need to wait here for a pear/pair. Now Maxi, tell us what you are waiting for." "I'm waiting for a pear to eat" [Show illustration, with Mary under the table. Then Maxi goes under and Mary comes out] "Okay, Mary tell us what you are waiting for." "I'm waiting for a pair of shoes." [Show illustration]

The experimenter will show the subject illustrations of the two possible meanings of pear/pair to ensure that the subject understands both meanings.

Explanation Questions
"I told them to wait for a pear/pair. Why does Mary say she's waiting for one thing and at the same time Maxi say he's waiting for another thing?"

"Does it make sense for Mary to say one thing and Maxi to say something else?" "Why does it (doesn't it) make sense?"

Standard probe if the subject is vague.
"You said .... Can you tell me more about that?"

Prediction Questions
"Maxi says he's waiting for a pear to eat and Mary says she's waiting for a pair of shoes. Now we will tell Ann and Josef to wait for a pear/pair." Ask about the two puppets' predictions consecutively. "Do you think Josef (Ann) will wait for a pear to eat, or for a pair of shoes, or wouldn't you know what they would say?" [counterbalance]

If the subject takes a position, ask:
"How can you tell what they will think?"

"How sure are you that they would think that?" [use pointer]

"Would they both think the same thing?"

If the subject says, "I don't know", ask:
"Why is it hard to tell what they will think?"

Repeat for second puppet.

Deviant interpretation:
"Well, Josef says he's waiting for an apple. Does it not make sense for Josef to say that or does it make sense?"

"Why does it (doesn't it) make sense?"

If this question needs to be repeated rephrase it with "... is that silly or not silly ..." [counterbalance].
Ambiguous Figure: (Example 1: "Duck-Rabbit")

a) The subjects will be shown the "duck-rabbit".
"Now we will show Mary and Maxi a picture. Mary what do you think this is?" [with Maxi under the table]
"I think that it's a duck" [Mary goes under and Maxi comes out]
"Okay, Maxi, what do you think it is?"
"I think that it's a rabbit."

Explanation Questions
The experimenter must ensure that the subject sees both entities.
"Why does Maxi say it's one thing and at the same time Mary say it's another thing?"
"Does is make sense for Mary to say one thing and Maxi to say something else?"
"Why does it (doesn't it) make sense?"

Standard probe if the subject is vague.
"You said .... Can you tell me more about that?"

Prediction Questions
"Mary says it's a duck and Maxi says it's a rabbit. Now we will showed this picture to Ann and Josef."
Ask about the two puppets' predictions consecutively.
"Do you think Josef (Ann) will think it's a duck or a rabbit, or wouldn't you know what they would say?" [counterbalance]

If the subject takes a position, ask:
"How can you tell what they will think?"

"How sure are you that they would think that?" [use pointer]

"Would they both think the same thing?"

If the subject says, "I don't know", then ask
"Why is it hard to tell what they will think?"
Repeat for second puppet.

Deviant interpretations:
"Well, Josef says it's an elephant. Does is make sense for Josef to say that, or does it not make sense?"
"Why does it (doesn't it) make sense?"

If this question needs to be repeated rephrase it with "... is that silly or not silly ..." [counterbalance].
Ambiguous Figure: (Example 2: "Rat-Man")

The subjects will be shown the "rat-man":
"Now we will show Mary and Maxi another picture. Maxi what do you think this is?"

[with Mary under the table]
"I think that it's a rat" [Maxi goes under and Mary comes out]
"Okay, Mary, what do you think it is?"
"I think that it's a man with glasses."

Explanation Questions
The experimenter must ensure that the child sees both entities. Then the experimenter will restate the problem in the question:
"Why does Maxi say it's one thing and at the same time Mary say it's another thing?"

"Does is make sense for Mary to say one thing and Maxi to say something else?"
"Why does it (doesn't it) make sense?"

Standard probe if the subject is vague.
"You said .... Can you tell me more about that?"

Prediction Questions
"Maxi says it's a rat and Mary says it's a man with glasses. Now we will showed this picture to Ann and Josef."
Ask about the two puppets' predictions consecutively.
"Do you think that Josef (Ann) will say it's a rat, or a man with glasses, or wouldn't you know what he would say?"

If the subject takes a position, ask:
"How can you tell what they will think?"

"How sure are you that they would think that?" [use pointer]

"Would they both think the same thing?"

If the subject says, "I don't know", then ask
"Why is it hard to tell what they will think?"
Repeat for second puppet.

Deviant interpretations:
"Well, Josef says it's really a dog Does it not make sense for Josef to say that, or does it make sense?"
"Why does it (doesn't it) make sense?"
If this question needs to be repeated rephrase it with "... is that silly or not silly ...
[counterbalance].