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# Children's understanding of interpretation

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## Abstract

The prevailing view in the study of children's developing theories of mind is that the 4-year-old's newfound understanding of false belief is the single developmental milestone marking entry into an adult "folk psychology." We argue instead that there are at least two such watershed events. Children first develop a "copy theory" that equates the mind with a recording device capable of producing either faithful or flawed representations of reality and according to which mental states are determined entirely by the flow of information *into* the mind. Only later, in the early school years, do children come to appreciate, as do adults, that the mind itself can contribute to the content of mental states. This later-arriving "Interpretive Theory of Mind" allows an appreciation of the capacity for constructively interpreting and misinterpreting reality. The main finding from the six studies reported here is that children who otherwise demonstrate a clear understanding that beliefs can be false (and so deserve to be credited with a theory of mind), can nevertheless fail to appreciate even the most basic aspects of interpretation: that despite exposure to precisely the same information, two persons can still end up holding sharply different opinions about what is the self-same reality. What these studies reveal is that an interpretive theory of mind is different from, and later arriving than, an appreciation of the possibility of false belief, and contrary to competing claims, this interpretive theory actually makes its first appearance during, but not before, the early school years. © 2002 Published by Elsevier Science Ltd.

## 1. Children's understanding of interpretation

When do children first know—as most adults seem to know—that they and others can share one and the same experience and yet come away with markedly different (perhaps even legitimately different) interpretations? When is it, you have every reason to wonder, that they round the first interpretive turn, and join their elders in

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1 finally recognizing that what people imagine to be the case about any given object of  
 knowledge is often highly person-relative and remote from the unvarnished truth?  
 3 Every competent adult understands this “true” versus “believed-to-be-true”  
 distinction more or less perfectly. Just as obviously, children of a certain tender  
 5 age do not. Because we require their collusion, we need assurances about when we  
 can reasonably expect them to make real headway in coming to a truly interpretive  
 7 “theory” of mental life. We can hardly wait.

As it is, the available literature on children’s developing “theories of mind” has a  
 9 precise answer. It happens at four, or whenever it is that preschoolers first come to  
 appreciate that ignorance is bad for you. Certainly (the contemporary literature tells  
 11 us) none of this happens as early as 1 or 2, and just as clearly not as late as 5 or 6. But  
 wait, somehow four just seems wrong. What about childhood egocentrism, you  
 13 say, and what about the children of our acquaintance who so regularly imagine that  
 reality wears its truth on its sleeve? Your doubts (our doubts) notwithstanding—the  
 15 experts are very firm—four it is, and all for the increasingly suspect reason that such  
 preschoolers are consistently able to pass standardized measures of “false belief  
 17 understanding”—the so called “litmus tests” that supposedly give us *prima-facie*  
 evidence of their having come to appreciate the fundamentally interpretive nature of  
 19 knowing.

This is what is routinely said about the reputed preciosity of your average 4-year-  
 21 old. As Wellman (1990) puts it, the typical 4- or 5-year-old is already in possession of  
 “an interpretive or constructive understanding of representation” (p. 244) “a notion  
 23 of mind as a system of interpretive mental processes” (p. 90) sufficient to allow them  
 to see mental contents as being constructed “actively by the person, on the basis of  
 25 inferences seen as subject to biases, misinterpretations and active interpretation  
 (Wellman & Hickling, 1994, p. 1578). Echoing the same point, Meltzoff and Gopnik  
 27 (1993, p. 335) report that “By 5 years old, children seem to understand that a  
 person’s beliefs about the world are not just recordings of objects and events  
 29 stamped upon the mind, but are active interpretations or construals of them from a  
 given perspective.” All of this is in line with parallel remarks by Perner (1991, p.  
 31 275), who argues that “around 4 years children begin to understand knowledge as  
 representation, with all of its characteristics. One such characteristic is *interpreta-*  
 33 *tion*” (italics in original). All this follows, we are told (Gopnik & Wellman, 1994), for  
 the reason that the tried-and-true ability of 4-year-olds to grasp the falseness of false  
 35 belief signals more than an evident facility with counterfactuals. It is an ability that  
 requires nothing less than the conceptual resources of an interpretive theory of mind.  
 37 Clearly, then, “theory theory’s” vanguard has convinced itself, and means to  
 convince you, that, while scarcely out of short pants, the typical 4-year-old has  
 39 somehow already come to know what so many of at least our colleagues apparently  
 fail to know: that human knowledge is a fundamentally interpretive achievement.

41 All of this conviction, we maintain, is unwarranted, and all of the foregoing  
 conclusions about the early days of interpretation simply mistaken. Four-year-olds,  
 43 we have shown (Carpendale & Chandler, 1996; Chandler & Lalonde, 1996), and  
 mean to show again, do not, and will not for some years to come, possess anything  
 45 closely resembling even a fledgling “interpretive theory of mind.” These are, of

course, strong claims and fighting words. If we are to convince you that we are correct about all of this, and that so many others are not just a little bit wrong, but wrong by a wide margin, then at least two things are required. First, we will need to persuade you that the reasons that others have offered in support of their own different conclusions are not good reasons. In short, and in direct challenge to the consensus view, we aim to demonstrate (both conceptually and empirically) that the passing of standard measures of false belief understanding actually tells us nothing one way or the other about children's early insights into the interpretive nature of belief. In the process, we hope to make clear what sorts of competing knowledge claims 3- and 4-year-olds are alert to and why these achievements are importantly different from anything that could reasonably qualify as evidence of a bona fide interpretive or constructive view of the knowing process. Second, and at considerably greater length, we will report out on a series of 6 studies that collectively make the point that simple false belief understanding is different from and importantly predates anything remotely resembling an interpretive theory of mind.

## 2. False beliefs about false beliefs

If, relieved of the excess theoretical baggage piled on by representational theorists of mind, one were to set out light and in the hope of actually determining when it is that young persons first awaken to the possibility that two individuals, exposed to one and the same potential object of knowledge, might, nevertheless, emerge with importantly different beliefs, then at least one minimal procedural condition would obviously have to be satisfied. The epistemic opportunities facing both such individuals—the very events that they encounter and are meant to come to some understanding of—would clearly need to qualify as one and the same object or state of affairs. Oddly, perhaps even perversely, few if any of the hundreds upon hundreds of available studies that purport to speak to questions about representational diversity come anywhere close to satisfying this minimal antecedent condition. Quite to the contrary, all but the smallest handful of such studies (e.g., Carpendale & Chandler, 1996; Lalonde, 1997; Pillow & Henrichon, 1996) head decisively off in just the opposite direction by carefully engineering assessment procedures that are purpose-built to guarantee that one of the persons whose beliefs are at issue succeeds in encountering one “reality,” while the second experiences something else entirely.

The endlessly paraphrased prototype of this “different people-different experiences” paradigm is Wimmer and Perner's (1983) now classic “privileged information” or “unexpected transfer task.” Here, as is widely known, “Maxi” and his mother begin by putting chocolate in one of two available cupboards. Later, when Maxi is out of the room, his mother relocates the chocolate in the second cabinet, guaranteeing that the world, as she has arranged it, is importantly different from the world of the kitchen as Maxi knows it. The operative question about poor benighted Maxi is “where will he look for the chocolate” on his return? Paradoxically, the routine inability of 3-year-olds to report that Maxi would be ignorant of the fact that

his chocolate is no longer where he left it is said to occur precisely because those under 4 reputedly lack the required cognitive competence to represent what they believe about some object or event in conjunction with another person's false beliefs about "the same" objective state of affairs. What obviously renders such accounts paradoxical is that the whole manifest purpose of this elaborate gerrymandering of available information—this re-writing of history while Maxi's back is turned—is all meant to absolutely guarantee that "reality," as the mother experiences it, is strategically different from the only "reality" that her son, in his ignorance, has any reasonable access to. While such a procedure may have much to recommend it as a way of assessing what young children take to be the relation between seeing and believing (Flavell, 1988; Taylor, 1988; Wimmer & Gschneider, 2000), as a way of determining what children do or do not know about interpretation, such standard false belief measures leave almost everything to be desired. Maxi legitimately knows one badly dated piece of the unfolding puzzle, and his mother knows something else entirely. The minimal conditions required for establishing the presence or absence of an interpretive theory of mind simply have not been met. Who could see it differently?

The answer is that all of those who are in the grip of a theory, or more precisely a 'theory-theory', of the sort that led Perner (1991, p. 165) to say that "since there is only one single situation being perceived," any realization on the part of the child that the mother's belief regarding the whereabouts of the chocolate is true, whereas Maxi's is false, should be counted as proof positive that such a child understands the interpretive character of knowledge.

The root of this deep running confusion, we propose, is to be found in a collective failure on the part of those holding to the consensus view to exercise adequate care and concern in calculating when it is that two views can be properly said to be *different* views of *one and the same* thing. There is, to be sure, a certain loose, but nevertheless familiar way of speaking that gives us license to talk about the fact that Maxi and his mother each have different beliefs about exactly where the chocolate happens to be at the precise moment that the test question is put. Properly understood, Maxi wrongly thinks the candy is still in proverbial Cabinet A, while his mother correctly understands it to be where she subsequently put it in Cabinet B. This does, perhaps, qualify as some sort of epistemic diversity. The "loose" part in all such easy talk about identity is that while the current location of the chocolate may be in some sense unitary and fixed, the *event knowledge* available to the protagonists whose viewpoints are in question is, in fact, experientially quite different. Maxi's mother has access to all of the relevant facts of the matter, while crucial information is lost upon her son, who is strategically arranged to be out of the room at just the critical moment when the question of where the chocolate is *really* located is finally settled. Consequently, although the two protagonists are fully entitled to their separate opinions, their different beliefs, while broadly having to do with the "same" topic, don't actually reference one and the same experiential reality. As such, standard measures of false belief simply do not, as advertised, require the child to jointly represent the same state of affairs in contradictory ways. Of course, for certain purposes (e.g., sorting out children's understanding of the causal

relationships between perceptual exposure and belief formation), none of this makes any difference. Where it *does* make a lot of difference is when one hopes to establish, as we do, that point in development at which children come to appreciate that one and the *same* event can in fact support multiple interpretations.

If the task of the moment is, as we have set it, to somehow decide when it is that young persons actually do come to subscribe to an understanding of mental life that is legitimately interpretive in the broader and more usual sense (i.e., recognizing that people can and regularly do interpret precisely the same information differently), then we will obviously need to pursue that question using procedures other than those that currently make up the roster of standard measures of false belief understanding.

### 3. Finding an alternative methodology

Among the numerous options that present themselves as potential procedural means of assessing children's emerging capacity to appreciate the interpretive character of the knowing process, two possibilities especially recommend themselves. One of these turns upon the fact that it is possible to identify a small class of stimuli that, whether by nature or design, turn out to have the unique feature of reliably prompting two—and only two—especially likely interpretations. Homophones are instances of this class for the definitional reason that the identically sounding words that make up this class naturally support just two either-or possibilities. When someone asks that you “take the watch,” for example, you should feel equally entitled to pick up the timepiece or otherwise stand guard over it. Certain line drawings, for example, Jastrow's (1900) “duck-rabbit” drawing, and Bugelski's (1960) “rat-man,” similarly share the property of being easily taken to be one or the other of just two different things. The second general class of stimuli that provide especially fertile ground for soliciting multiple interpretations is made up of things like Rorschach inkblots and clouds and puddles of spilled milk that, because of their vague or amorphous natures, appear to easily call out a wide variety of different responses in different people. Stimulus materials of the first variety made up the working ingredients of a study sequence carried out by Carpendale and Chandler (1996). In contrast, the research to be reported here adopts the second of these two measurement strategies by featuring as stimuli a series of line drawings that, because of their fractional and ill-defined character, seem especially likely—at least in the eyes of adults, for whom such interpretations come naturally—to prompt different people to regard them differently.

The drawings we employed for this purpose were based on puzzle pictures called “Droodles” first popularized by cartoonist Roger Price (1953). Such drawings are perhaps better illustrated than explained. Fig. 1, for example, depicts a droodle originally published by Price over the caption “A ship arriving too late to save a drowning witch.” The humor in this and related cartoons is obviously meant to arise from the fact that, given the restricted or keyhole view imposed, it would be ludicrous to imagine that anyone could ever correctly guess about the larger scene of

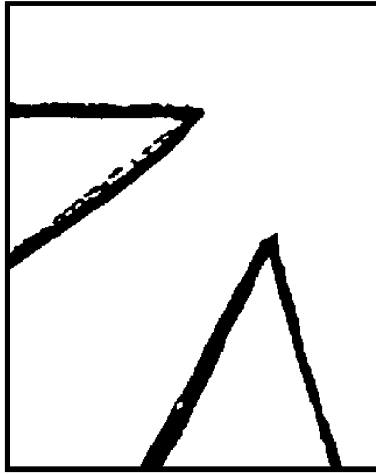


Fig. 1. Doodle labeled “A ship arriving too late to save a drowning witch”.

which the doodle itself is only a small, non-descript part. Once oriented by the caption, however, the cryptic fragments of the original drawing fall into place and it becomes possible to imagine—even difficult not to imagine—that the drawing depicts some fractional part of what its caption announces it to be.

Such Doodles were first used by Chandler and Helm (1984) as a measure of children’s role-taking competence, and later by Taylor (1988) to assess what she termed “conceptual perspective taking.” In each case, the procedures made use of a set of cartoon drawings patterned after those developed by Price and extended in such a way as to include not only the limited details contained within the original doodles themselves, but also the more complete scenes suggested by the doodle captions. Each drawing was then fitted with a cardboard overlay into which a small viewing window was cut. Once in place, these overlays masked most of the extended drawing, exposing only the original doodle portions of the picture, as illustrated in Fig. 2.

In the Chandler and Helm procedure, children aged 4, 7, and 11 years were shown such pictures and asked to describe their contents. The cover of each picture was then closed to reveal the restricted (or doodle) view and the subject was asked “What will (named classmate) think this is?” As originally administered, this procedure amounts to a demanding precursor of what subsequently became standardized measures of false belief understanding. What is at issue in the original doodles task is whether children of a given age are able to bracket their own understanding that the two triangles in Price’s original drawing are actually the bow of a ship and the tip of a witches hat, and to set aside this privileged information long enough to appreciate that anyone denied access to the full drawing, and who was obliged to make sense of the contents of only the restricted viewing window, would necessarily come to a conclusion different from their own.

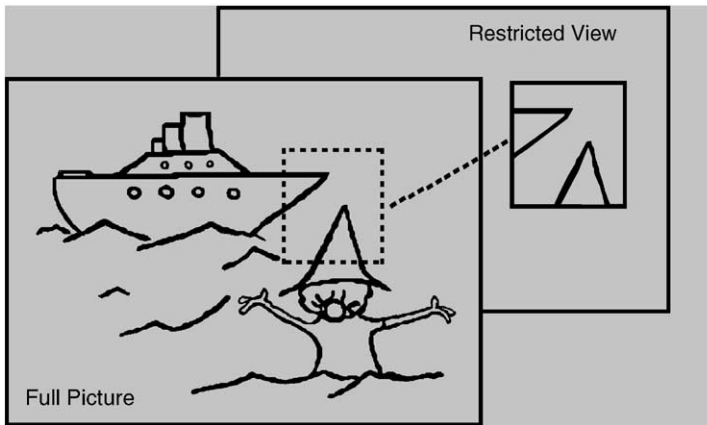


Fig. 2. The “Ship-Witch” droodle.

Although formally similar to “unexpected transfer” measures of the sort involving Maxi and his missing chocolate, what makes this task other than a “minimally complex” version of such now familiar “privileged information” measures is the same thing that make droodles funny in the first place. Once “in the know,” the two triangles that dominate the restricted window onto this larger scene just go on irrepressibly looking like a peaked hat and a ships prow, despite the fact that there are no “local” reasons for assuming that this is so. Consequently, it is not surprising that, stripped of their humor and otherwise procedurally simplified, this task can be made to yield results that are in line with those produced by other measures of false belief (Perner & Davies, 1991). This fact notwithstanding, there are other features of the droodles procedure that open up new possibilities for exploring the early development of a bona fide interpretive theory of mind that are not easily available in more heavily subscribed “privileged information” or “unexpected change” measures. In particular, it makes a kind of natural sense to ask how someone with only restricted access to the full details of these stimulus materials might “interpret” the fragments of the drawing available to them, and to do so in a way that would seem anomalous if one were to ask how Maxi might “interpret” the location of the chocolate. One possible way of understanding this difference is to note, as Wimmer and Gschaider (2000) have done, that, in the absence of compelling reasons to the contrary, we simply assume (without embarking on anything that could qualify as a pointed “belief”) that reality is preduring, and remains as we have left it. By contrast, once participants are aware that the limited contents of the viewing window constitute only a fractional part of a much larger scene, they are at least potentially positioned to understand that the beliefs of those who view only the droodle portion of the picture would be the outcome of a misleading inference.

This prospect is clearly brought out by a study by Taylor (1988), in which she utilized “droodles” similar to those employed by Chandler and Helm (1984), and attempted to “train” 4- and 6-year-olds to better appreciate that a naive observer,

exposed to only the restricted views onto these drawings, would be hard pressed to know the larger reality of which these doodles were only the leading edge. She did this by demonstrating over and over again that one and the same doodle could actually result from constructing limited viewing windows onto entirely different drawings (see Fig. 3). While her training efforts did meet with real but limited success, their relevance to the present study sequence is that they serve to show-case the potentially interpretive nature of this task, and help make the point that any serious interest in the difficulties that young children have with such materials is dependent on a demonstration that their failures are not due to some “will-o-the-wisp” problem that can be made to go away with modest training. Study 3, in the study sequence that follows, is closely patterned after Taylor’s earlier training efforts, and, as will be made clear, again demonstrates that the interpretive difficulties with these materials experienced by 5- and 6-year-olds are both rugged and persistent.

Although the term “interpretation” appears throughout these earlier reports of children’s reactions to doodles, each fails as a measure of children’s understanding

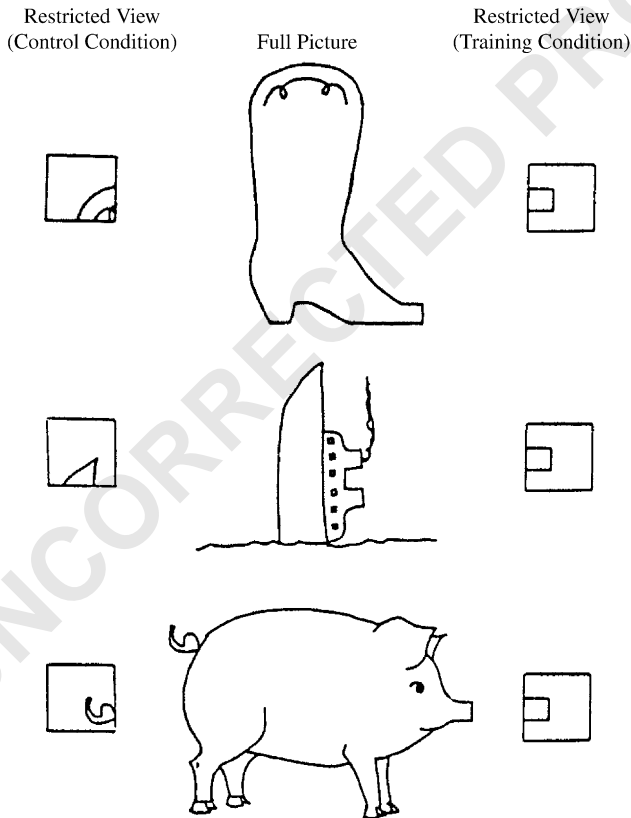


Fig. 3. Restricted views used by Taylor (1988).



that two persons given access to one and the same reality can interpret that reality differently. In the procedures used by Perner and Davies (1991) and by Taylor (1988), children are never asked what some other person might think—only whether or not the puppet will know this is a picture of a giraffe, or boot, etc. In the Chandler and Helm (1984) report, children are asked what a naïve classmate might think, but here again, the child has access to privileged information and so need only remark on the difference between their own true belief and some false belief that is said to be had by some classmate.

The six studies to be detailed below are each meant to remedy these earlier problems by asking children and adults what *two* naïve observers (Raggedy Ann and Andy puppets) think of the same doodle. In these new testing circumstances, children are first given an opportunity to showcase both an understanding, first of false belief and then of interpretation. When the child (but not the puppet) has seen the full picture, and the child is asked what Raggedy Ann will think of the doodle view, the task is one of attributing false belief (i.e., does the child appreciate that Ann, who is ignorant of the real truth, will form a false belief?). Inquiring into the thoughts of a second onlooker (Andy) succeeds where earlier studies have failed in offering children the chance to showcase a more sophisticated grasp of mental life under which both protagonists are potentially free to entertain different false beliefs or different interpretations of the self-same reality.

Each of the 6 studies, to be discussed in turn, contain variations on this same theme of asking what first one puppet, and then the other, would think of the same picture. The key hypotheses under examination were that false belief understanding is: (1) an *earlier occurring*; and (2) a *necessary but not sufficient* condition for the emergence of an interpretive or constructivistic theory of mind.

In brief, Study 1 establishes the overall suitability of the doodle stimuli and general experimental procedures using a sample of adults. Study 2 demonstrates that 5- and 6-year-olds who routinely report that Ann will have a false belief, rarely report that Andy will differently interpret the same stimulus picture. Study 3 explores the possibility that modeling or training can improve these children's performance. Study 4 shows that children continue to find it difficult to assign differing interpretations even when told that the puppets disagree. Studies 5 and 6 are intended to rule out certain reductive readings of the results of Studies 3 and 4 by addressing issues of creativity, imagination, and subjects' access to alternative interpretations.

#### 4. Study 1

As discussed above, doodles would be useful for the purpose of assessing children's interpretive capabilities only if they could first be shown to be legitimate objects of interpretation for adults. That is, unless adults, whose interpretive capabilities are largely beyond dispute, can be prompted to provide more than one interpretation of such stimuli, or otherwise give clear evidence of seeing that such drawings are meant to afford multiple interpretations, there would be little real point

in presenting such doodles to young children. Study 1 is meant to accomplish this background purpose.

In submitting the doodle stimuli to a panel of adults, a pair of objectives were satisfied. The first was to determine if adults do, in fact, respond to the stimuli with multiple interpretations. That is, do adults see that these stimuli—like clouds or inkblots—can be assigned many different meanings? Second, it was essential that the stimuli be rarely interpreted in exactly the same way by different persons. If not, we would risk classifying as “interpretive” those non-interpretive children who offered an alternate reading of that stimuli for no other reason than that they were simply reading off meanings that were self-evident in the drawings themselves.

In Study 1, a sample of adults were presented with the restricted views of the pictures used in Studies 2–6 and asked what two hypothetical naïve observers—Raggedy Ann and Andy—might think of the pictures.

#### 4.1. Method

##### 4.1.1. Participants

Participants were recruited and tested “on the Internet” using an electronic questionnaire. Messages were sent to various Internet news groups frequented by persons interested in psychology (e.g., sci.psychology.theory) inviting readers to use the World Wide Web to view and complete a questionnaire. A total of 105 responses were received. Of these, 57 identified themselves as male, and 48 as female. Reported age ranged from 21 to 57 years ( $M = 36.01$ ,  $SD = 9.58$ ).

##### 4.1.2. Procedure

The on-line questionnaire consisted of a ‘page’ containing a short set of instructions, the 7 stimulus pictures, and a set of questions. For the foreseeable future, the questionnaire can be viewed on the Internet at the following location: <  
<http://web.uvic.ca/~lalonde/research/>>.

The stimulus pictures were 7 “doodles” and the accompanying larger picture of which they were a part. Each set of images was followed by the questions: “What will Ann think this is (doodle portion of the picture)?” and “What will Andy think this is?”, followed by text boxes in which responses could be typed. After completing the questionnaire, the participant could elect to submit their responses via electronic mail by clicking on a button labeled “Submit Responses.”

#### 4.2. Results

##### 4.2.1. Classification of responses

The participant’s first response to each doodle (i.e., the response they attributed to Ann) was coded for false belief understanding according to the following criteria: if the attribution had no obvious connection to the underlying picture (e.g., if the participant responded that Ann would think the “ship/witch” doodle was “an arrow”), it was coded as *False Belief*. If the response contained an obvious reference to the underlying picture (e.g., “A ship and a witch’s hat”), it was coded *Reality*.

*Error*. If the response made no explicit reference to the underlying picture, but nonetheless could be seen to have a direct connection to the larger scene (e.g., “A boat about to hit an iceberg”), it was judged a *Contamination Error*. A second rater scored the responses from 15 participants drawn at random. Among the 105 (30 subjects each responding to 7 stimuli) responses that were coded by both raters, 2 disagreements were noted. In each case these involved responses originally judged to be *Reality Errors* that were coded *Contamination* by the second rater.

Pairs of responses—that is, the responses attributed to Ann and Andy for any particular doodle—were classified as *Interpretive* if the responses given for Ann and Andy were each scored as *False Belief* according to the criteria listed above, and if the responses were different from one another. Thus, to qualify as an *Interpretive* response pair, the participant was required to provide two different false beliefs for a particular doodle, for example, “Ann would think this is an arrow” followed by “Andy would think this is two knife points.” If the responses given for Ann and Andy were identical, or if one response was classified as either *Reality Error* or *Contamination* by the criteria listed above, the pair was judged *Non-Interpretive*. A second rater, who scored 105 pairs of responses from 15 participants, agreed in all but 3 cases.

The number of unique responses provided for each doodle was also calculated as a way of later weeding out any doodle that prompted only a restricted set of alternative interpretations.

#### 4.2.2. *False Belief attributions*

By the criteria listed above, 92% of all responses were judged to be False Beliefs. Participants were awarded a single point for each belief attributed to Ann that was coded as *False Belief* according to the criteria described above. Scores could range from 0 to 7. The mean score was 6.24 (SD = 1.31).

#### 4.2.3. *Interpretive attributions*

When the pairs of responses to each doodle were examined (what Ann would say and what Andy would say of the same picture), 70% of all pairs were judged *Interpretive*. A single point was awarded for each response pair judged *Interpretive* yielding a mean score of 4.29 (SD = 2.13) of a possible 7. In short, even by these demanding criteria, almost 3/4 of the responses were coded as interpretive.

#### 4.2.4. *Stimulus suitability*

The number of unique responses for each of the 7 doodles was calculated from the responses attributed to Ann. This offered a maximum of 105 different attributions per doodle. Each doodle managed to amass at least 25 unique responses, although each had a set of common themes. For the Witch doodle, for example, the most common responses were variations on either teeth of some kind, or shark/dolphin fins, in addition to all manner of “sharp” things.

### 4.3. Discussion

For the most part, the adult participants saw the stimuli as an opportunity to showcase their interpretive skills. That is, the lion's share of individual responses (92%) were classified as "False Belief," and a smaller, but still sizable proportion of response pairs (70%) were classified as "Interpretive." The fact that False Belief scores were higher than Interpretive scores could indicate adults find it difficult to behave interpretively, or more likely, because some respondents reported that they had elected to respond as though they were children themselves, or on behalf of the puppets whom they took to be children.

Still, the data from this study appear to provide sufficient justification for using the droodle stimuli in subsequent studies with child participants: The adults were largely successful in attributing different interpretations of the same stimulus to Ann and Andy, and each of the stimuli used generated a sufficiently large and varied pool of interpretations.

## 5. Study 2

If the aim of this research was to entice children who are capable of doing so into commenting upon differing interpretations of one and the same thing, then, one might wonder, why not simply show them a droodle and ask them what they and another person might think? The problem is this. It is entirely possible under such circumstances that when the full details of the larger picture are unknown, children may assume that the task is one of discovering what the picture "really" is, and so give what they consider to be the "right" answer on Ann's behalf and then either repeat themselves or assign some "wrong" answer to the second puppet. Alternatively, children may approach the task as one of fielding a series of guesses regarding the contents of the window, in which case, their multiple *guesses* could be misread as representing alternative *interpretations* (Wimmer & Gschneider, 2000). Instead, it is only when the respondents have reason to believe that the real fact of the matter has already been revealed—when they have seen the underlying picture, but others have not—that it becomes more compelling to attribute false beliefs or legitimate interpretations to others. Consequently, presenting the droodle views from the outset has the obvious attraction of simplicity, but it lacks the potential discriminative power suggested in earlier studies that used these stimuli (Chandler & Helm, 1984; Taylor, 1988). The aim of this second study, then, was to demonstrate an important distinction between: (a) saying more than one thing about a droodle by simply offering up multiple guesses, and; (b) having more than one thing to say about how the same stimulus can be differently interpreted.

## 5.1. Method

### 5.1.1. Participants

A total of 66 five- and 6-year-old children ( $M = 71.8$  mos.,  $SD = 6.98$ ; 39 boys, and 27 girls) were recruited for participation from, and tested in, after-school care facilities.

### 5.1.2. Procedure

Four of the seven stimulus pictures employed in Study 1 were used in Study 2. Each picture consisted of a line drawing fitted with a cover and a small window that could be opened to reveal a non-descript portion of the underlying picture. A pair of 30 cm dolls ("Raggedy Ann" and "Raggedy Andy") served as protagonists, and two cardboard boxes with lids served as their "houses."

A total of four trials were conducted: two *Doodle-only* trials, followed by two *Full Picture* trials. In *Doodle-only* trials, the participant saw only the restricted, or doodle portion of the full picture, but never the full picture itself. In *Full Picture* trials, the participant first saw the full underlying picture followed by the doodle view. The order of these conditions or trial types was not counterbalanced since presenting a *Full Picture* trial would likely have led participants to expect the presence of a larger underlying picture in subsequent trials.

Participants were introduced to Raggedy Ann and Raggedy Andy and then asked to "pretend that these dolls are real people like you and me." Two cardboard boxes served as the dolls' "houses" and participants were told that "when Ann and Andy are inside their houses, they can't hear what we're saying, and they can't see what we're doing." The dolls were then placed inside their respective houses, and the participant was asked "Can Raggedy Ann hear us talking right now?", and "Can Raggedy Ann see us right now?" All participants willingly joined in this conspiracy.

Participants were shown the first of the *Doodle-only* pictures and told: "Raggedy Ann and Raggedy Andy have never seen this picture before. Let's get Ann out of her house and show her this picture." The child then retrieved Ann from her house. "Now, Ann has never seen this picture before. What will Ann say this is?" The child's response was noted and repeated aloud by the experimenter. This same procedure was then repeated for Andy: "Let's get Andy out of his house and show him this picture. Now, Andy has never seen this picture before. What will Andy say this is?" A second *Doodle-only* trial immediately followed.

*Full Picture* trials began by showing the child the full picture and asking him or her to describe it. If the child's response failed to take into consideration those particular sections of the picture that would later be visible through the window in the cover (e.g., the bow of the ship or the witch's hat), they were asked to specifically comment on those features of the picture. The child was then told: "Raggedy Ann and Raggedy Andy have never seen this picture before. Let's get Ann out of her house and show her this picture. But we're going to show her the picture like this (cover is closed to reveal only the restricted view)" The child then retrieved Ann from her house. "Now, Ann has never seen this picture before. What will Ann say this is?" The child's response was noted and then the procedure was repeated for Andy:

“Let’s get Andy out of his house and show him this picture. Now, Andy has never seen this picture before. What will Andy say this is?” This same procedure was repeated for the second *Full Picture* stimulus.

## 5.2. Results

### 5.2.1. Classification of responses

Responses were scored for False Belief and Interpretive understanding using the criteria described in Study 1. Results are reported separately for the *Doodle-only* and *Full Picture* trials.

### 5.2.2. False Belief attributions

*Doodle-only trials.* A total of 119 of the 132 (90.1%) responses given to the question “What will Ann say this is?” were classified as instances of false belief attribution. Because participants never saw an underlying picture in these trials, errors could only arise if the attribution happened to be a “lucky guess” or result from previous exposure to one of the stimuli used. Eleven responses (8.3%) were judged to be either Contamination and Reality Errors—though no child indicated that they had seen the full picture before. When assigned a single point for each response classified as *False Belief*, the mean score (of a possible 2.0) was 1.81 ( $SD = 0.40$ ) for the total sample (5-year-olds = 1.72; 6-year-olds = 1.86).

*Full Picture Trials.* A truer measure of participant’s understanding of false belief comes from responses on the *Full Picture* trials where the child sees the underlying picture but the puppet does not. On these trials, 102 of 132 responses (77.3%) qualified as false beliefs.

Comparing False Belief Scores across Trial Type (*Doodle-only* vs. *Full Picture*) and Age Group (5- vs. 6-year-olds) in a repeated measures ANOVA, revealed reliably lower False Belief scores on *Full Picture* trials (1.54 vs. 1.81,  $F[1, 64] = 9.93$ ,  $p < 0.01$ ) and reliably lower scores for 5-year-olds (1.55 vs. 1.77,  $F[1, 64] = 6.65$ ,  $p < 0.05$ ) indicating some lingering failure on the part of these young children to reliably attribute false beliefs under these demanding circumstances. The Age Group by Trial Type interaction, however, was not statistically significant.

### 5.2.3. Interpretive attributions

*Doodle-only trials.* Applying the scoring criteria for response pairs described in Study 1 resulted in Interpretive classifications for just 8.6% of the response pairs provided by 5-year-olds and 24.3% of the 6-year-olds’ response pairs when participants saw only the restricted view.

*Full picture trials.* Scoring the response pairs from trials on which the children saw the full picture, but the puppets did not, just 10.4% of the response pairs provided by 5-year-olds, and 39.2% of 6-year-olds were classified as *Interpretive*.

Comparing Interpretive Scores across Trial Type (*Doodle-only* vs. *Full picture*) and Age Group (5- vs. 6-year-olds) in a repeated measures ANOVA, revealed reliably higher Interpretive scores on Unrestricted View trials ( $F[1, 64] = 10.99$ ,  $p < 0.01$ , mean scores = 0.530 and 0.348) and reliably higher scores for the group of 6-

year-olds ( $F[1, 64] = 6.88, p < 0.02$ , mean scores = 0.635 and 0.190). A significant interaction between Age and Trial Type ( $F[1, 64] = 5.66, p < 0.03$ ) indicates that these results are entirely due to the performance of the 6-year-olds whose scores were reliably higher on the *Full picture* trials (mean = 0.784 vs. 0.486), while the scores of the 5-year-olds were not affected by this manipulation (0.207 vs. 0.172).

#### 5.2.4. Comparing False Belief and Interpretive understanding

The False Belief results suggest that children in general, or perhaps 5-year-olds in particular, find it more difficult to attribute a 'false belief' when they have seen the full contents of the picture. Since the beliefs attributed in the *Doodle-only* trials cannot be considered legitimate false beliefs, the conclusion to be drawn from these data seems to be that, when children are shown only a doodle, their false belief competence will be overestimated. In contrast, these same *Doodle-only* trials underestimate children's understanding of interpretation since they find it easier to give more than one attribution when they have seen the full picture (see Fig. 4).

### 5.3. Discussion

The purpose of Study 2 was to show that in order to estimate a child's grasp of the interpretive possibilities that are inherent in the doodles stimuli, one must first reveal the larger picture of which the doodle is a part. The procedural route chosen for this demonstration was to contrast the same children's attributions to the puppets under two different testing conditions. In the first, the child and the puppets remained equally ignorant of the true state of affairs. In the second, the child was given privileged access to the real truth of the matter while the puppets were kept strategically ignorant. In the first condition, all attributions made to the puppet

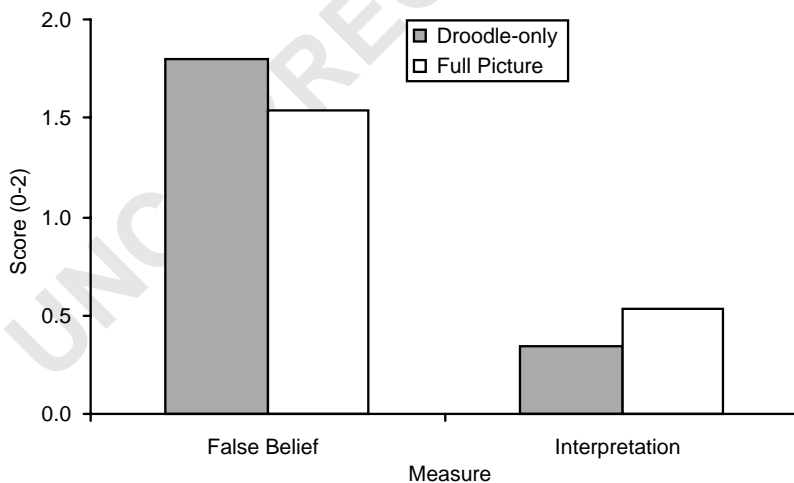


Fig. 4. Mean False Belief and Interpretive Scores by trial type (Study 2).

should technically qualify as “False Beliefs” since the child is unaware of the larger picture. Over 90% of responses given under these circumstances were scored as False Belief (the remainder being ‘lucky guesses’ conservatively scored, and ‘don’t know’ responses). When asked what the second puppet might think of this same picture, however, two thirds of the responses (68.1%) were a simple repetition of whatever had been attributed to the first puppet and just 8.6% constituted a new and different belief. In the second condition, when the child knew the contents of the larger picture, but the puppets did not, the percentage of responses scored False Belief fell from 90% to 77.3% and when asked what the second puppet would think, repetitions fell from 68% to 25.7%, while the frequency of new and different beliefs rose from 8.6% to 26.5%.

This pattern of findings suggests that simply asking children to attribute beliefs to others about some ambiguous stimulus will result in an overestimation of their understanding of false belief and an underestimation of their understanding of interpretation. It seems likely that on the first set of trials, the participants viewed the task as one of discovering what the picture “really is” and, having satisfied themselves that they had done so, they merely repeated the same belief for both puppets. In later trials when the truth had been revealed to them, participants struggled to deny their own privileged knowledge to the puppets and (for those able to do so) worked to come up with different mistaken readings of the same stimulus for each puppet.

Having established both the suitability of the stimuli (Study 1) and the sensitivity of the procedure (Study 2), attention was turned in Study 3 to certain earlier attempts to chart the course of children’s perspective-taking skills that employed somewhat similar materials and techniques to the procedures used in the present studies and to efforts to employ training or modeling as a way of improving children’s performance.

## 6. Study 3

It may be that children simply need a little help in order to display their understanding of interpretation. Taylor (1988) found that training trials with restricted views had a positive effect on 4-year-old participants’ ability to predict that a puppet (who had seen only a restricted view) would not know the contents of the larger picture of which the droodle is only a fractional part. In Study 3 this manipulation was replicated with the addition of a second puppet in an effort to determine whether training improves only participants’ grasp of the possibilities for false belief inherent in the droodles stimuli, or also aids them in their efforts to report upon multiple interpretations.

Study 3 compares the performance of groups of children under three training conditions. The first acts as a Control Condition by offering children no special training or instruction. In the second (False Belief Training Condition), participants are meant to benefit from a series of trials in which the capacity of droodles to promote false beliefs is illustrated. In the third (Interpretive Training Condition), a



series of trials showcase the fact that doodles can be interpreted in more than one way—that is, that more than one false belief can be had about any one doodle.

### 6.1. Method

#### 6.1.1. Participants

The subject pool for this study consisted of 49 children recruited from the ranks of those who completed Study 2. Eliminating children from Study 2 with no evident grasp of false belief (False Belief understanding scores of 0) as well as those whose understanding of interpretation was at ceiling (Interpretive Understanding scores of 2), resulted in a sample of children who could be expected to benefit from training. Forty-eight 5- and 6-year-old children from Study 2 who met these selection criteria (19 girls, 29 boys) were assigned to one of the three conditions to produce 3 groups roughly equal in terms of age, sex, and prior ability. All participants were tested within 7 days of having completed Study 2, with the majority tested on the following day.

#### 6.1.2. Procedure

A set of 8 line drawings were used. Three of these (Pig, Boot and Ship, see Fig. 3) were taken from Taylor (1988). All other materials were as described in Study 2. All participants were once again introduced to the two puppets and given the same instructions provided in Study 2. This was followed, depending on the condition, by one of 3 procedures outlined below.

In the *False Belief Training Condition*, the Boot, Ship, and Pig drawings from Taylor (1988) were used (see Fig. 3). The restricted views of these pictures were identical to one another. Children were shown one of the stimuli and asked to identify the object. The cover was then fitted over the picture and Raggedy Ann was retrieved from her house and shown the restricted view. Following Taylor (1988), the experimenter “spoke for Raggedy Ann” who guessed incorrectly, saying for example that the boot is a box, the ship is a boot, and the pig is a ship. When the puppet erred, the experimenter said “No Ann, look” and the cover was removed to reveal the full picture. With the second and third mistakes, the experimenter pointed out that the restricted views were identical. Following the third picture the experimenter noted: “Ann made a lot of mistakes, didn’t she? She thought this (pointing to boot) was a box, but it’s a boot (removes cover); she thought this was a boot but it’s a ship (removes cover); she thought this was a ship, but it’s a pig (removes cover).” The puppet was then held up to ‘see’ one of the restricted views and, again, the child was asked “When Ann sees just this, does she know what this is a picture of?” After the child answered, the puppet guessed incorrectly for each picture. Following Taylor, the purpose of this manipulation was to “make the child realize that the three restricted views are identical” (p. 714). Nine of these trials were conducted unless the child answered correctly on three trials in a row. This replicated Taylor’s *Training Condition*.

The *Control Condition* precisely replicated Taylor’s own *Control Condition*. In this condition the same three Pig, Boot, and Boat stimulus pictures were used but the

restricted views had different contents. As above, the child was shown one of the stimuli and asked to identify the object. The cover was then fitted over the picture and Raggedy Ann was retrieved from her house and shown the restricted view. The experimenter again spoke for the puppet who guessed incorrectly, for the Pig, Boot, and Boat pictures, saying that the boot was a ball, the ship was a shark, and the pig was a hand. The experimenter then presented the pictures with covers closed and said: "This is how the pictures looked to Ann. She could only see a little bit of them. She thought this one was a ball, but it's a boot (remove cover); she thought this one was a shark, but it's a boat (remove cover); she thought this one was a hand, but it's a pig (remove cover)."

The *Interpretive Training Condition* largely replicated Taylor's *Control Condition* with the important exception that both Ann and Andy guessed at the contents of the picture. In this condition the same stimulus pictures were used, but now the restricted views were different rather than identical. For the Boot picture, Raggedy Ann guessed incorrectly, saying it was a ball; Andy guessed that it was a leaf. The puppets differed in their guesses for the Pig and Boat pictures as well: Ann said the boat was a shark, Andy said a paint brush; Ann said the pig was a hand, Andy said it was a French fry. Following this, the puppets were placed back in their 'houses' and the experimenter presented the Pig, Boot, and Boat pictures with cover closed and said: "Ann and Andy made a lot of mistakes, didn't they? Ann thought this (pointing to boot) was a ball, and Andy thought it was a leaf, but it's a boot (removes cover); Ann thought this was a shark and Andy thought it was a paint brush, but it's a ship (removes cover); Ann thought this was a hand, and Andy thought it was a French fry, but it's a pig (removes cover)."

Participants in all conditions then received a total of 4 post-training Test Trials using four different stimulus pictures. On each trial the child saw the full picture and was asked to identify the object(s) it contained. Then, as in Study 2, the child was asked to attribute beliefs to Ann and Andy.

## 6.2. Results

In the *False Belief Training Condition*, all but 2 of the 16 children correctly answered 3 times running that Ann would not be able to identify which of the Pig, Boot, or Boat pictures lay beneath the restricted view. This suggests that, like the participants in Taylor's Study 2, children of the present study were able to improve their already good understanding "that restricted views in general can be ambiguous ... (and) ... that a naive observer might not guess the identity of a partially covered object" (p. 716).

### 6.2.1. False Belief attributions

The data from the testing trials were coded for understanding of false belief using the scoring criteria employed in Studies 1 and 2. All but 2 of the 48 participants were able to attribute a false belief on at least one of the 4 occasions afforded them (scores could range from 0 to 4). Scores for 6-year-olds ( $M = 3.27$ ,  $SD = 0.767$ ) were reliably higher than those of 5-year-olds ( $M = 2.54$ ,  $SD = 1.174$ ,  $F[1, 46] = 6.312$ ,

$p < 0.02$ ). Mean scores for each group were: *Control Group* = 3.00,  $SD = 0.90$ ; *False Belief Training* = 2.69,  $SD = 1.35$ ; *Interpretive Training* = 2.94,  $SD = 0.93$ . No reliable differences in False Belief scores were found across conditions. In a repeated measures ANOVA, however, a reliable effect for Study did emerge ( $F[1, 45] = 161.3$ ,  $p < 0.0001$ ) indicating higher False Belief scores in Study 3 than in Study 2. The improvement in false belief understanding, then, appears not to be connected with any of the particular training conditions, but may instead be a function of further testing trials.

#### 6.2.2. Interpretive attributions

As in Studies 1 and 2, the pairs of responses attributed to the puppets for each stimulus pictures in the post-intervention assessment were coded for evidence of an understanding of interpretation: 5.2% of the response pairs given by 5-year-olds, and 10.5% of pairs from 6-year-olds qualified as Interpretive. No reliable differences were found between age groups or conditions. A repeated measures ANOVA again revealed a modest but reliable improvement in scores between Studies 2 and 3 ( $F[1, 45] = 8.242$ ,  $p < 0.01$ ).

#### 6.2.3. Comparing False Belief and Interpretive understanding

Overall, just 8 of the 48 children (17%) gave any indication of appreciating the interpretive aspects of the stimuli, compared with 46 of 48 (96%) who gave some evidence of understanding that such stimuli can promote false beliefs.

### 6.3. Discussion

The purpose of Study 3 was to determine whether or not Taylor's (1988) method of presenting doodles actually taps children's abilities to attribute false beliefs, and whether her training techniques can be adapted to influence their interpretive understanding. Participants in the present study were chosen in a manner that would highlight any observed training effects. That is, they were selected on the basis of their performance in Study 2 such that all were known in advance to have some understanding of false belief coupled with little or no understanding of interpretation. Thus, if Taylor's training techniques were to have any influence on what she terms "conceptual perspective taking" we might expect some improvement in the understanding of either interpretation, false belief, or both. The data, however, show a non-specific increase in both false belief and interpretive understanding across all conditions. Training/exposure of any either kind is equally effective, or, more simply, increased exposure to the testing materials and the procedures promotes better performance on the post-training outcome measure.

Whether a test-retest effect or not, the findings of the present study show, again, that there is a gap between false belief and interpretive understanding—that is, that when scored on both measures, participants appear to find the attribution of a false belief to one puppet easier than attributing different false beliefs to two puppets. Along with the findings of Study 2, these data urge the importance of focusing attention on the question of why it is that some children who evidence a good grasp

of false belief, by attributing a false belief to Ann, often fail to provide a second false belief for Andy. This question is taken up more directly in Studies 4–6.

## 7. Study 4

Studies 2 and 3 establish that passing measures of false belief understanding is no guarantee of similar success on interpretive versions of the droodles task. Perhaps, the cautious reviewer of such findings might suppose, even children who are interpretive might find it difficult to give more than one interpretation of a restricted view simply because the saliency of the underlying picture overwhelms their interpretive capabilities by requiring all of their efforts to edit out their own privileged knowledge of the contents of the underlying picture. That is, once a child knows that the picture contains a ship and a witch, no amount of covering up bits of the drawing might induce them to say anything other than “ship and witch.” Clearly, this task demands some measure of self-control, but we still need to be convinced that children can at least treat a droodle as a thing unto itself before going on to trust the procedure to reveal their interpretive capabilities. These concerns can be, and were, addressed by having Ann view the picture through one window and Andy view through another. To provide different false beliefs to the puppets would, in these circumstances, require only an appreciation of false belief. The simple question that this manipulation is meant to answer is: Can children see the restricted views as somehow things-in-themselves, distinct from the underlying picture, and then go on to differently label the separate windows?

It could also be the case that children otherwise capable of recognizing that two different target characters can sometimes entertain different interpretations of one and the same stimulus may simply see no compelling reason to assume that such differences are in place in this particular situation. Perhaps children need additional prodding to display their interpretive talents. The most blatant of helpful hints would be to outright tell such respondents that Ann and Andy disagree as to the contents of the restricted view. In Study 4, participants were given just these instructions after they had provided an attribution for Ann and prior to being asked about Andy’s thoughts. These changes, it was hoped, would pave the way for them to report upon the puppets’ two different interpretations if they have it within them to do so.

Finally, children may fail to provide a second interpretation simply because they lack the imagination or creativity to actually invent a second reading of any one restricted view, or because they find these particular droodles to be too impoverished to support a second reading. To help control for these perhaps extravagant but real possibilities, a final droodle was presented. In this last presentation, children were shown only a restricted view and asked to “guess what this (the restricted view) might be.” Following their initial response, the experimenter remarked: “That’s a good guess, now guess again. What do you think this is?” If any of the children were to find it difficult to have more than one thing to say about any one picture, their lack of imagination should be made apparent in this final presentation.

## 7.1. Method

### 7.1.1. Participants

A total of 45 children (21 boys, 24 girls) were recruited for testing in this fourth study. Fifteen children were tested in each of 3 age groups: 5-, 6-, and 7-year-olds. Mean ages for each group were: 5.52, 6.44, and 7.61 years, respectively. All participants were recruited from, and tested in, a community-based after-school care facility.

### 7.1.2. Procedure

Materials consisted of the 7 doodles used in Study 1 and the puppets and boxes used in Studies 2 and 3. The stimulus pictures used in this study were fitted with covers containing two windows—allowing two different restricted views to be produced from each picture (see Fig. 5).

A total of 6 doodles, divided into 3 groups of 2 doodles each, were presented. On *Two Window Trials*, both of the viewing windows were used. That is, Ann was shown a doodle through one viewing window, while Andy saw a different doodle through a second window on to the same underlying picture. Participants were asked to describe what Ann would think of the contents of window 1, and then what Andy would think of the contents of window 2. On *Single Window Trials*, a single viewing window was used, but this time, participants were asked what first Ann and then Andy would say about the contents of one and the same window. On *Disagree Trials*, Ann and Andy were said by the experimenter to actively disagree about the

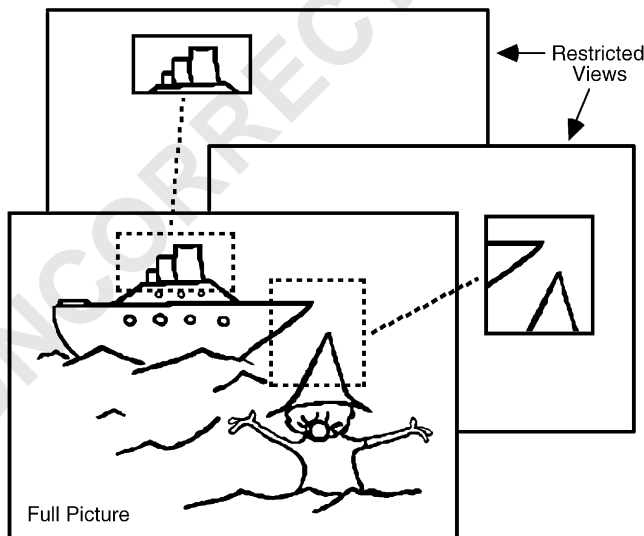


Fig. 5. Two window version of the ship-witch doodle.

contents of the restricted view. For example, if the child said of the Witch doodle, that Ann would think it was “two knife points,” they were told: “You know what? Andy *doesn't* think it's two knife points, what does Andy think it is?” In order to ensure that the participants do not assume that Andy and Ann always, or automatically disagreed about the contents of the restricted views, the Disagree Trials were always conducted last.

On the final *Guess Trial* using the 7th picture, participants were shown only a restricted view while Ann and Andy remained inside their houses. Participants were asked to “guess what this (the restricted view) might be.” Following their initial response, the experimenter remarked: “That's a good guess, now guess again. What do you think this is?” They were then shown the full picture and told: “Those were good guesses! Here's what the big picture looks like.”

## 7.2. Results

Attributions to Ann and Andy on the various single window trials of this study (i.e., pairs of responses to the 4 doodles that made up Single Window and Disagree Trials) were scored using the criteria for false belief and interpretive understanding described in Study 1.

### 7.2.1. False Belief attributions

All but two of the 45 children tested (two 5-year-olds) were able to attribute false beliefs to these puppet characters on at least one occasion. The percentage of responses classified as false belief attributions for the 5-, 6-, and 7-year-olds were: 53.3%, 68.3%, and 98%, respectively.

### 7.2.2. Interpretive attributions

Responses to the four doodles that made up the Single Window and Disagree trials were coded using the criteria for interpretive understanding described in Study 1. Five-year-olds managed to produce *Interpretive* response pairs on just 20% of these occasions. Six-year-olds managed 33.3% and 7-year-olds 88.3%.

The attempt, on Disagree trials, to oblige participants to provide different responses by insisting that Ann and Andy disagreed, was largely unsuccessful. Only 5 of the 31 participants who were not already at ceiling on Single Window trials actually improved their score on Disagree trials, and all of these had already provided one interpretive response pair on Single Window trials. No child was prompted by the manipulation on Disagree Trials to adopt an interpretive view if they had not already done so on Single Window trials.

### 7.2.3. Control trial

When asked, on the final trial to simply guess at the contents of a restricted view, 97% provided guesses that differed from one another in non-trivial ways. That is, when assessed against the criteria employed in evaluating attributions to Andy and Ann, almost every response was judged *Interpretive*. What these control data suggest

is that the children did not suffer any lack of imagination and that, when asked, they can easily re-read the same stimulus picture in a new and different way.

#### 7.2.4. *Comparing False Belief and Interpretive understanding*

Over 95% of the participants were able to come up with at least one false belief, while only 60% (typically the older respondents) could muster one or more interpretive response pairs.

### 7.3. *Discussion*

When shown an ambiguous restricted view, all but two participants seemed to appreciate that Ann would, at least sometimes, hold a false belief about the underlying picture. Less than 1 in 5, however, routinely reported that Ann and Andy would differently interpret this same ambiguous drawing. This failing cannot be blamed on the pressing salience of the underlying picture: when Ann and Andy viewed the same picture through different windows, all but two children were able to attribute different beliefs to Ann and Andy. Nor does it seem likely that the children naively assumed Ann and Andy always agreed in their interpretations. Even when told otherwise, however, some among the younger children continued to report that Ann and Andy held the same false belief. Nor, finally, is it a simple lack of imagination: when asked to guess at the contents of a restricted view, all of the children were able to give two different responses.

Still, one could argue, children may be confused by the stimuli used in these studies. Doodles are, after all, deliberately cryptic 2-dimensional line drawings, and children may be perplexed by them. What is still needed, then, is a demonstration that children of this age can, in fact, see multiple possibilities in all of these *particular* stimuli. That task is undertaken in Study 5.

## 8. Study 5

It could be argued that, despite the inclusion of a seventh doodle in Study 4, one cannot be sure that the failure of some children to give interpretive responses is not still somehow an artifact of the stimuli used rather than a conceptual difficulty on the part of the participant. What we really need to know, then, is whether or not children can easily generate alternative interpretations, not of cryptic line drawn pictures in general (as the data from the seventh doodle shows), but of the six particular doodles actually used in Study 4. This rather straightforward question can be answered using a new sample of children and presenting them with these 6 doodles using the procedure described for the seventh doodle in Study 4. That is, if children who were asked to “guess” and “guess again” can give two different readings for each and every one of the 6 doodles used in Study 4, we can be reasonably sure that the participants in Study 4 were able (in principle) to similarly generate alternate, non-interpretive, readings of precisely these stimuli.

## 8.1. Method

### 8.1.1. Participants

A total of 30 children (13 boys, 17 girls) were tested in this study (10 each of 5-, 6-, and 7-year-olds). Mean ages for each group were: 5.41, 6.58, and 7.46 years. All were recruited from, and tested in, a community-based after-school care facility.

### 8.1.2. Procedure

Materials consisted of the 6 doodles and other experimental materials used in Study 4. Participants were shown a restricted view of one of the stimulus pictures and asked to: "Guess what this is." The experimenter then noted: "That's a good guess, now guess again. What do you think this is?" Each participant was tested on 3 of the 6 doodles used in Study 4, with doodles counterbalanced across participants.

## 8.2. Results

Responses to the "guess what this is" question were scored using the same criteria employed in Study 1. Of interest here is the frequency with which participants gave two different "guesses" in response to each doodle. The short answer is: almost always. The 6- and 7-year-olds performed flawlessly with each and every child giving two different "guesses" to each and every doodle they were shown. Examples of responses given to the Witch doodle include: "two knives," "two pointy sticks," "an arrow," and "sharp teeth"—essentially the same sorts of responses that were offered by participants in Studies 1 and 4. Nine of the ten 5-year-olds gave perfect performances, with just one child failing to give a second guess on two of the three occasions she was afforded. The mean percentage correct (a correct response being a *pair* of different guesses concerning any one doodle) by age group are: 5-year-olds 93%; 6-year-olds 100%; 7-year-olds 100%. This level of performance rendered any further search for particularly "easy" or "hard" stimuli, or for age or gender differences, unnecessary.

## 8.3. Discussion

These findings clearly support the data from Study 4 suggesting that children in this age range do not suffer any lack of imagination and, when asked, such children can easily re-read the same stimulus picture in a new and different way. More importantly, this study effectively rules out the possibility that the participants in Study 4 who failed to offer interpretive responses to these same stimuli might have done so because the stimuli are somehow inherently difficult to re-read. Still, one might argue, what trips young children up in this procedure is not the restricted, but the *unrestricted* view: that knowledge of the contents of the full picture somehow limits their otherwise powerful imaginations. That prospect is taken up in Study 6.



## 9. Study 6

In Study 5 children capable of assigning a false belief to Ann occasionally—even when told not to—merely repeated themselves when asked what Andy thought. Perhaps, one final argument goes, the problem is a lack of alternatives. If such children could be provided with some ready alternative belief to assign to Andy, they could suddenly be made to appear on the Interpretive side of the ledger. One could, for example, add a pre-test trial, similar to the procedure followed in Study 5, in which children had access to alternative interpretations of precisely the droodle that was about to become the focus of attention by first showing them the restricted view and asking: “What do you think that is?” followed by: “That’s a good guess, have another guess.” Since the child had not yet seen the full picture, these guesses (provided they are incorrect) become, when the picture is revealed, false beliefs about its contents. On this account, when faced with the task of attributing a plausible belief to Ann and then to Andy, children with even the most tenuous grasp on the interpretive nature of the knowing process could reasonably be expected to take advantage of their own previous ‘guesses’ and to attribute these as legitimate false beliefs to the puppets. Of course, we would need to be convinced that these alternatives were actually available to the child ‘on-line’, or during the trial itself. Still, a simple post-test recall question (“What did you guess when I first showed you the picture?”) could ensure that the alternative representations were not somehow flushed from the child’s memory when their access to the full picture had proven their guesses “wrong.” In Study 6, a final sample of 5-to 7-year-old children was tested using just these modifications to the earlier procedures.

Finally, in addition to shoring up the findings from earlier studies, this last study was designed to provide a more detailed understanding of how the children themselves view the task of attributing beliefs to the puppets. Toward this end, the 7-year-old participants were asked a series of questions meant to prod them into justifying the beliefs they attribute to Andy and Ann. Following each of the final 2 trials, the 7-year-old participants were asked the following questions:

1. Why would Ann think it was a (belief attributed by child)?
2. Why would Andy think it was a (belief attributed by child)?
3. Why didn’t they think the same thing?
4. One child said Andy and Ann would think the *same* thing, is that OK?
5. Would Ann or Andy know it was a (description of full view) from just seeing this (restricted view)?

It was hoped that these questions would not only lead the children to discuss the interpretive possibilities afforded by the testing procedure, but also to provide some insight into the process by which their attributions were constructed.

## 9.1. Method

### 9.1.1. Participants

A total of 30 children (16 boys, 14 girls) were tested in this study (10 each of 5-, 6-, and 7-year-olds). Mean ages for each group were: 5.61, 6.43, and 7.29 years. All were recruited from, and tested in, a community-based after-school care facility.

### 9.1.2. Procedure

Materials consisted of the 6 droodles used in Study 1. Six droodles comprising 3 trial types of two droodles each were presented, but here only one-window trials were used—that is, Andy and Ann always viewed the same restricted window onto any droodle.

Trials 1 and 2 formed the *Standard Trials* in which participants were asked what first Ann and then Andy would “think” of the restricted view. Trials 3 and 4 formed the *Guess Trials*, which were in all other respects identical to the Standard trials with the exception that children were first shown the restricted view and asked to “Guess what this is.” Following one guess, they were told “That’s a good guess, guess again.” Once two guesses had been made, participants were shown the unrestricted view before being asked about Andy and Ann’s beliefs as in the Standard Trials. Trials 5 and 6 formed the *Guess+Recall Trials*. These trials were identical to Guess Trials except that, at the end of each trial, participants were asked “Remember when I *first* showed you this (restricted view), what was your *first* guess? What was your *second* guess?” Following this the eldest group of participants were asked the post-test questions listed above.

## 9.2. Results

### 9.2.1. False Belief attributions

When submitted to the scoring and coding criteria employed in Study 1, a pattern of findings similar to that of earlier studies emerged. All 5-year-olds were able to attribute at least one false belief, with 48.3% of all responses classified as expressions of false belief understanding. Among the 6-year-olds, 78.3% of responses were classified as false beliefs, with all but one child providing at least one false belief response. All of the 7-year-olds provided at least one false belief, with 91.6% of their responses classified as false belief.

### 9.2.2. Interpretive attributions

Using the same criteria employed in the earlier studies, the 5-year-old participants in Study 6 managed to produce *Interpretive* response pairs on just 11.7% of the possible occasions afforded them; for 6-year-olds gave interpretive responses on 45.0% of trials and 7-year-olds on 78.3%.

### 9.2.3. Use and recall of guesses

When asked to provide two guesses in response to viewing the droodles, participants in Study 6 performed in much the same fashion as did children in Study

5: they were able to provide two non-trivially different guesses as to the contents of the window on 114 of the 120 (95%) opportunities afforded them. The remaining 6 pairs included four repetitions of the first guess when asked for a second, and two failures—both on the part of a single child—to provide a second guess. During testing, participants attributed these guesses as beliefs to Ann or Andy on just 39 of 240 possible occasions (16%) with nearly a third of these coming from just two participants (one 5-year-old and one 6-year-old). Finally, participants were able to correctly recall their guesses at the conclusion of 118 of the 120 trials (98%).

What these data suggest is that: (a) children find the production and recall of such guesses a simple matter, and (b) that only rarely do their guesses end up coinciding with the beliefs they attribute to the puppets.

#### 9.2.4. *Justification of beliefs*

When asked to justify or explain their attributions, all of the 7-year-old participants were quick to point out features of the doodle that might lead one to hold just the beliefs they had ascribed to the puppets. These off-the-cuff reconstructions of how Ann and Andy had been ‘led astray’ were typically accompanied by gestures and narratives concerning the orientation and composition of the various ‘parts’ of the imagined picture and routinely included allusions to those parts which could be imagined to extend beyond the borders that framed the restricted view. Indeed, no child was struck dumb by this question, and most had to be restrained from continuing their elaborations upon the puppets’ supposed beliefs.

Having given what, in their own minds, must have seemed quite adequate explanations, most simply scoffed when asked why Ann and Andy had not come to the same interpretation of the doodle. When pressed, however, only two especially disappointed participants retreated and claimed not to know. Most were able to revive their narratives and supply some sort of cogent answer. One child noted that, in her experience, Ann and Andy would “never agree on anything.” Another felt that Andy’s mischievous nature had compelled him to listen to Ann’s response and then “go her one better” by inventing a more fantastic interpretation. Four of the 10 children made reference to the context and the ambiguity of the stimulus, claiming that there was no fault to be found in Andy and Ann’s disagreement, since “that’s just how they saw” the doodle at that particular moment, and that their beliefs could easily have been otherwise, or even reversed. Two children sought to resolve the differences between Andy and Ann’s interpretations by suggesting that, although we might not know what had led them to their differing views, there are *always* reasons for such differences and that more detailed information about Andy and Ann would be required to determine what those reasons were. Finally, one particularly savvy participant noted: “They’re not a two-headed monster with the same brain! Do you think they both think the *same* thing *all* the time?”

Fully half of the children balked when told that “one child said Andy and Ann would think the same thing.” The flavor of these responses is best captured by one child who rolled her eyes and muttered “yeah, right.” A further three children, though incredulous, agreed that while such a thing could conceivably occur, it was extremely unlikely. Though the remaining two acknowledged that it was indeed

“OK” to think such things, it was apparent that they meant “permissible” rather than “plausible.” Finally, all of these 7-year-olds emphatically denied that it would be possible for Andy or Ann to know what the contents of the larger picture would be given access only to the restricted view.

The children gave good evidence to the effect that they understand: (1) that no one could be expected to know what the true contents of the pictures were, and; (2) that the beliefs they attribute to the puppets should be justifiable rather than simply flights of fancy, and; (3) that it would be perhaps permissible, but still particularly bad form, to attribute the same beliefs to both puppets.

### 9.3. Discussion

The post-test interviews conducted with the 7-year-old participants reinforce the contention first raised in Study 1, that doodles are seen by these children as objects that require interpretation. Their responses revealed an understanding of the basic premises of interpretation: that the beliefs must be justifiable, that multiple beliefs are all but inevitable in this context, and that it is somehow a sign of immaturity to attribute full knowledge of the picture or exactly the same false belief to both puppets.

The guessing manipulation employed in the present study did not enhance performance. It seems likely that children experience guessing and belief attribution very differently. That is, being asked to “guess what this is” without having seen the full picture involves generating a set of responses that, to the child, are not statements about reality, but rather conjectures that no one could be expected to be held to account over. That children seem to grasp this aspect of the task can be inferred from the rising inflection of their responses (e.g., “A cow?”), indicating that they expect corrective feedback. Once the contents of the picture are known, however, and attention is turned to the thoughts of others, a different and more demanding context is created. Now the child must keep reality at bay and make use only of the visible parts of the doodle to generate and attribute a credible belief to the puppet. Having children guess should have armed them with a pair of ready-made, legitimate false beliefs about the picture or, at the very least, eased the cognitive burden of conjuring up words to place in the mouths of the puppets. Once again, however, this last attempt to narrow the gap between false belief and interpretive capabilities by removing imagined extraneous task demands also largely failed.

## 10. An overall test

All that really remains is to conduct some omnibus comparison of the false belief and interpretive abilities across all of the children studied in this sequence of experiments. This can be accomplished by examining the performance of individual children on all those occasions when they had access to the full picture but the puppet did not: 189 children were given a total of 816 opportunities to demonstrate

their understanding of false belief and to demonstrate an understanding of interpretation. The children succeeded in attributing a false belief to Ann on 75.0% of these trials, while on only 29.7% of these occasions did the same children go on to evidence an appreciation of interpretation by attributing a different false belief to Andy. Fig. 6 presents these summary data by age group across Studies 2, 3, 4, and 6.

It is also possible to categorize individual children according to their false belief and interpretive skills. Nominal measures of false belief and interpretive understanding were created by using scores from all trials when the child saw the full picture but the puppet did not that formed parts of Studies 2, 3, 4, and 6. Participants with false belief summary scores of 0 out of 2 were classified as *False Belief Understanding Absent*, those with scores of 1 as *False Belief Understanding Transitional*, and scores of 2 as *False Belief Understanding Present*. Similarly, participants with interpretive understanding scores of 0 out of 2 were classified as *Interpretive Understanding Absent*; scores of 1 = *Interpretive Understanding Transitional*; scores of 2 = *Interpretive Understanding Present*. By this measure, 116 children (61.4%) were always able to attribute a false belief to Ann, but only 50 (26.4%) always attributed a different false belief to Andy. Read slightly differently, 96.3% could attribute a false belief at least once, while only 40.2% could be counted on to give different interpretations to Ann and Andy on at least one occasion.

As a way of comparing individual participants' performance on measures of false belief and interpretive understanding, a contingency table was constructed that assigned each participant to a cell based on these classifications (see Table 1). Several of the cells in this table are italic to indicate that they will not be used in the subsequent analysis. These cells are excluded for one of two reasons. Three cells

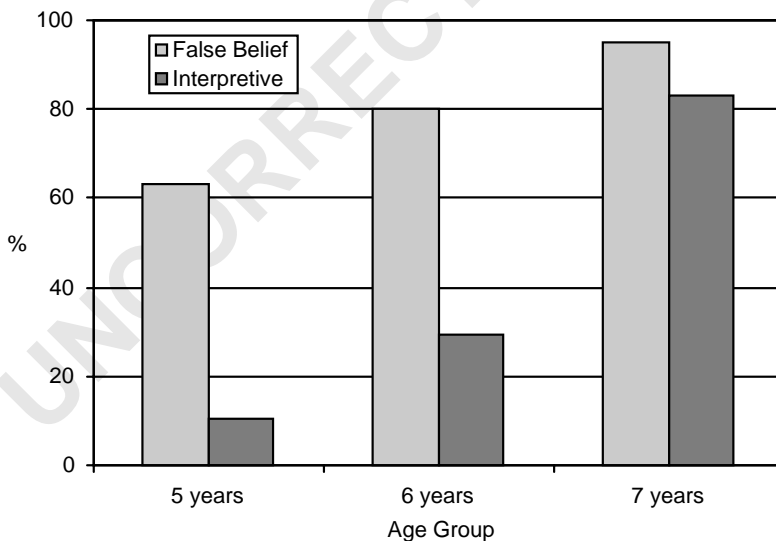


Fig. 6. Overall percentage of responses classified as False Belief and Interpretive (Studies 2, 3, 4, and 6).

Table 1  
Contingency table of participant's False Belief and Interpretive Understanding (Studies 2, 3, 4, and 6)

False Belief Understanding	Interpretive Understanding			
	Non-interpretive	Transitional	Present	
Absent	7	—	—	7
Transitional	61	5	—	66
Present	45	21	50	116
	113	26	50	189

(those containing “—”) are empty by definition according to the scoring procedures. These 3 cells could not contain observations because, to be classified as an Interpretive response pair, each pair *must* include one False Belief response. Thus, a child who gave no False Belief responses could only attain an *Interpretive Understanding Absent*. Similarly, no *False Belief Understanding Transitional* child could ever appear in the *Interpretive Understanding Present* column. The cells labeled Absent/Non-interpretive and Present/Present (i.e., row 1, column 1; row 3, column 3), are also excluded for the simple reason that these cells contain those analytically uninteresting participants who have either all or none of the two capabilities under consideration. In other words, since we are interested in determining the degree of overlap between measures of false belief and interpretive understanding, participants who are either at ceiling or floor on both measures offer us little in the way of real guidance. While this eliminates 30% of the sample, the remaining 132 participants do allow a direct test of the hypothesis that false belief understanding is not sufficient for an appreciation of interpretation.

A Chi Square analysis of the cells in Table 1 indicates a non-random distribution of participants and suggests the appreciation of false belief does not guarantee an understanding of interpretation ( $\chi^2[1, N = 132] = 12.261, p < 0.0005$ , Fisher's Exact  $p < 0.0008$ ).

11. General discussion

The overall aim of the sequence of studies just reported was to investigate young children's earliest insights into the interpretive nature of knowing. It was argued that, at a minimum, such insight would need to encompass an understanding that it is possible for two persons to be exposed to *precisely the same* information or stimulus event and yet to arrive at *different* opinions about what is still the self-same reality. To understand mental life in this way would mark one as having acquired a theory of mental life that shared in the common adult conception that minds not only capture and record information about an external reality, but also work in the other direction by creatively constructing and uniquely interpreting reality. This understanding of the interpretive character of the mind, it was argued, involves more than an appreciation of the possibility of false belief, and in opposition to certain

readings of earlier research findings, the hypothesis tested in the present work held that false belief understanding is a necessary but not sufficient condition for this more constructive view of the knowing process.

The study sequence began with what amounted to a background task. In Study 1, the suitability of the stimuli and procedures were tested using adult subjects who could be safely assumed to already hold to an interpretive theory of mind. The goal of this first study was to ensure that the stimuli to be employed were actually capable—as advertised—of prompting an awareness of the possibility of both false beliefs and multiple interpretations. The results indicated that both the subjects and the stimuli were equal to the task. Adults appropriately provided false beliefs on over 92% of all occasions afforded them, and then went on to provide differing interpretations of the same stimulus picture on 70% of these trials. Similarly, the individual stimulus pictures each garnered a sufficient number of unique interpretations and were sufficiently free of common or popular readings to effectively satisfy any concerns about their suitability as objects of interpretation. With these results in hand, attention was then turned, in Study 2, to the reactions of young children to these same stimuli and procedures.

The results of Study 2 suggest that children of 5 years of age and older can, for the most part, be counted on to recognize that these stimuli promote the formation of false beliefs. Only a subset of these same children, however, proved capable of appreciating the interpretive possibilities inherent in the pictures.

In an effort to improve the performance of a specially chosen subset of these children who had, in Study 2, shown some evident grasp of the possibility of false belief, but little in the way of interpretive understanding, efforts were made in Study 3 to expose the same children to various training schemes. The study partially replicated procedures used by Taylor (1988) meant to showcase the ambiguity of the restricted views, with the addition of a new condition that modeled differing interpretations of the same stimulus pictures. While children's performance did not differ across these training conditions, an overall improvement was observed from these same children's earlier performance in Study 2. While these findings may indicate that a test-retest effect is at work, it should also be noted that, as in Study 2, although all of these subjects could attribute false beliefs to the puppets, even after explicit training, only a handful could ascribe differing interpretations of the same stimulus picture.

In Study 4, several alternative explanations for the now evident gap in performance on measures of false belief and interpretive understanding were addressed. First, it was shown that children are easily able to provide differing false beliefs when the puppets were made to view the same picture through *different* windows. That is, when Ann saw one restricted view while Andy saw another, children had little trouble attributing different beliefs. Second, this study ruled out the possibility that the children were generally capable of understanding that the puppets would hold to different beliefs but simply saw little reason to exercise that capacity in this particular testing environment: even explicitly telling children that the puppets disagree about the contents of the restricted view fails to improve their performance. Finally, a post-test measure showed that these children did not suffer

1 some lack of imagination that prevented them from re-reading a restricted view in  
 3 more than one way. What these results demonstrate is that children do not lack the  
 5 required creativity or somehow misunderstand the task in ways that prevent them  
 7 from exercising an appreciation of interpretation if they have it within themselves to  
 9 do so. Finally, and once again, only a subset of those who passed the measure of  
 11 false belief went on to pass the measure of interpretation.

13 In Study 5 yet another attempt was made to rule out reductive readings of the  
 15 earlier findings by ensuring that the stimuli used in Study 4 were not somehow  
 17 particularly hard for children to re-read. Here children were simply asked (without  
 19 ever seeing the full pictures) to provide two guesses as to the likely contents of each  
 21 of the restricted views used in Study 4. Almost without exception, the children were  
 23 able to provide what, in other circumstances, would amount to “false” beliefs and  
 25 “interpretive” response pairs for each and every restricted view placed in front of  
 27 them. It would appear, then, that the failure of some children to behave  
 29 interpretively in earlier studies is not the result of some artifact having to do with  
 31 these particular stimuli.

33 Study 6 had two objectives. First, a final attempt was mounted to close the  
 35 performance gap between the measures by providing children with ready-made  
 37 alternative interpretations, and second, a post-test interview was conducted that  
 39 aimed to probe the thoughts of the most capable of the participants (the 7-year-olds)  
 41 concerning the actual process of attributing beliefs to the puppets. The attempt to  
 43 improve subjects’ interpretive scores largely failed. Despite having themselves given  
 45 what amounted to different “false” beliefs about the same restricted view when  
 asked to guess at its contents, very few subjects took advantage of the opportunity to  
 employ these alternative readings as the beliefs they attributed to the puppets. In the  
 post-test interview, the children described their experience in much the same way a  
 typical adult might have done. That is, when asked why it was that the puppets had  
 different ideas about the contents of the pictures, these children were quick to point  
 to the fact that, since no one could possibly know the true contents, and since many  
 different things could potentially be said about the restricted view, it was highly  
 unlikely (in their opinion) that any two persons would see and interpret these  
 ambiguous line drawings in exactly the same way.

As a way of evaluating our main hypothesis, the performance of children was  
 collapsed across studies to compare their false belief and interpretive abilities (see  
 Table 1 and Fig. 6). In total, 96% of the children, who participate, regardless of their  
 age, were able to attribute a false belief to Ann on one or more of the testing  
 occasions afforded them. In sharp contrast, however, only 40% of these same  
 children gave comparable evidence of understanding that Ann and Andy might  
 differently interpret one and the same stimulus picture. Further, interpretive  
 understanding was strongly age-graded: our 5- and 6-year-old participants had little  
 trouble assigning a false belief to Ann (63.4% of all responses from 5-year-olds;  
 79.9% of responses from 6-year-olds), but largely failed to demonstrate an  
 “interpretive theory of mind” by attributing different false beliefs to Ann and Andy  
 (10.2% and 29.6%). Only the 7-year-olds appear to have mastered both tasks  
 (95.0% false belief and 83.3% interpretive responses).



As these data show, the mastery of false belief understanding in the preschool years is not the same thing as, and importantly predates, an appreciation of interpretation. Just as clearly, however, false belief understanding is a natural ingredient of any subsequent conception of mind, including what is termed here an “interpretive theory of mind.” This follows for reasons that are largely definitional. In the standard form of our droodles task (i.e., when the child knows the contents of the underlying picture, but the puppets do not) only those respondents who have succeeded in avoiding a false belief error by successfully attributing to Ann and Andy some belief that is different from their own true belief are in a position to qualify as “interpretive” by further imagining that the mistaken notions held by these two puppets are also different from one another. That is, while cases in which either Ann or Andy is assumed to be laboring under some false belief while the other is (wrongly) imagined to somehow mysteriously know the real truth of the matter may well qualify as an instance of “representational diversity,” such response patterns do not qualify as *bona fide* instances of interpretation for the reason that they require no more in the way of a “theory of mind” than an appreciation of the fact that people are often mistaken—an insight that is simply tantamount to false belief understanding. In short, in just the same way that one cannot be said to understand the concept of belief if one fails to appreciate the possibility that beliefs can be false, one cannot be said to understand interpretation without realizing that two different persons may differently, and legitimately interpret (or misinterpret) one and the same thing.

Obviously, any “one-miracle” view that equates false belief understanding with an interpretive theory of mind cannot be made to square with these data. Still, the results should not be taken to justify any updated “two-miracle” view that simply insists that children acquire their last theory of mind at the age of 7 rather than 4. Clearly a simple understanding that different persons may differently interpret droodles is still a very long way from a more mature and thorough-going appreciation of the idea that knowledge is a personal construction. All of this still leaves open what, if anything, it might be that still separates middle-school aged children from their elders?

At least three promising candidate possibilities spring to mind. These include: (1) the gradual elaboration of personological variables in a developing theory of mind—particularly as seen in the capacity of middle school children to incorporate notions of enduring personality structures in their explanations and predictions of social and interpersonal behavior; (2) the movement, in adolescence, from entertaining retail doubts about the validity of *some* knowledge claims, to a wholesale rejection of the adequacy of *any and every* claim to absolute certainty, and; (3) the potentially life-long intellectual struggle to justify and uphold a personally coherent world view and sense of personal identity in the face of challenge and change. Although each of these broad topic areas obviously deserve much more space than can be allotted them here, a few words will need to be said if, only to support their candidacy as items on a theories of mind “to-do” list.

With regard to the first topic, what might be called “child as personality theorist,” there is already good evidence to suggest that between the ages of 6 and 11 years

1 children move from giving situational or behavioral accounts of the behavior of  
 3 others to more sophisticated psychological descriptions and comparisons that  
 5 include the notion of stable personality traits (e.g., Barenboim, 1981; Rholes &  
 7 Ruble, 1984). This seems fertile ground for any researcher interested in the changing  
 ways that children come to make real use of these powerful but more intricate  
 variables in their theorizing about the mental lives of others and in making concrete  
 judgments about just how it is that a particular peer or playmate might interpret the  
 nuances of a given situation.

9 Slightly farther along the developmental course are questions concerning the ways  
 in which somewhat older children and adolescents resolve matters of intellectual  
 11 uncertainty. That is, how such young persons come to first recognize, and later  
 overcome an awareness of their own fundamental “epistemological loneliness”  
 13 (Chandler, 1975) or ultimate subjectivity in a world marked by the unrelentingly  
 private and privileged nature of their own and others’ thoughts and feelings. This  
 15 disquieting realization foreshadows even more serious epistemological troubles:  
 “unlike their younger counterparts, such adolescent youths no longer hold out the  
 17 prospect that all differences of opinion will eventually succumb to the authority of  
 objective facts, and instead toy with the prospect that certain of the interpretive  
 19 differences that divide people are endemic to the knowing process itself” (Chandler,  
 1988, p. 409). Coming to grips with the essential subjectivity of the knowing process  
 21 and the notion that all knowledge is unavoidably interpretive, brings the adolescent  
 squarely to the problem of the fundamental ambiguity of all knowledge. Here, where  
 23 all claims to absolute certainty must be abandoned, they are left to construct a  
 theory of mind that rests on the impossibility of maintaining a “viable, certainty-  
 25 preserving bridge between the realms of subjective experience and objective truth”  
 (Chandler, 1988, p. 411).

27 The prospects for making individual headway on such a seemingly bleak  
 epistemological landscape are not entirely foreclosed, however, and a substantial  
 29 body of more hopeful research exists concerning the routine business of making  
 one’s grown-up way through a world of ultimately undecidable knowledge claims.  
 31 Among the ranks of those charting progress toward the upper limits of an  
 interpretive theory of mind, the work of Perry (1970), Kitchener and King (1981)  
 33 and those researchers concerned with women’s epistemic development (Belenky,  
 Clinchy, Goldberger, & Tarule, 1988) deserves special mention.

35 The connection that is offered here between the findings of our own studies of  
 young school-aged children and those arising out of the ongoing work of others  
 37 examining later developmental periods, is rather simple: Children begin their careers  
 as theorists of the mind by recognizing that others can ‘get things wrong’ (simple  
 39 false belief); they progress to the realization that there is more than one way to be  
 wrong (interpretation); then to more sophisticated notions of interpretation that  
 41 include the possibility that there is (perhaps) more than one way to be ‘right’; and  
 eventually to the view that any and all claims to knowledge rest upon finding the best  
 43 available warrant for what must remain fundamentally doubtable knowledge claims.  
 Updating the “one-miracle” view to encompass all of these findings is not so simple  
 45 and, thankfully, is not a task that need be accomplished here.

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