

From simple desires to ordinary beliefs: The early development of everyday psychology*

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Abstract

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We provide evidence for the claim that before young children construe human action in terms of beliefs and desires they understand action only in terms of simple desires. This type of naive psychology—a simple desire psychology—constitutes a coherent understanding of human action, but it differs from the belief–desire psychology of slightly older children and adults. In this paper we characterize what we mean by a simple desire psychology and report two experiments. In Experiment 1 we demonstrate that 2-year-olds can predict actions and reactions related to simple desires. In Experiment 2 we demonstrate that many 2-year-olds pass desire reasoning tasks while at the same time failing belief reasoning tasks that are passed by slightly older children, and that are as comparable as possible to the desire tasks they pass with ease.

Introduction

Our aim is to chart the early development of everyday psychology, that is, the early development of commonsense understandings of human action. One example of an everyday psychology is adults' explanation of actions in terms of beliefs and desires. Recent research has shown that preschool children also understand and predict human action by considering actors' beliefs and desires (e.g., Wellman & Bartsch, 1988; Wimmer & Perner, 1983; Yuill,

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1984). Here we examine the everyday psychology of still younger children, 2-year-olds.

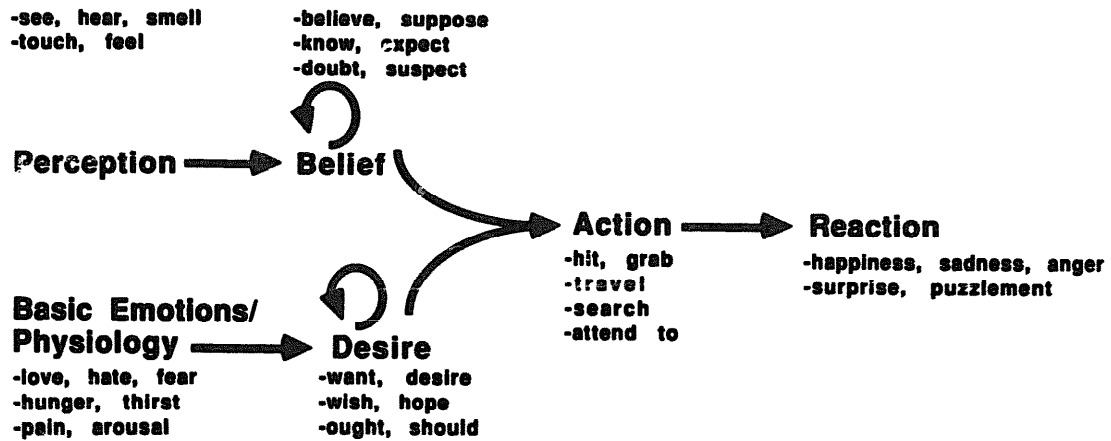
Adults' everyday explanation and prediction of human behavior is essentially mentalistic. We explain actions in terms of the wishes, hopes, beliefs, and ideas of the actor and we feel that our own behavior is the product of such mental states and attitudes. A shorthand description for this causal-explanatory system is that it is a belief-desire framework for construing action. If John goes to McDonald's to buy hamburgers, for example, this is explained, in essence, by appeal to something like John's *desire* for hamburgers, and his *belief* that he can buy hamburgers at McDonald's. These factors—beliefs and desires—intertwine and interpenetrate. Along with constructs such as feelings and emotions, perception and intention, they form a coherent explanatory system for human action. The scheme in Figure 1 provides an outline of these and other aspects of everyday belief-desire reasoning. It is difficult to capture succinctly the nature of everyday belief-desire psychology; certainly the scheme in Figure 1 provides only a crude outline. Still, something like this scheme seems central to such everyday explanations as:

- (1) Why did John buy a green car? He wanted a new car, believed that that model was the best one, and thought green looked good.
- (2) Why did Jill go to the deli? She was hungry and wanted a sandwich, she hates white bread, and thought she'd seen a nice whole-wheat sandwich at the deli.

Thus, the scheme suggests that actions are caused by and hence predictable from desires (e.g., wanted a car) and beliefs (e.g., believed that model was best); but that, in addition, perceptions often cause or inform beliefs (e.g., she'd seen a nice whole-wheat sandwich); that basic emotions (e.g., hate) and physiological states (e.g., hunger) ground one's desires (e.g., she was hungry and wanted a sandwich); and that actions result in real-world outcomes which produce psychological reactions (e.g., getting something you want tends to produce happiness or satisfaction, getting something you did not expect produces surprise).

Note especially the importance of the construct of belief in this construal of our everyday psychology. Desires motivate behaviors but beliefs frame them. Persons' actions can thwart their own desires (Joe wants his watch, which is in the basement, but he's looking for it in the bedroom) because beliefs are also at work (Joe think it's in the bedroom). There is controversy at present about whether 3-year-olds understand others' beliefs; some studies seem to show that they do (e.g., Wellman & Bartsch, 1988) but several investigators claim that this understanding is apparent only at about 4 years

Figure 1. *Scheme for depicting belief–desire reasoning (from Wellman & Bartsch, 1988).*



(e.g., Ferguson & Gopnik, 1988; Perner, 1988). Nonetheless sometime around 3 or 4 years children, like adults, seem to understand others' behavior via a conception of belief embedded within a larger belief–desire reasoning scheme recognizably like the one depicted in Figure 1.

In the current research our hypotheses focus on younger children still. In essence, we claim that 3 years is just about the earliest age at which children understand belief and thus can participate in belief–desire reasoning; 2-year-olds fail to understand belief.¹ However, 2-year-olds are not simply ignorant of human action; we propose that they too evidence a coherent naive understanding of certain psychological causes of human action, but an understanding different from our own and one that we will term a simple desire psychology. To advance this hypothesis we undertake two tasks. First, we wish to characterize what we mean by a simple desire psychology. To do this we contrast it first with a drive psychology and then contrast it with a belief–de-

¹In this paragraph, and at other places throughout the paper, we talk about 2-year-olds versus 3-year-olds. This is purely a convenience. To be more accurate, and as stated in several places, we believe that understanding of belief first appears in many older 2-year-olds in the months right before the third birthday. Even this is inexact. We do not believe that the conceptual developments we are charting are tied to chronological age, in any very precise way; we simply use age as a convenient marker for talking about a sequence of early developments. We contend only that among samples of middle-class children of the sort studied here (and in related studies such as Shatz et al., 1983; Wimmer & Perner, 1983) late in the third year is when many children first evidence an early understanding of belief. Of course some individuals do so earlier and some later. As a shorthand way of describing this development we talk of 2-year-olds as desire psychologists versus 3-year-olds as belief–desire psychologists, although many children have a beginning understanding of belief somewhat in advance of their third birthday. To be clear, our focal claims are that (1) simple desire understanding precedes understanding of beliefs, but that (2) understanding of belief is typically achieved at a very young age.

sire psychology. In this discussion we provide a description of what simple desire reasoning might look like. Second, we provide some needed evidence for the claim that 2-year-olds are simple desire psychologists.

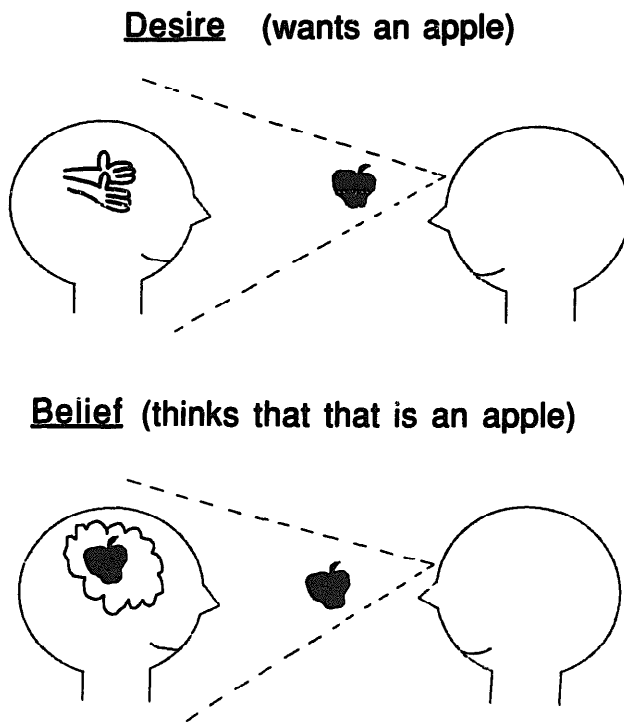
In our analysis, both drives (e.g., he is hungry) and simple desires (e.g., he wants an apple) are descriptive of motivational forces behind a potential action. Being hungry and wanting an apple both describe internal states energizing the organism toward certain outcomes, namely relieving hunger or obtaining an apple. But in specifics and in emphases, drives and simple desires are quite different sorts of descriptions of an organism's internal, energizing states. Drives describe the organism's internal physiological state (e.g., he's hungry; she's thirsty); simple desires describe a specific object (or event or state of affairs) that is sought. Conversely, drives, in their core sense, are silent about objects; desires are silent about physiological state. For example, being hungry can be satisfied by an apple, a banana, or a hamburger. The object is not (essentially) described by stating the drive. But "wanting an apple" is not satisfied by a banana; the object is essential. In short, drives and desires, while similar in some respects (note their contiguous relation in Figure 1), are different in that desires, not drives, encompass a specified object.

This necessary specification of an object makes desires, even simple desires, similar to beliefs in an important respect. Simple desires in our proposal, and beliefs more ordinarily, are intentional constructs in the sense that they are about some "object". This is an important similarity, often noted (e.g., Brentano, 1874/1973; Dennett, 1978). Indeed, in adult understanding, a person's desires are often construed in terms similar to our construal of beliefs. Thus, both desires and beliefs are called propositional attitudes. Beliefs, for example, are beliefs about a proposition: He believes that that is an apple. In this construal beliefs are seen as representational. To say that "he believes that that is an apple" is to assert something like that the believer has a cognitive representation of the world and in that representation the designated object is an apple. In parallel, a person's desires can be construed in such propositional attitude terms—a desire about a proposition, about a possible represented state of affairs. He wants an apple, becomes: He wants that there be an apple and that he obtain it. This is plausible because, in adult belief-desire psychology, desires are inextricably connected with beliefs. If he wants an apple, then it implies that he believes an apple exists.

However, intentional states need not be representational. More specifically, it seems possible to imagine a very simple conception of desire, unlike our typical understanding of belief, in which desires are not representational. In this simple understanding, to say that "he wants an apple" would embody no notion of representing an apple, simply wanting one. In this simple con-

ception, desires are not attitudes about a proposition but attitudes about actual objects or states of affairs. Figure 2 is an attempt to capture this simple conception of desire and to contrast it with a conception of belief. That figure graphically portrays, at the top, someone (the person on the right) thinking of another's (the person on the left) internal state of desire. At the bottom the figure portrays someone thinking of another's internal state of belief. The internal states of the target person (on the left) are graphically depicted in something like the way the first person construes them. Note that in the case of simple desires the conceiver need only think of the target person as having something like an internal longing for an external object. The relevant outcome concerns simply obtaining the object. In the case of belief the conceiver must think of the target person as representing the apple somehow, and thus the relevant outcome concerns truth or correspondence. This depiction is both too crude and too specific, but no matter how portrayed, the key idea here is that any valid conception of belief evidences appreciation of the fact that persons live not simply in a world of objects and events but also in a world of representations of objects and events. A simple understanding of desires is conceivable, however, that does not require such an appreciation.

Figure 2. *A pictorial contrast between simple desires and beliefs.*



In sum, we want to propose and describe a simple desire psychology—one resting essentially on a conception of internal states directed toward obtainment of objects in the world—and in this way quite different from a belief-desire psychology which rests centrally if not wholly on a conception of internal cognitive states representing truths about the world. To reiterate, we are not claiming that this simple conception of desire is the notion of desire characteristic of everyday adult thought. Our everyday adult conception is more complex, more inextricably intertwined with the business of belief. But, a simple desire notion of this sort is possible and it might conceivably characterize 2-year-olds' naive psychology. If so, what sort of reasoning about actions might be encompassed by a simple desire psychology?

To reiterate, in simple desire psychology as we characterize it, the actor is attributed simple desires, that is, internal dispositions toward (or against) certain actions or objects. Thus, actors are seen as wanting to get a drink of water, wanting to run or jump, desiring a certain toy, and so on. Such desires may or may not be seen by even young children as grounded in basic emotions and physiological states (e.g., fears, thirst). We do not know. More focally, however, such simple desires are seen as causing the organism to do certain things. Essentially (but not exhaustively), simple desires cause actors (1) to engage in goal-directed actions (seek water, avoid fire) including persisting in goal-directed actions (if the route to water is blocked, seek an alternative), and (2) to have certain emotional reactions (getting what you desire yields happiness, not getting it produces frustration, unhappiness, etc.).

Such a desire psychology can provide some simple but cogent accounts and predictions of various acts. Thus, if a desire psychologist knows that "Jill wants an object", he can predict that Jill will look for the object. And if he knows "Jill wants the object" and that "the object is in the kitchen", he can predict that Jill will look in the kitchen. He can predict that "Jill will look in the kitchen" under the general maxim that people act to fulfill their desires. This example can be used to clarify how simple desire reasoning can proceed without a conception of belief. The simple desire psychologist knows the object is in the kitchen, and utilizes this knowledge in predicting where Jill, the character, will look. Critically, the desire psychologist does *not* attribute such a knowledge state to Jill. The simple desire psychologist sees Jill as having a desire and sees the world as having objects; the desire psychologist recruits his own knowledge of the world and of Jill's desires to predict Jill's desire-caused action. He does not attribute knowledge of the world (a belief-representational state) to Jill. Similarly a desire psychologist can also predict that if Jill finds the desired object she will be happy. If Jill does not find the object she will be unhappy to some degree. The desire psychologist can pre-

dict Jill's happiness and unhappiness under the general maxim that getting what you want makes you happy.

Note that simple desires are intentional states and thus simple desire psychology rests on an important distinction between internal intentional states and external reality. Specifically desires are, in part, independent of outcomes; one can desire things that may or may not be obtained. This independence of psychological state and reality is clear in several respects. It underpins, for example, differential prediction of continued action (because you did not yet get what you want) versus cessation of action (because you did) and also underpins prediction of emotional reactions of happiness versus unhappiness. To summarize, a simple desire psychology attributes to the actor certain internal desires, recruits various sources of knowledge about the external world, and generates inferences about how actions in the world stem from and fulfill (or not) the actor's desires. In these regards a simple desire psychology can provide the reasoner with some significant explanatory resources.

A simple desire psychology fails in some respects, however. In particular there are certain phenomena that belief-desire psychology can account for that simple desire psychology cannot. These achievements depend on a conception of belief as a representational mental state in interaction with, but independent of, desire. Including a concept of belief in one's explanatory apparatus can provide, for example, an explanation for why two organisms with the same desire (or the same organism with the same desire at different times) might nonetheless engage in two different acts—because they have different beliefs. Moreover, adding a concept of belief can provide an explanation for why an actor might do something that seems contradictory to his or her own desires, for example why Jill might look for a desired object at one location when it is really at a second location—“because she *believed* it was at the first location”.

Our hypothesis is that most 2-year-olds have a simple desire psychology and engage in only desire reasoning about actions, but that by 3 years, or just a little before, children have and utilize a concept of belief. Given our prior demonstrations that 3-year-olds do understand belief (Wellman & Bartsch, 1988; Bartsch & Wellman, 1989), we concentrate on two demonstrations here. In Experiment 1 we demonstrate that 2-year-olds can predict actions and reactions related to simple desire descriptions. In Experiment 2 we demonstrate that many 2-year-olds pass desire reasoning tasks while at the same time failing belief reasoning tasks that are as comparable as possible to the desire tasks and that are passed by slightly older children, 3-year-olds.

Experiment 1

If 2-year-olds do possess a simple desire psychology this represents an intriguing, indeed critical, acquisition. Desire psychology is a naive psychology of some utility and complexity. It seems important, therefore, to document whether such young children can engage in simple desire reasoning. As outlined above, a simple desire psychologist should, at a minimum, be able to (1) predict certain actions given information as to an actor's simple desires, in particular to predict (a) the cessation of relevant actions for an actor who attains his or her desires, and (b) the persistence of action for an actor whose desires are as yet unattained. In addition, a desire psychologist should be able to (2) predict appropriate emotional reactions, essentially to predict (a) that getting what you desire yields happiness, pleasure, or satisfaction, and (b) that not getting it yields unhappiness or sadness. In Experiment 1 we examine whether 2-year-olds can engage in these four sorts of desire reasoning.

Methods

Subjects

Sixteen older 2-year-olds (range 2-7 to 3-1, $M = 2-10$) participated. There were 8 boys and 8 girls, all from a preschool program serving an ethnically mixed but predominantly white middle-class clientele in a small midwestern American city.

Tasks

Children made judgments about the actions and emotional reactions of small cardboard characters in each of three types of situations. In the Finds-Wanted situation the character wants something that may be in one of two locations, the character searches in location 1 and gets the object. The Finds-Nothing situation was identical to Finds-Wanted except that upon searching in location 1 nothing was there. The Finds-Substitute situation was identical to Finds-Wanted except that upon searching in location 1 the character found an attractive object but not the one said to be wanted. It was important to include this Finds-Substitute situation in our procedures in order to assess whether children understand the object specificity of desires.

In making *action* judgments children had to predict the character's subsequent action, that is, whether he or she would go on to search in location 2 or would stop searching. An understanding of the implications of characters' desires should lead to a prediction of continued search in the Finds-Nothing and Finds-Substitute situations but not in the case of Finds-Wanted.

In making *emotion* judgments children had to state the character's emotional reaction, whether he or she was happy or sad. An understanding of the role of desires in mediating emotional reactions should yield a prediction of happiness in the Finds-Wanted situation but sadness in the Finds-Nothing and in the Finds-Substitute situations.

Procedures

Two parallel sets of six stories each, Action stories and Emotion stories, were presented to each child. All stories were about a character who wanted to find something. Each story was told with a cardboard cut-out of the character, shown from the back (so as to depict no facial expression), and a cardboard layout depicting two locations. Children were told, for example, that Sam wants to find his rabbit, told that the rabbit might be hiding in either of the two depicted locations, then shown Sam walking to one of the locations, opening it, and either finding the desired object (a cut-out of the rabbit) or something else (a dog) or nothing. In Action stories, stories where the child had to judge the character's search actions, children were also told that the character wanted the object for a specific purpose, for example, to take it to school. Thus, in these stories a third location, a final destination (e.g., the school), was depicted also. After the character had looked in the first location children made their predictions. To elicit action judgments children were asked what the character would do next. For example, "What will Sam do next, will he look in the (other hiding location) or will he go to school?" Children could respond by naming or pointing to their choice.

Emotion stories, stories where children had to judge the character's emotional reaction, were identical to Action stories except that no final destination was mentioned. Children were simply told, for example, of Sam who wanted a rabbit, shown Sam looking in one of the two hiding locations, and shown him either finding the rabbit there or not. Then, to elicit emotion judgments the children were asked how Sam felt: "Does he feel happy or does he feel sad?" Children could respond by saying happy or sad or by pointing to a drawing of a happy or sad face. The six story scripts are presented in Table 1.

Each child was tested in two sessions, one session for Action stories and another for Emotion stories. In each session he or she received two stories each of the Finds-Wanted, Finds-Nothing, and Finds-Substitute varieties. Within a session the stories and characters varied (e.g., Sam wants to find his rabbit, Annie wants to find her crayons) with one exception. In two pairs of stories two characters were presented as getting the exact same object but it was either wanted or not. For example, Sam wants a rabbit and gets a dog (Finds-Substitute story) and Johnny wants a dog and gets a dog (Finds-

Table 1. *Stories used in Experiment 1*

Finds-Wanted Stories

Here's Johnny. He wants to find his dog [to take his dog to the park, 'cause that's what he really wants to do].^a His dog might be in the house, or it might be in the garage. So, he's looking for his dog [to take it to the park]. Watch, he's looking for his dog in the garage. Look. He finds his dog.

Here's Linda. She wants to find her mittens [so she can go outside and play with her snowman, 'cause that's what she really wants to do]. Her mittens might be in the closet, or they might be in her backpack. So, she's going to look for her mittens [so she can go outside]. Watch, she's looking for her mittens in her backpack. Look. She finds her mittens.

Finds-Nothing Stories

Here's Betsy. She wants to find her horse [to take her horse to the pond, 'cause that's what she really wants to do]. Her horse might be in the red barn, or it might be in the green barn. So, she's going to look for her horse [to take it to the pond]. Watch, she's looking for her horse in the green barn. Look. She doesn't find her horse.

Here's Peter. He wants to find his bike [to ride his bike on the sidewalk, 'cause that's what he really wants to do]. His bike might be in the garage or it might be in the playroom. So, he's going to look for his bike [to ride it on the sidewalk]. Watch, he's looking for his bike in the playroom. Look. He doesn't find his bike.

Finds-Substitute Stories

Here's Annie. She wants to find her crayons [to take her crayons to her friend's house, 'cause that's what she really wants to do]. Her crayons might be in the desk, or they might be in the toybox. So, she's going to look for her crayons [to take them to her friend's house]. Watch, she's looking for her crayons in the toybox. Look. She finds some mittens.

Here's Sam. He wants to find his rabbit [to take his rabbit to school to show to his friends, 'cause that's what he really wants to do]. His rabbit might be in the shed, or it might be in the garden. So, he's looking for his rabbit [to take it to school]. Watch, he's looking for his rabbit in the garden. Look. He finds a dog.

^aThe main text presents information included in Emotion stories. Text in brackets indicates information that was included in the Action stories but omitted from the Emotion stories.

Wanted). This arrangement allowed us to compare children's ratings of characters experiencing the exact same outcome but having had different desires. This provides a sensitive test of whether individual children understand the independence of desire and outcome.

In each session the stories were presented in two different orders counter-balanced across the 16 children. These two orders varied whether a Finds-

Wanted story or a Finds-Substitute story was presented first; Finds-Nothing stories always separated the other two stories. When soliciting action judgments, whether the second location or the final destination was mentioned first was counterbalanced (e.g., “Will he look in the (other location), or will he go to school?” vs. “Will he go to school or will he look in the (other location)?”). Similarly, for emotion judgments mention of happy or sad was counterbalanced (e.g., “Does he feel happy or does he feel sad?” vs. “Does he feel sad or does he feel happy?”). Half the children received Emotion tasks in their first session, and half received Action tasks first.

Results

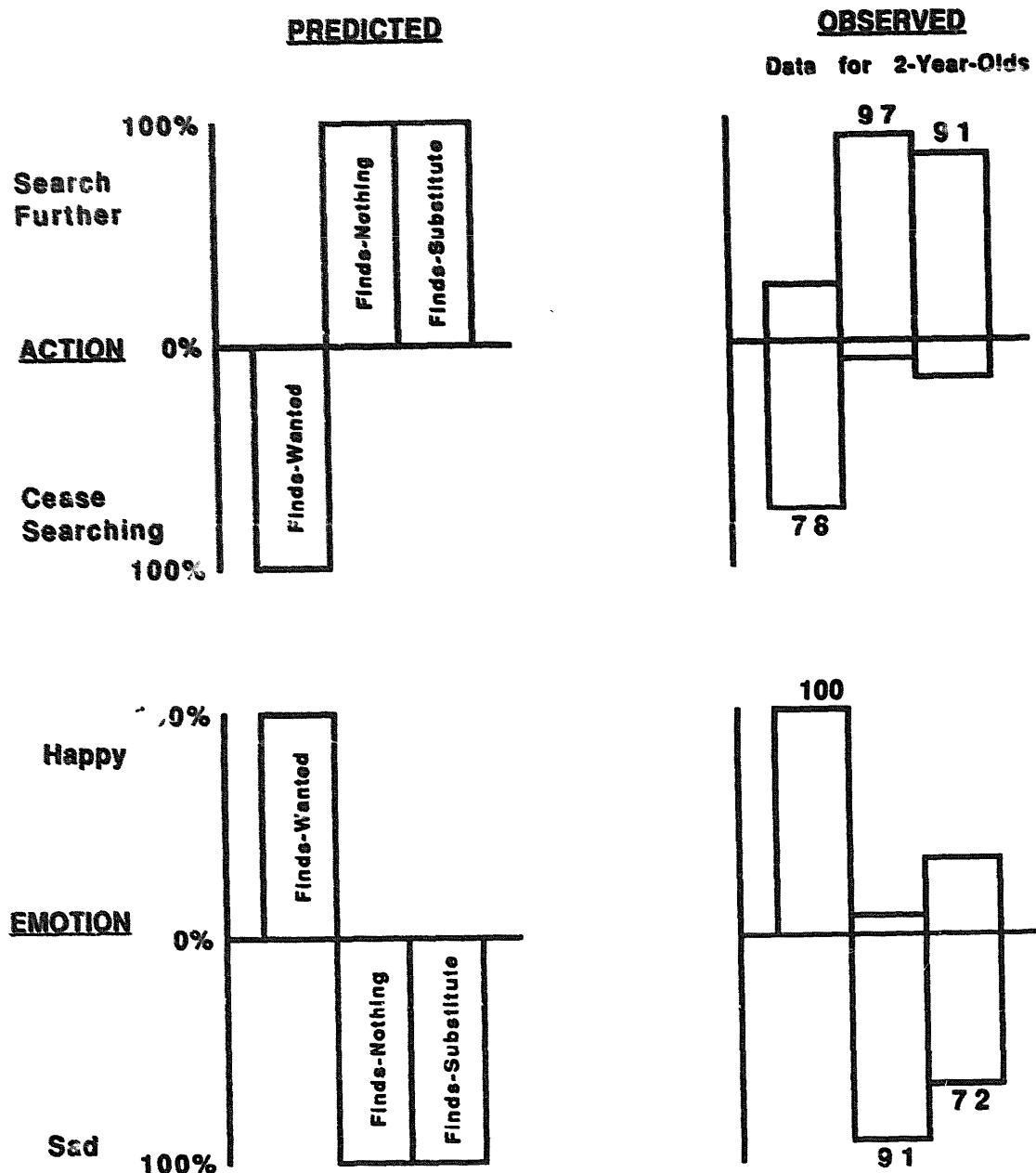
A preliminary 2 (Sex) \times 2 (Order of Sessions) \times 3 (Story type) analysis of variance indicated that there were no effects of sex or of order of sessions (Emotion vs. Action story session first). Similarly, the two orders of stories within a session yielded nonsignificant differences.

Figure 3 provides a graphical depiction of the results. On the left are predicted patterns of results if children understand the role of desires in predicting actions (at the top) and emotional reactions (at the bottom). At the right are the relevant data from the 16 2-year-olds. As can be seen, in essence children conform to the ideal pattern. Inferential statistics confirm this graphical picture.

Univariate ANOVAs yielded significant effects of the story types—Finds-Wanted, Finds-Nothing, Finds-Substitute—for action judgments, $F(2, 30) = 39.12$, $p < .001$, and for emotion judgments, $F(2, 30) = 65.50$, $p < .0001$. Scores for these analyses were children’s predictions of continued searching (proportion out of 2) for action stories, and predictions of happiness (proportion of 2) for emotion stories. As can be seen in Figure 3, children appropriately predict continued searching for Finds-Nothing and Finds-Substitute story characters but cessation of search for Finds-Wanted. They appropriately predict happiness for Finds-Wanted but sadness for Finds-Nothing and Finds-Substitute stories. Post-hoc Scheffe comparisons ($p < .05$) showed that Finds-Wanted scores for emotion judgments were appropriately higher, and for action judgments appropriately lower, than in the other two conditions. The other two conditions did not differ from each other on either measure.

Not only did 2-year-olds on average evidence these understandings of desire but most individual children did so. Children judged six stories with respect to action and six with respect to emotion. Being correct on five or six of the six judgments represents above-chance performance (binomial test, $p < .05$ one-tailed). Thirteen of 16 children (81%) were correct on five or six of the six action judgments and 13 of 16 children were similarly correct on

Figure 3. Predicted and observed responses for the action and emotion judgments.



the emotion judgments. Further, recall that each child received two pairs of stories contrasting two characters getting the exact same outcome (e.g., a dog) where one character desired the outcome (dog) and one desired something else (e.g., a rabbit). Precise understanding of desire requires judging these same-outcome pairs to be appropriately different. That is, Johnny should be happy with a dog because it was desired, whereas Sam should be unhappy with a dog because he desired a rabbit; Sam should search further when the dog is found, but Johnny should quit when he finds the dog. Ten of 16 children were correct on both of their pairs of this precise contrast for action judgments and two were correct once. Thus, these 2-year-olds were correct on 22 of 32 such contrasts (69%). Ten of 16 children were correct on both of their pairs of this precise contrast for emotion judgments and three were correct once. Thus, 2-year-olds were correct on 23 of 32 such contrasts (72%).

Discussion

These data straightforwardly depict older 2-year-olds' ability to reason about actions and reactions via desire. Specifically, 2-year-olds correctly predicted actions from information as to a character's simple desire, including the appropriate continuance and cessation of search, and correctly predicted emotional reactions, even to the extent of predicting that two characters finding the same attractive object would be happy or sad depending on their relevant desires. In this regard note that children's responses evidence not only the generation of correct inferences but also an appreciation that desires are internal psychological states. Young children might have thought that actions are caused by the external qualities of objects, for example that certain items are just objectively attractive, functioning somewhat like magnets, attracting any person in their path. But if so then both Sam (said to want a rabbit) and Johnny (said to want a dog) should be attracted to the same object. Children appropriately judged, however, that Sam and Johnny would be happy only with different objects and would stop searching under different conditions. This same finding serves to demonstrate that 2-year-olds understood characters' motives as something like desires rather than as drives. Children judged that characters' actions and reactions were object specific, as appropriate for desire. When Johnny wants a dog, he is happy and ceases searching only when he finds a *dog*. In short, 2-year-olds reasoned correctly about the characters' internal object-specific states, their simple desires.

Children's desire reasoning encompassed two separable aspects: ratings of characters' *emotions* and prediction of characters' *actions*. Our demonstration that young children understand desire-dependent emotions adds to other re-

cent findings. Studies with slightly older children, young 3-year-olds, have shown that such young children understand the relation of happiness and sadness to fulfilled and unfulfilled desires (Stein & Levine, *in press*; Yuill, 1984). For example Stein and Levine presented 3-year-olds with four story types. The stories presented all combinations of a protagonist's wanting and not wanting an object crossed with obtaining or not obtaining it. After hearing such stories (e.g., Jimmy wants a toy car and gets one), children were asked to say how the protagonist would feel (happy, sad, or angry). Stein and Levine's data straightforwardly show that 3-year-olds predict the reactions appropriate to the various desire–outcome eventualities, namely, that wanting and obtaining leads to happiness, and that wanting and not obtaining leads to sadness and anger. In fact, Bruchowsky (reported in Case, 1985, pp. 164–165) found that even old 2-year-olds could tell which character would be sad given a choice between a puppet who wanted a bike and got a bike versus a puppet who wanted a bike and got (an appealing, attractive) doll. Thus our data are not alone in suggesting that quite young children understand something of the emotional reactions dependent on desire. However, we are aware of no additional research addressing 2-year-olds' predictions of characters' desire-dependent actions. Because of this, in part, we included further action prediction tasks in Experiment 2.

More focally, in Experiment 2 we examined young children's reasoning on simple desire reasoning tasks and on belief reasoning tasks as well. We are proposing that very young children are simple desire psychologists, not drive psychologists and not belief–desire psychologists. Certainly the ease with which young children solved desire judgment tasks in Experiment 1 suggests that they were able to utilize desire reasoning. At the same time both we and others have failed to find any evidence of an understanding of belief in 2-year-olds (see, for example, Table 2 below). Indeed, many studies (e.g., Gopnik & Astington, 1988; Perner, Leekham, & Wimmer, 1987) fail to find understanding of beliefs even in 3-year-olds. However, in order to demonstrate that 2-year-olds are not belief–desire psychologists, we need to show that the same young children both succeed at simple desire reasoning tasks and also fail at comparable belief reasoning tasks.

Experiment 2

Our intent was to show that 2-year-olds not only understand simple desires but also fail to validly understand beliefs. To do this, we began with the simplest yet still valid belief reasoning tasks we could find. As noted above, many extant belief tasks (such as the false belief prediction tasks used by

Wimmer & Perner, 1983) are failed even by 3-year-olds. But, in Wellman and Bartsch (1988) we presented a series of tasks evidencing an early understanding of belief in young 3-year-olds. In that study we used seven different versions of such tasks which were uniformly passed by 3-year-olds. In the present study we sampled two of those seven tasks. We picked two which seemed (a) individually well controlled, (b) representative of the more completely controlled larger set, and (c) for which we could construct simple desire reasoning tasks of a similar sort, that is, tasks comparable to the belief ones but that mentioned only simple desires and that could be solved via desire reasoning as we have been describing it. We reasoned that if 2-year-olds passed the desire tasks but failed the belief tasks we would have a convincing initial demonstration of our proposed developmental sequence.

The desire reasoning tasks we devised in this fashion provide replications and extensions of the action prediction tasks used in Experiment 1. For example, we wish to grant that even 2-year-olds have desires, that they are motivated by internal dispositions on the order of desires, preferences, and so on with respect to objects in the world. Furthermore, we assume that young children can purposefully engage in actions to fulfill their desires and also that they have emotional reactions dependent on the satisfaction or failure of their own desires. All this could be true and young children could still fail to *conceive* of their own and other's behaviors in terms of a construct of *desire or something like it*. Therefore, suppose in Experiment 1 that children simply have the same desire as that stated for the protagonist—when John is described as wanting a dog, the child himself wants a dog. When then asked whether John will search beyond location 1 the child simply reports his own action tendency—he would search if the item was still missing and he would stop searching when it was found. When asked to rate John's emotion the child simply reports his own—he is happy when the dog is found and unhappy if it is not. In Experiment 2 we utilized a Not-Own Desire task, where the child's preference and that of the story character differed. If young children can properly predict the character's action on the basis of the character's desire and not their own, this substantially strengthens our demonstration that they conceive of desires and employ them in their reasoning over and above simply having them.

Similarly, according to our analysis of desire reasoning if a desire psychologist knows that Sam wants an apple and that the apple is in one of two locations, he can predict Sam will search that location. The converse of this is that if there are apples in both locations the character should be indifferent between them. Thus, we utilized a No-Preference Desire task to test whether 2-year-olds understand this aspect of simple desire reasoning. If these action prediction tasks are also solved by 2-year-olds we will have

added significantly to the scope of our demonstration of 2-year-olds' desire reasoning skills.

Method

Tasks

In Wellman and Bartsch (1988) we used several tasks to demonstrate 3- and 4-year-olds' ability to reason about action based on an understanding of beliefs in addition to desires. For example, in a Standard Belief task children were presented stories like:

Sam *wants* his dog. His dog might be in the garage or under the porch. Sam *thinks* his dog is under the porch. Where will Sam look for his dog?

Appropriately construed, such a task requires the child to understand that Sam's belief constrains the course of action initiated by his desires. However, in such Standard Belief tasks a child might provide the correct answer simply by having the correct belief herself. For example, suppose the child coincidentally believes that dogs are much more likely to hide under porches than in garages, and then simply says that Sam will search where she would search. Not-Own Belief tasks (Wellman & Bartsch, 1988) partly control for this possibility. In a Not-Own Belief task children are told, for example, that Sam wants his dog and then are asked where they themselves think the dog is, under the porch or in the garage? After citing their own belief (e.g., under the porch) children are told that Sam has the opposite belief (e.g., in the garage), and asked to predict Sam's behavior. If children predict Sam's behavior on the basis of Sam's belief, they provide some evidence of an understanding of belief beyond simply predicting correct search for the object based on their own (coincidentally correct) belief. Not-Own Belief tasks are therefore more controlled than Standard-Belief tasks, although they too are easily passed by 3-year-olds.

We constructed Not-Own Desire tasks parallel to Not-Own Belief tasks. In Not-Own Desire tasks, the child is told about a character with two options (e.g., swimming in the pool or playing with the dog by the doghouse). Then the subject is asked his or her own preference (what would you want to do?). After citing their own desire (e.g., swimming) they are told the character has the opposite desire (e.g., play with the dog) and asked to predict the character's action (e.g., go to the pool or go to the doghouse). If children predict the character's action based on the character's desire, they are unlikely to be merely *having* desires and citing their own relevant actions; instead they evidence some *understanding* of desire as a cause of action. Successful perfor-

mance by 2-year-olds in Not-Own Desire tasks therefore would provide a needed addition to our demonstration of desire reasoning. Concomitant failure on Not-Own Belief tasks would provide a demonstration of desire reasoning prior to belief reasoning.

Suppose on the Standard Belief task illustrated above that children just attempt to assess where the object really is and then simply predict that Sam will act to fulfill his desire. Specifically, children ignorant of belief may simply interpret the belief-statement ("Sam thinks his dog is under the porch") as a reality statement ("his dog is under the porch") and then predict Sam's behavior via a form of desire reasoning (Sam wants his dog, it is under the porch: Sam will look under the porch). Discrepant Belief tasks are a belief-desire task (Wellman & Bartsch, 1988) designed to control, in part, for reality assessment reasoning. In Discrepant Belief tasks, there are target objects in both of two locations (e.g., magic markers in the desk and in the toy box) and the child knows this. Then the child is told for example, that "Bill thinks there are only magic markers in the desk, he doesn't think there are magic markers in the toy box". Correct prediction of Bill's behavior while simultaneously knowing that markers are really in both places requires prediction of Bill's behavior via an understanding of belief rather than a reality assessment strategy.

No-Preference Desire tasks were designed to parallel Discrepant Belief tasks. In No-Preference Desire tasks, as in Discrepant Belief tasks, children see that target objects are really in both locations (e.g., markers are in the desk and in the toy box). Then they are told Jill's desire (to find markers). In this situation (lacking any differentiating belief on Jill's part), reasoning simply that the actor will act to fulfill her desires should lead to a prediction of no preference on Jill's part for either location, and hence children should predict that Jill will look in either or both locations. Successful performance on No-Preference Desire tasks therefore would demonstrate that children understand an aspect of desire reasoning not tested in Experiment 1; namely, that given a desire and equal alternatives, an actor would be indifferent between them. Correct performance on the No-Preference Desire tasks but not Discrepant Belief tasks would imply the presence of desire reasoning before belief reasoning.

Subjects

Twenty young children from the same preschool program described in Experiment 1 participated ($M = 3-0$, range 2-9 to 3-3, 10 boys and 10 girls). We used this age range in order to test some children who should evidence desire reasoning while failing to understand belief, as well as some children who should understand beliefs as well as desires.

Materials and Procedures

Each child was tested individually in two sessions. Four types of tasks were used: Not-Own Belief, Not-Own Desire, Discrepant Belief and No-Preference Desire. Each child got three tasks of each type, six tasks in each of two sessions. Belief tasks were presented in one session and desire tasks in another. Half the subjects received belief tasks in their first session, half received desire tasks. When presented the belief tasks, half the children received Discrepant Belief tasks first and half received Not-Own Belief tasks first. When presented desire tasks, half the children received No-Preference Desire tasks first and half Not-Own Desire tasks first. Each of the 12 tasks concerned a different protagonist. Discrepant Belief and the No-Preference Desire tasks contained the same object and locations, and only differed in the inclusion of belief information in the former. The Not-Own Belief and Not-Own Desire tasks contained different objects or actions and locations. All stories were told with a cardboard cut-out of a character and a cardboard layout depicting two locations.

In the Discrepant Belief and No-Preference Desire tasks, children were first shown a depiction of two locations, for example, a cupboard and a refrigerator. The doors to these two locations were then opened, revealing the same item (e.g., bananas) in both. Then the doors were closed, children were introduced to a cardboard character, told his or her name, and told that the character wants some of the object that is in the two locations (e.g., "This is Suzi. She wants a banana."). In No-Preference Desire tasks, at this point the child was asked where Suzi would look for bananas. In Discrepant Belief tasks, children were told that the character "thinks there are only bananas in (one of the locations)" and then asked to make their prediction. As the doors to the two locations remained closed after the initial viewing, children were not able to see the object when they made their judgments. After they made their judgments children were asked, as a control question, whether there were also some of the desired objects in the other location, to ensure that they remembered that target objects were really in both locations. No children ever responded incorrectly to these control questions.

In the Not-Own Belief and Not-Own Desire tasks children were first introduced to the cardboard character. Then they were shown a depiction of two locations, for example, a classroom and a playground. Both locations were presented as being plausible choices for fulfillment of the character's desires. For example, in Not-Own Desire tasks children were told "At Betsy's school they can play with puzzles in the classroom or they can play with sand on the playground." In Not-Own Belief tasks, children were told that "Sam's puppy might be in (one location) or it might be in the (other)". In Not-Own Belief tasks children then were asked to choose which location they thought the

target item was in, and in Not-Own Desire tasks were asked to choose which object *they* would want to play with. When children had made their choice, they were told that the character desired the *other* object or thought the item was in the *other* location. They then were asked to predict where the character would go.

Within each type of task, certain procedural controls were instituted. Each statement of a story character's beliefs or desires was presented in both the positive and negative form, so that both options or locations would be included in the statement. For example, "Betsy *wants* to play with puzzles today; she *doesn't want* to play with sand" in the Not-Own Desire tasks, or "Mary *thinks* her ball is by the garage, she *doesn't think* it's by the porch" in the Not-Own Belief tasks. Order of presentation of positive and negative forms was counterbalanced.

Results

We first compared Not-Own Belief to Not-Own Desire performance, then compared Discrepant-Belief to No-Preference Desire performance. After reporting these analyses we will place our findings with very young children in the context of comparable data for 3- and 4-year-olds.

Not-Own Belief versus Not-Own Desire

In both of these tasks children were given sufficient information to predict one of the two story locations as the character's choice. Scores, therefore, were the number of correct choices on the three stories of each type. A preliminary analysis showed no effects of sex or of order (getting belief vs. desire stories first). A univariate (Condition: belief vs. desire) ANOVA yielded a significant effect, $F(1, 19) = 8.14, p < .01$. These young children averaged 73% correct responding on Not-Own Belief stories and 93% correct responding on Not-Own Desire stories, both of which exceeded a chance value of 50% ($ps < .05$).

The most important question is whether 2-year-olds frequently understand desire but not belief. Being correct on three of three tasks represents a substantial degree of understanding, unlikely by chance alone. Only 9 of 20 children (45%) were correct on all three Not-Own Belief stories whereas 17 of 20 (85%) were correct on all three Not-Own Desire stories. Nine children passed all three desire tasks but failed the parallel belief tasks whereas only one child showed the reverse pattern, McNemar's $\chi^2(1) = 4.91, p < .05$.

Discrepant Belief versus No-Preference Desire

These young children were poor at Discrepant Belief tasks, as expected.

Only 5 of 20 (25%) were correct on all three Discrepant Belief tasks; for comparison 17 of 20 were correct on all Not-Own Desire stories, as reported above.

More specifically, if our hypothesis that young children understand a role for desire in causing behavior but not a role for beliefs is true, then two predictions should follow. First, children should judge that the actor will search in either or both locations on No-Preference Desire tasks, because search in either location will satisfy the actor's desire. For control purposes children's performance on No-Preference Desire tasks can be compared to their performance on Not-Own Desire tasks where a single location is correct. Second, young children should make similar predictions on Discrepant Belief and No-Preference Desire tasks, because if children fail to appreciate the actor's belief then Discrepant Belief tasks become equivalent to No-Preference Desire tasks.

We began by testing the second prediction above, that performance should be similar on both No-Preference Desire and Discrepant Belief tasks. Our tests of this prediction used correct responses on Discrepant Belief tasks as a baseline. On Discrepant Belief tasks, the actor was portrayed as having a specific belief, so there was a single correct response. Since No-Preference Desire tasks paralleled Discrepant Belief tasks exactly with regard to the objects, locations, and desires specified (the sole difference being the extra belief information provided in the Discrepant Belief tasks), we were able to calculate parallel *pseudocorrect* scores on No-Preference Desire tasks. That is, we arbitrarily gave children credit for a pseudocorrect response on a No-Preference task, if they chose the location which was correct on the parallel Discrepant Belief task. (When children responded that the actor would search in both locations, these responses were simply excluded from this analysis.) Children averaged 61% correct on Discrepant Belief tasks and 44% pseudocorrect on No-Preference Desire tasks, $F(1, 16) = 2.60$, n.s. Thus, in accord with prediction 2 above, children responded similarly to both tasks.

In accord with prediction 1 above, that on No-Preference Desire tasks children should say that the actor will search either or both locations, children's pseudocorrect responses on No-Preference Desire tasks were not different from a value of 50%, $t(16) = -.50$, n.s. Fifty percent represents equal distribution of responses across the two locations and is what would be expected if children were choosing either location based on an understanding of the character's indifference between the two locations. It might be argued that such performance reflects only chance performance in a two-choice task rather than an understanding of indifference. However, several aspects of the data confirm that children were appropriately judging that the character would be indifferent.

First, in the No-Preference Desire condition children explicitly mentioned that the character would search both locations on 23% of their responses, confirming at least a partial understanding that indeed the two locations would both fulfill the character's desire. This is particularly impressive as "both" was not explicitly presented as an alternative. For comparison, no "both" responses were given to Not-Own Desire tasks and only 7% were given to the parallel Discrepant Belief tasks. These data suggest that children's responding indexes an appreciation of the character's indifference in No-Preference situations, rather than simple random responding.

Second and most importantly, children's responses on No-Preference Desire tasks can be compared to their responses on Not-Own Desire tasks. Pseudocorrect responding was 44% on No-Preference Desire tasks, correct responding was 96% on Not-Own Desire tasks, $F(1, 16) = 36.77, p < .001$. The same children thus chose single correct locations on Not-Own Desire tasks and chose either location on No-Preference tasks. This differential responding across critically different desire tasks demonstrates an appropriate understanding of desire. Children do not respond randomly to desire reasoning tasks; instead they correctly predict a choice where one is appropriate (Not-Own Desire) and correctly predict indifference where it is appropriate (No-Preference).

Children's responding on the Discrepant Belief tasks also did not differ from 50%, $t(16) = .93, n.s.$ This is in accord with our second prediction above, that children interpret Discrepant Belief tasks only in simple desire terms (and thus predict indifference). However, in this case we have no further data to rule out the possibility that very young children are simply performing randomly on Discrepant Belief tasks. In either event (whether children predict indifference or respond randomly) however, young children fail the Discrepant Belief task. Therefore, across No-Preference Desire, Not-Own Desire, and Discrepant Belief tasks children's performance again reveals the hypothesized pattern of failing belief reasoning tasks while passing comparable desire tasks.

Comparisons across ages

These data on very young children's poor performance on belief tasks is more revealing if seen in the light of the correct performance of only slightly older children. In several studies (here and in Wellman & Bartsch, 1988) we have now collected data from children ranging in age from 2 years 5 months to 5-0 on both Not-Own Belief tasks and Discrepant Belief tasks. Table 2 presents these aggregated data. As can be seen there, the youngest children (2-5 to 3-0) are at chance on belief reasoning. At only a slightly older age, however, children are markedly above-chance on belief reasoning. Table 2

Table 2. Comparison of young children's understanding of belief and desire

Age	Not-Own Belief tasks ^a		Discrepant Belief tasks ^a		Experiment 2 Not-Own Desire tasks			Experiment 1 Emotion Prediction Desire tasks			Experiment 1 Action Prediction Desire tasks			
	N	Percent correct ^b	Age	N	Percent correct ^b	Age	N	Percent correct ^b	Age	N	Percent correct ^b	Age	N	Percent correct ^b
2-5 to 3-0	17	66%	2-5 to 3-0	11	57%	2-9 to 3-0	11	96%*	2-7 to 3-0	16	89%*	2-7 to 3-0	16	88%*
3-1 to 3-5	15	90%*	3-1 to 3-5	13	67%	3-1 to 3-3	9	90%*						
3-6 to 4-0	16	80%*	3-6 to 4-0	11	80%*									
4-1 to 5+	16	80%*												

^aData aggregated from Experiment 2 of this research and Experiments 2 and 3 of Wellman & Bartsch (1983).

^bThe mean of children's scores where each child's score is the percent correct across 3 different trials.

*Significantly greater than chance (50%) at $p < .05$.

also shows the data from the current studies for desire reasoning tasks. In this case even the youngest children (2;7 to 3;0) are very proficient at desire reasoning.²

Discussion

These data indicate that, as a group, older 2-year-olds are largely correct on tasks requiring reasoning about human action on the basis of actors' simple desires. The data from the desire reasoning tasks provide an important replication of the results from the action prediction tasks of Experiment 1. Two-year-olds readily infer actors' actions given information as to their simple desires. For example, as shown in Table 2, the youngest children, old 2-year-olds, were 96% correct on the Not-Own Desire tasks. At the same time these young children perform significantly more poorly on tasks requiring understanding of actors' beliefs. Indeed, individually, many 2-year-olds pass desire tasks but fail comparable belief tasks.

We need to reiterate the logic of Experiment 2. We began with tasks which require an understanding of belief but which are solved by very young children (Not-Own and Discrepant-Belief tasks). We then examined whether 2-year-olds fail such tasks while at the same time passing comparable desire reasoning tasks (Not-Own and No-Preference Desire tasks). Our experimental logic required us (1) to choose the most sensitive possible yet still valid belief reasoning tasks, (2) to show that children understand the task formats, language, and situations while still failing these tasks, and (3) to show that only slightly older children do pass these tasks.

With respect to choosing rigorous yet sensitive tasks, we made our choice empirically. The belief tasks we used are representative of those revealing the earliest understanding of belief demonstrated in the literature so far. We do *not* claim that Experiment 2 provides a rigorous demonstration of an understanding of belief in 3-year-olds. We rely on Wellman and Bartsch (1988) and Bartsch and Wellman (1989) to do that, where we used nine different belief-desire reasoning tasks and found the pattern of responses across all the tasks to be compelling. Our aim in the current studies, instead, was to choose two well-controlled tasks representative of that larger set and to show that 2-year-olds understand parallel desire reasoning tasks while failing the belief tasks. Passing Not-Own and Discrepant Belief tasks does not comprehensively demonstrate an understanding of belief (without the

²These aggregated data depict a tendency for Not-Own Belief tasks to be easier than Discrepant Belief tasks at younger ages. This trend is evident in Experiment 2 as well; the 20 Experiment 2 children averaged 57% correct on Discrepant Belief tasks and 73% correct on Not-Own Belief tasks. However, this difference was not significant.

addition of other tasks incorporating further controls) but that was not our aim. Instead, we demonstrate that 2-year-olds fail those representative tasks while passing analogous desire reasoning tasks.

With respect to the second requirement, showing that children understand our task formats, the pattern of results obtained in Experiment 2 is important. In that experiment many 2-year-olds systematically failed the belief reasoning tasks but they passed comparable desire reasoning tasks. Methodologically, young children's failure on belief tasks alone could have numerous interpretations. For example, perhaps the general vocabulary or response formats of the tasks employed were simply too difficult for children of this young age. However, the same children's correct performance on comparable desire reasoning tasks argues against these possibilities. Such young children were convincingly competent at our specific task formats even when they failed to incorporate an understanding and utilization of belief into their psychological reasoning.

The third requirement is that the tasks chosen be easily passed by older children. We demonstrate in Table 2 that only slightly older children pass these belief reasoning tasks with ease.

An alternative explanation for our results might argue that our belief tasks, because they involve both beliefs and desires, are inherently more complex than the desire tasks. According to this argument children fail our belief tasks not because they do not understand belief, but because they are unable to reason about beliefs and desires at the same time. Our reply to this objection is twofold. First, as noted above, we used the simplest belief reasoning tasks of which we are aware and then worked backwards from them. Second, while it is true that these include information about desires as well as beliefs, still, children could pass such tasks given an understanding of belief alone. In the Discrepant Belief task, for example, imagine a child that ignored the desire information and heard or processed *only* "Bill thinks the magic markers are only in the cupboard. Where will Bill look for markers?" If such a child understood Bill's belief then he or she could clearly answer correctly, because it is not mandatory to know or assume that Bill wants the markers. In short, we think that young children first understand beliefs only as a supplement to desires, but our tasks can be passed by belief reasoning alone.

A final possibility is that perhaps 2-year-olds understand belief but simply are not familiar with the term *think*. In our methods we used the term *think* to convey a character's belief to the subjects (e.g., "Suzi thinks there are bananas in the refrigerator"). Unfamiliarity with or miscomprehension of the term may have masked young children's understanding of the concepts. However, children of this age are clearly conversant with the term *think*, indeed children spontaneously produce *think* and *know* in their everyday utterances

beginning right about the second birthday (Bretherton & Beeghly, 1982; Limber, 1973). Perhaps children are familiar with the term but nonetheless our statements to them were too difficult for them to understand. Our statements did require use of predicate complement constructions involving two verbs—"Sam *thinks* that his dog *is* in the garage". Again, however, children are familiar with and indeed use such constructions themselves beginning shortly after the second birthday (Limber, 1973). They even use such constructions with the term *think*, although not for mental reference (Shatz, Wellman, & Silber, 1983). The Shatz et al. (1983) data, for example, include such productions as "I think you have something," "I'm thinking about Lisa," and "I didn't know that," produced by young 2-year-olds. Even more to the point, our desire statements (e.g., "Sam wants to find his rabbit") in both Experiments 1 and 2 employed parallel predicate complement constructions. Two-year-olds clearly understood complex statements of this sort in our tasks.

In an important sense, of course, 2-year-olds do not correctly understand mental terms like *think*. Namely, although children spontaneously use mental verbs such as *think*, *know*, and *forget* earlier in the third year of life, they only use such verbs for reference to mental states in the months just before the third birthday (Shatz et al., 1983). That is, only right before age 3 do children use the term *think* to talk about a person's thoughts and beliefs, evidencing appropriate comprehension of such terms. But this is our point. If we are correct, children fail to understand a construct of belief until late in the third year and thus, while aware of the term and even using it, do fail to appropriately understand the term *think*.

General discussion

These findings shed light on early desire reasoning and on early belief-desire reasoning as well. With respect to desire reasoning, summing across both studies, 2-year-olds correctly predicted characters' actions given information as to the characters' desires, including (1) predicting cessation of search when desires were fulfilled, (2) predicting continuance of search when desires were unfulfilled (even when the character found an attractive object but not the desired object), (3) predicting that the character would engage in a specific activity opposite to the child's own desired activity, and (4) predicting that characters would be essentially indifferent to which of two locations they would search if both locations contained the desired objects. These young children also correctly predicted characters' emotional reactions including (5) predicting happiness when outcomes fulfilled desires and (6) predicting unhappiness when outcomes failed to fulfill desires. Taken singly, correct per-

formance on any one of these reasoning tasks is not definitive. Collectively, however, consistently correct performance on all these tasks is quite convincing with respect to young children's prediction of action and emotion via desire. Children's highly correct responding in these cases (averaging essentially 90% correct on the desire reasoning tasks used here) is all the more remarkable since such young children so often perform poorly on laboratory tasks of this sort requiring sustained attention to verbal materials and deliberate choice among several response options. One important aspect of our tasks is that they all require understanding of only simple desires, that is, straightforward longings for external objects or outcomes. They do not require understanding of impossible, hypothetical desires, such as a boy who wants to fly.

Our proposal is that at an early age children understand others' mental states in intentional but not representational terms. Specifically, they understand that others can want specific objects but not that others can believe certain propositions. While our proposal concerns an understanding of simple desires specifically, in a general sense it is similar to some other recent theoretical suggestions that children's first understanding of the mind may be nonrepresentational. Perner (1988) suggests that young children understand belief statements such as "Jane thinks the ice cream van is at the park", as merely "associating" the character, Jane, with an external description, "the ice cream van at the park." Flavell (1988) suggests that young children may know that persons can be "connected" to external situations, but not that persons can represent such situations. In this regard, we feel that young children's remarkable success at desire reasoning tasks is limited to an understanding of simple desires—nonrepresentational longings for external objects—but we have not attempted to prove that definitively. Our goal was a prior one, to provide evidence of a reasonable expertise in 2-year-olds in reasoning about people's actions when presented information as to their simple desires, and hence with a simple sort of dispositional reasoning. This represents an impressive acquisition of a psychological understanding of human action in very young children.

By attributing a simple desire psychology to very young children we grant them a beginning awareness of how people's internal intentional states can guide their behavior. In the introduction we contrasted this conception of simple desires with drives and with beliefs. We believe that the understanding demonstrated by 2-year-olds is more than the former but less than the latter. At the end of Experiment 1 we discussed how our data document that young children's understanding of desire is object specific in a way that goes beyond a conception of mere drives. It is worth considering, however, whether 2-year-olds' conceptions might be something more on the order of tropisms

than simple desires. Tropisms, too, have an object directedness, as for example plants that grow toward sunlight or mosquitoes that seek blood. However, in our conception simple desires are psychological states, whereas tropisms, in the sense we ordinarily think of them, are not. The flower does not *intend* to grow to the sun; a mosquito does not *want* blood. Could 2-year-olds be exhibiting only a tropistic psychology? We think not. Desires as psychological states are linked to other psychological states in special ways, for example they are linked to emotions. Tropisms, in contrast, are not linked to emotions. The flower is not happy when it orients toward the sun; the mosquito is not sad or angry if everyone at the picnic is wearing bug repellent. But such emotional reactions are implied by desires and even 2-year-olds know this. Thus, in Experiment 1 when Johnny finds his desired dog he not only ceases to search, he is happy. When Betsy fails to find her horse she not only continues to search, she is sad. Children's understanding of these sorts of concomitant emotional reactions is consistent with their understanding persons as having simple desires beyond evidencing tropisms.

Our data extend several other recent findings which suggest that 2-year-olds evidence a sizable developing understanding of human action as stemming from the internal goals and motives of the actor. For example, in their spontaneous speech children begin to talk about internal states such as wants and happiness at about their second birthday (e.g., Bretherton & Beeghly, 1982). More impressive than just the appearance of such words in the child's language is the nature of children's conception of action that underpins their comprehension and production of such words. Hood and Bloom (1979) analyzed the naturally occurring causal utterances of eight children studied longitudinally from approximately 2 to 3 years. They found that children's causal explanations were correctly ordered and commendably sensible. They found as well that children made almost wholly references to psychological causation. "Children did talk about intentions and motivations in their causal utterances which could be support for Piaget's characterization of the child's first causal relations as expressing ... psychological causality" (pp. 29-30).

More recently, Huttonlocher and Smiley (Huttonlocher & Smiley, 1987; Huttonlocher, Smiley & Charney, 1983; Smiley & Huttonlocher, in press) have been intensively investigating young children's understanding and use of action verbs. Such verbs can refer to overt aspects of events (e.g., *bouncing*, *breaking*) or to psychological aspects of agency such as goals and desires (e.g., *getting*, *pulling*, *avoiding*). Huttonlocher and Smiley believe children first understand others' actions only in terms of observable features, but their data show that children clearly construe others' actions with respect to internal states early in the third year of life. "As children approach 2½ years, they begin to describe other people as subject of experience, using words like *get*,

give, and *want* in relation to others. At this time, we believe the child's word use provides evidence of having acquired the critical elements of the adult notion of person" (Huttonlocher & Smiley, 1987, p. 2).

We do not claim that we or others have fully characterized or investigated early desire psychology. One can imagine that even simple desire reasoning might encompass several other understandings beyond those studied here. For example, 2-year-olds might have some notions of how others influence one's desires—early simplified understandings of obligation, permission, and authority. In addition, beyond age 2 children come to acquire increasingly sophisticated ways of thinking about human desires, goals, and intentions (e.g., Astington, in press; Shantz, 1983; Shultz, 1980).

In comparison to 2-year-olds, however, we claim that older children acquire more than simply a refined and perfected desire psychology. They develop a belief–desire psychology, a sense of psychological causation that rests on and requires consideration of the actor's mental convictions about the world as well as his or her goals. Note that this places an important caveat on any claims that 2-year-olds understand "psychological causation" or "the adult notion of person". The psychological causation understood by 2-year-olds, while indeed impressive for such young children, is quite different than our own.

Our data begin to demonstrate that desire reasoning precedes children's initial belief–desire psychology. Besides the data reported here, this proposed developmental sequence from understanding desire to understanding belief receives suggestive support from several other sources. For example, in spontaneous language use while very young 2-year-olds are already using such desire words as *want* and related emotion words such as *happy*, they only begin to sensibly use mental terms such as *think*, *know*, and *surprise* at just before the third birthday (Bretherton & Beeghly, 1982; Shatz et al., 1983).

Furthermore, young children of 2 and 3 years have been found to use deontic modal expressions before epistemic ones. Modal auxiliaries, such as *may* and *must* in English, can refer to notions of ability, intention, and permission—deontic modality—or to notions of probability, conviction and logical necessity—epistemic modality. Deontic modality seems clearly aligned with notions of agency, desire, and intent—that is, notions that seem meaningful within simple desire psychology alone. Epistemic modality seems clearly aligned with notions of belief and conviction—that is, aspects of belief encompassed by belief–desire psychology. Both in English and in other languages such as Greek, 2- and 3-year-olds consistently evidence use of modal expressions for deontic meanings before they use the same expressions for epistemic meanings (Stephany, 1986).

Finally, in another study (Bartsch & Wellman, 1989) we have asked young

children to explain persons' actions. In this explanation task children are simply told of a character's action, for example, "Jane is looking for her kitten under the piano" and then asked "Why do you think she is doing that?" Note that in this task to provide a belief explanation the child need not understand desire or process any information as to desire. In this task most 3-year-olds give both belief and desire explanations. However, some young children explain action only by recourse to desire and never by appeal to belief, *even* when prompted by being asked for example "What does Jane think?" When 23 3-year-olds were given nine such actions to explain, six young children consistently provided desire explanations but *never* mentioned belief even when prompted, while only one child evidenced the reverse pattern. Such an explanation task is difficult to use with young children so we did not use it with 2-year-olds in this study. However, this pattern of results with 3-year-olds corroborates the current results—early understanding of desire before understanding of belief.

These findings of a developmental transition from simple desire to ordinary belief–desire psychology are consistent with the hypothesis that not only does belief–desire psychology succeed an understanding of simple desires but that it develops out of it. We believe, as outlined in the introduction, that belief–desire psychology represents a theory change sponsored by and derived from simple desire psychology. To reiterate, an understanding of simple desires provides the young child with significant explanatory resources, allowing the child to predict and understand a variety of actions and emotional reactions as stemming from the actor's internal desire states. However, a revision of simple desire psychology is necessitated by the predictive and explanatory failures of that reasoning scheme, failures which engender a construct of belief. Thus, for example, two characters with equal desires can still engage in different actions and have different emotional reactions to the same outcome because they have different beliefs. These sorts of everyday phenomena are theoretical anomalies for desire psychology. Note, however, that thinking about actors in intentional terms at all, that is, with respect to their internal desires, makes it possible for the child to confront such theoretical anomalies in the first place. A behaviorist, for example, would not face such problems. But, such anomalies once generated require addition of a very different sort of intentional construct to one's theoretical arsenal, specifically a conception of cognitive states of representation and conviction, not merely states of desire and disposition.

This hypothesis addresses, in part, the intriguing question of where does everyday belief–desire psychology come from? The question "where does some conceptual understanding come from?" has at least two developmental answers: one with respect to origins and one with respect to mechanisms. To

be clear, our proposal concerns the origins of belief–desire psychology—its origination out of an earlier desire psychology. We are not addressing the question of mechanisms, the sorts of learning and experiences or representational and computational changes that drive and constrain belief–desire conceptions (see, for example, Leslie, 1987). Our hypothesis as to origins does suggest that the mechanisms are, in part, constructive ones—children construct a new theory by revising an older one. But we cannot address as yet the role of changes in basic cognitive infrastructure, parental tutoring, linguistic assistance, and specific learning experiences that might be involved. This is a large agenda, to be met by future research.

Still, the descriptive information we have provided and the hypothesis as to origins that we advance seem important.

Any theory of learning must have at least two components: a specification of the initial state and a specification of the mechanisms in terms of which that initial state is modified. “Initial state” here is specified relative to the particular change under consideration. Both components are necessary for stating the constraints on induction that guarantee that learning is possible. Psychologists who decry the lack of mechanisms of conceptual change focus on only half of the problem. Equally important is the specification of the initial state (Carey, 1985, p. 200).

In this research we attempt to characterize, if not precisely the “initial state”, a very early understanding of human action, simple desire psychology. Moreover, we have pinpointed an early transition to a first understanding of the mind and of belief–desire psychology. We are not claiming that understanding of desires ceases at this point of transition, it does not. Adult understanding of desire goes far beyond an understanding of simple desires as we have described them. We are claiming instead that an initial understanding of simple desires precedes and also results in an understanding of ordinary beliefs and that acquisition of this later construct seriously transforms the young child’s naive psychology.

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