Representation and desire: a philosophical error with consequences for theory-of-mind research

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ABSTRACT   *This paper distinguishes two conceptions of representation at work in the philosophical literature. On the first, "contentive" conception (found, for example, in Searle and Fodor), something is a representation, roughly, if it has "propositional content". On the second, "indicative" conception (found, for example, in Dretske), representations must not only have content but also have the function of indicating something about the world. Desire is representational on the first view but not on the second. This paper argues that philosophers and psychologists have sometimes conflated these two conceptions, and it examines the consequences of this conflation for the developmental literature on the child's understanding of mind. Specifically, recent research by Gopnik and Perner on the child's understanding of desire is motivated by an argument that equivocates between the two conceptions of representation. Finally, the paper suggests that an examination of when the child understands the possibility of misrepresentation in art would be helpful in charting the child's understanding of indicative representation.*

1. Introduction

About 20 years ago, David Premack and Guy Woodruff (1978) asked whether the chimpanzee had a "theory of mind". A number of philosophers provided commentary on Premack and Woodruff's article, and several outlined a research paradigm for studying the understanding of false belief in primates and children (Bennett, 1978; Dennett, 1978; Harman, 1978). This paradigm was later taken up by Heinz Wimmer and Josef Perner (1983) and was instrumental in launching contemporary research on the child's understanding of mental life.

Ever since, theory-of-mind research in developmental psychology has shown how philosophical work can productively be employed by the practitioners of other disciplines. There are risks, however; if the philosophy is genuinely being used, rather than merely tacked on as an afterthought, one would expect errors in philosophy to lead to further errors down the road. In this paper, I will examine one such error in theory-of-mind research, stemming from the misuse of the concept of *representation*.

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What I shall argue, in particular, is the following. In contemporary philosophy, the word "representation" is used with a variety of different meanings which are not always clearly distinguished even by the philosophers who discuss them. Some of these meanings have found their way into the literature in developmental psychology, where they have been run together, resulting in misrepresentations of existing data and ill-fated research. I will begin by distinguishing two different ways of viewing representation. I will then describe the motivation and mistakes of the developmental research that is the focus of this paper. I will conclude with some suggestions about how certain experiments on the child's view of drawing might be of help confirming or disconfirming a popular hypothesis about the child's understanding of mind. Representation is a crucial concept in philosophy of mind and cognitive psychology, and trouble with its use is bound to strike to the roots of these disciplines.

2. Desire in indicative and contentive accounts of representation

The contemporary philosophers whose accounts of representation have had the most impact on the theory-of-mind literature in developmental psychology are probably Fred Dretske, John Searle, and Jerry Fodor. Although the differences between these philosophers' views of representation are large, this fact is not as widely recognized as it should be (even Fodor doesn't seem always to recognize the degree of difference between himself and Dretske; see Fodor, 1984, 1987, 1990) [1]. I will focus on just one dimension of difference here, crucial yet typically ignored, and because ignored a source of unrecognized difficulties. The difference that interests me is the difference between what I will call *contentive* and *indicative* accounts of representation. Searle and Fodor offer contentive accounts, Dretske an indicative one.

I shall call an account of representation *contentive* just in case it treats as representational anything meeting the following condition:

(A) It has propositional (alternatively: intentional or semantic) *content.*

The sense of "propositional content" I mean to be invoking here is that now broadly used in philosophy of language and philosophy of mind. The notion of propositional content is itself somewhat unclear, but my current project does not depend on any specific way of cashing out that concept. Accounts of the sort I want to label as "contentive" are those that treat all the following types of things as representational: beliefs, desires, and the other so-called "propositional attitudes"; sentences and linguistic acts; pictures, maps, and certain kinds of artistic objects perhaps. John Searle (1983), Jerry Fodor (1975, 1981, 1987, 1990, 1991), and Hartry Field (1978) offer—at least to a first approximation—contentive accounts of representation in the sense just described. Searle argues that anything with propositional content (everything listed above) is a representation. Fodor and Field argue that some things with propositional content, like beliefs and desires, while not themselves *representations* are nonetheless *representational states.* Belief and desires are "representational states", on this view, because they are relations *between* people and internal representations. So, for example, John's belief that it is raining is a relation

between John and an internal representation with the content that it is raining (Fodor, 1981, Chapter 7; Field, 1978).

Indicative accounts of representation require a further condition. Not only must any representation or representational state have "content" [condition (A)], but also:

(B) The content of a representation *is supposed to match up* (alternatively, in "normal" conditions matches up) with the way things are in the world. If it does not, *misrepresentation* (itself a type of representation) has occurred.

On an indicative account, a representation's "job" is to match up with, or somehow reflect, the way things stand in the world. What exactly counts as "matching up" will be spelled out differently in different accounts, but may involve some kind of resemblance or counterfactual dependence between representer and represented.

All representations, on the indicative view, have what Searle (1983) calls a "mind-to-world" or "word-to-world" (or "representation-to-world") *direction of fit*. That is, if the representation and the world fail to match in the relevant respects, the representation (and not the world) is faulty—it has failed in its function of matching the world. Such indicative representations stand in sharp contrast to things like desires and commands, which, though contentful, function *not* to reflect the way things are but (very roughly) the way things *should* be. Desires and commands have the opposite "direction of fit"—they succeed by bringing the world into line with them, not by bringing themselves into line with the world. (For more on direction of fit see Searle, 1983; Anscombe, 1957; Humberstone, 1992.) Fred Dretske (1988) espouses an indicative view of representation; so, for example, although he is happy to say that desires do have intentional content, he denies that they are representational (p. 127).

Conditions (A) and (B) are meant to be approximate, not precise. Fodor, for example, though he accepts (A) as a good "first approximation" of his view (1987, p. xi), suggests conditions in which he thinks having content is possible without representation (p. 22). Searle seems to require that mental representations, at least, have not only a content but also a direction of fit (either direction), and a "psychological mode" (1983, p. 12). At the same time, Searle allows for "Intentional states" whose "representative content" is not a whole proposition. So, for example, Gernot might believe *that the stove is on* or desire *that Pauline arrive promptly*, but love *Sally* (pp. 6–7). Although belief and desire take entire propositions as their contents, love does not. Since direction of fit is, for Searle, defined in terms of *propositional* content, intentional states such as love, presumably, have no direction of fit, thus failing to fulfill one of Searle's apparent requirements for mental representations. Such details, however, are beside the point for my argument, so long as indicative and contentive accounts cluster *roughly* around the criteria I have given.

An essential point of agreement between those who subscribe to indicative and those who subscribe to contentive accounts of representation is that *beliefs* are representational. If I believe that yesterday it rained two inches, then I am in a mental state whose propositional content is that yesterday it rained two inches. If I believe that Rick will someday return my copy of *Doctor Faustus*, then I am in a state

whose propositional content is that Rick will someday return my copy of *Doctor Faustus*. Beliefs surely also satisfy condition (B). My belief about yesterday's rain is supposed to reflect the way things actually are (or were) in the world. If it does not, it is my belief, not the world, that ought to be changed. Misrepresentation has occurred.

The crucial point of disagreement between the two accounts, for my purposes, is in the treatment of *desire*. On indicative views of representation, desire is not representational (Dretske, 1988, Chapter 3 and p. 127; also Millikan's "indicative representation", 1984, 1993) [2]. Desires are not supposed to indicate how things are; they are dispositions or urges to bring things about that may not be the case, or hopes that events will transpire in one's favor regardless of one's input. We do not say of a person who desires an ice-cream sandwich but is not eating one that she *misrepresents* herself as eating an ice-cream sandwich. But if we regarded desires as representations in the indicative sense, we would be committed to saying that, by condition (B) of representation: the content of that desire, "that I eat an ice-cream sandwich now", does not in fact match up with the world. Surely desires may be *based* upon false beliefs or misrepresentations—perhaps I have forgotten what ice-cream sandwiches taste like and would be disappointed upon actually tasting one—but that does not mean the desires themselves are misrepresentations. Rather, the beliefs that inform them are. Desires, then, are not representational states for those who subscribe to indicative accounts of representation.

On *contentive* accounts, however, desires are clear-cut, central cases of representational states. Desires, like beliefs, are generally offered by philosophers as prototypical instances of "propositional attitudes". If I desire that Tori drink a latte, then I am in a state whose content is the proposition that Tori drinks a latte. If I desire an ice-cream sandwich, then I am in a state whose propositional content is that I eat an ice-cream sandwich. States of this sort clearly satisfy condition (A).

Dennis Stampe (1986, 1987) argues that desires have an indicative function also: the desire that P functions to indicate that *it would be good* if P were the case. Others have suggested, in conversation, that desires function to indicate what the organism needs or would profit from. I do not find views of this sort compelling. I grant that, evolutionarily, to explain the presence of desires in human beings, we might have to appeal to the tendency of desires to direct us toward things that enhance our reproductive fitness or the fitness of our kin; but it seems distortive to describe the *function* of our most uniquely human desires, such as my desire to see a certain sports franchise win or my wife's desire to donate money to her alma mater, as indicating what is in our reproductive best interest. If so, there is something terribly wrong with those desires, since it is not in my reproductive interest for my favorite team to win or in my wife's to send money to Swarthmore. Recognizing this problem, perhaps, is part of what motivates Stampe to characterize desires as functioning to indicate just what is "good". This, however, seems to make an error complementary to the first. How could evolution have created as one of the most basic elements of our psychology a sensitivity to something as abstract and unrewarding as "the good", where this idea is not to be understood in terms of reproductive advantage?

Furthermore, even if such an indicative view of desire were plausible, it would not follow that desires are indicative representations as I have described them, since the actual content of a desire (e.g. that I drink more soda) is not supposed to match up with the way things are in the world as required by condition (B). Rather, the satisfaction of the desire is supposed to be good or beneficial to the organism.

Both contentive and indicative accounts of representation draw on certain of our pretheoretical intuitions. Indicative accounts pull heavily on the idea that there are things out in the world that representations are supposed to be representations *of* and that if those things are portrayed inaccurately, or if there are no such things to begin with, then the representation must be a *mis*representation. Contentive accounts depend more on recognition of the possibility of fictional or hypothetical representations—paintings, for example, that are "representations" of unicorns or military sandboxes that are "representations" of hypothetical maneuvers. Such representations are not supposed to match up with or indicate anything about the actual world, nor is the world supposed to be brought in line with them; they have no direction of fit [3]. Our ordinary-language intuitions about representation thus conflict with each other: One cannot grant full credit simultaneously to the idea that all representations are meant to be portrayals of the way things are and to the idea that representations can be fictional or hypothetical. Hence the divergence between the accounts.

3. An error in the theory-of-mind literature in developmental psychology

Despite the large difference between contentive and indicative accounts of representation, people do not always make clear when using the word "representation" exactly what it is they have in mind. Philosophers of mind and, to an even greater extent, cognitive and developmental psychologists tend to use the word "representation" unqualifiedly, as though everyone were in perfect accord over the meaning of that term. The term is far more frequently invoked than explained. Since the word has no univocal meaning in philosophy and cognitive science, however, such behavior is ill-advised. Not only are indicative and contentive accounts quite different in nature, but the contentive accounts are themselves quite different— Fodor (1975), for example, thinks representations must have a formal syntactic structure, while Searle (1983) denies this. Add aesthetically motivated accounts of representation (e.g. Wollheim, 1993) and "re-presentation" puns (the latter sometimes offered by the very same authors who give different accounts of representation when the latter is not being contrasted with presentation; Searle, 1983; Dennett, 1991), and you have a recipe for serious confusion.

I would now like to suggest that a number of developmental psychologists studying the child's theory of mind have conflated contentive and indicative approaches to representation. I will focus on the work of two of the most prominent (and most philosophically minded) researchers in the field: Alison Gopnik and Josef Perner. I will begin with textual evidence that the word "representation" is being used sometimes contentively and sometimes indicatively by these two authors. I will then show how equivocation between the two meanings of "representation" pro-

duces problems for their research on the child's understanding of desire. By offering a diagnosis of Gopnik's and Perner's difficulties, I hope both to give an example of how a philosophical error can have consequences for empirical research and to show how serious the conflation of indicative and contentive accounts of representation, in particular, can be.

So as not to make it seem as though I am picking on developmental psychologists in particular, let me note that I sometimes see a similar conflation in the philosophical literature. It typically takes this form: the philosopher sets out to discuss contentive representational states in general, including belief and desire. For simplicity's sake (or so it is alleged), belief is taken as the prototypical representational state, and on the basis of an exploration of belief, various conclusions are drawn about representation in general—and at least some of these conclusions have no obvious application to desire or to other states with a world-to-mind direction of fit. Thus, the features attributed to representation "in general" begin to look symptomatic of an indicative understanding of representation, rather than a contentive one. Stampe (1977) and Fodor (1984) are good examples of this pattern.

3.1. Some evidence of the equivocation

Lynd Forguson and Alison Gopnik begin their 1988 paper with a clear statement of a contentive account of representation:

> Accordingly, we will understand by the term *mental representation* a mental state consisting of (a.) a *representational attitude* (e.g. believing, wanting, wishing, regretting, fearing), and (b.) a *symbolic content* ... that differentiates one belief from another, one desire from another, and so on. (1988, p. 228, italics theirs)

Notice that desire is specifically included in the list of representational states, since it has "symbolic content". Nonetheless, a few pages later Forguson and Gopnik say

> However, these children do not seem to be able to distinguish between the different informational relationships that may hold between representations and reality. As we will see, they show little understanding of the principles of representational change, representational diversity, or the appearance–reality distinction.
>
> *All these abilities require that the child* simultaneously *consider a particular representation* as a representation and *as an indicator of how the world really stands.* (1988, pp. 234–235, italics mine)

Forguson and Gopnik claim that understanding that representations change over time or that different people may have different representations requires understanding how representations work as indicators of how the world really stands. Implicit in this claim is the view that all representations have an indicative function. Desires, however, have no such function, as I have argued. Even if they had the function, say, of indicating that the desired object is good (Stampe, 1986), it is hard to see how it

would be necessary to understand this fact about desire to understand change and diversity in desires as Forguson and Gopnik suggest. In the case of belief, the recognition that beliefs can be false (which is to recognize that a belief has failed in its indicative function) is plausibly necessary for the recognition that people can have different or changing beliefs, since if one were to think that all beliefs were true, then one could not grant that different people may believe contradictory things on the same subject. The parallel argument does not work for desire. Even if all desires are "true"—i.e. accurately indicate what is good—different people may have different desires, since it may be good for different people to do different things. The view of representation implicit in Forguson's and Gopnik's latter remarks, then, must be an indicative one, despite their earlier endorsement of a broader view.

Perner says that the "scientifically satisfactory" way to view desires requires that "an internal representation is posited in [that person's] mind, which represents the nonexisting situation she desires" (1991b, p. 116) and that "treating desires as mental representations becomes necessary for understanding how desires change and how they are controlled" (1991b, p. 205). In these passages he treats desires as representations. Elsewhere, however, he says that "for any representation it is possible to misrepresent" (1991b, p. 20) and

> the definition of representation should therefore contain two elements: (a.) there must be a correspondence between states of the representational medium and states of the represented world, and (b.) this correspondence must be exploited by an interpretive system so that the representation is used as a stand-in for the represented. (1991a, p. 144)

Neither of these latter remarks is coherent with regarding desires as representations: it makes no sense to talk of a desire as a misrepresentation of something (though the beliefs on which a desire *depends* may be misrepresentations); desires do not correspond the way beliefs do (or are supposed to) to states of the external, represented world; desires do not (in any clear sense) function as "stand-ins" for what they are supposed to represent.

Perner later argues (contra his 1991b, p. 205, cited above) for the Fodor (1981) and Field (1978) view that desires are not themselves *representations*, but rather are *representational states* consisting of relations between people and representations (Perner, 1995). As described above, on this view, S's desire that P is a relation between S and an internal representation whose content is P. This account of desires as representational states also is not consistent with Perner's indicative-sounding remarks about representation cited above (1991b, p. 20; 1991a, p. 144). My desire, for instance, that I get some fresh air is not plausibly seen as a relation between me and some internal mental thing with that content and the function of corresponding with the state of the world. If it were, we would have to say that this desire of mine involves a misrepresentation: I am *not* getting fresh air, so any mental representation with the content that I get fresh air and the task of corresponding to the world would have to be failing in its representational task. But of course there is no misrepresentation. The facts are clear: I know that I want fresh air, and I know that I am not getting it.

Perner, I think, recognizes the difficulty here and seeks to avoid it by arguing that desires involve a "secondary" type of representation:

> The primary function [of a representation] is to reflect the represented environment faithfully so that the user can learn to use it as a reliable guide. This is primary because it establishes the meaning of representational elements ... But once this meaning has been established, a map of a fictional environment can be generated by combining representational elements established by the primary process. This allows representations to be positively employed to represent hypothetical, nonexisting states of the environment. (1991b, pp. 24–25)

Perner follows these remarks with an interesting discussion of the use of "models" (e.g. a military sandbox) for both indicative and fictional purposes. However, although these remarks do clarify his position in some ways, they don't get him out of the bind described above: either secondary representations are truly representational, in which case his account is contentive and he ought not regard correspondence to the world and the possibility of misrepresentation as necessary attendants of representation; or secondary representations are not genuine representations, in which case desire ought to be left off the list of representational states.

3.2. An equivocal argument

Gopnik and Perner both have enormous influence on research in the child's understanding of mind, and so it is interesting to see them making such a similar mistake. But this mistake might be of merely conceptual interest, had it not also led to misguided empirical research.

It does so via the following equivocal argument, which both Gopnik and Perner accept:

1. Children come to understand representation at four years.
2. Therefore, their understanding of all representational states must undergo transformation at this age.
3. Desire is a representational state.
4. Therefore, the children's understanding of desire must undergo some important transformation (presumably analogous to their transformation in belief understanding) at four years.

First, some caveats. Neither Gopnik nor Perner put the argument forward in precisely this form. Nor does Gopnik, at least, deny the possibility of some "décalage" (difference in timing) between belief understanding and desire understanding (Astington & Gopnik, 1991). They also each admit that there is probably some less sophisticated, "nonrepresentational" understanding of desire available to younger children. Gopnik sees no such nonrepresentational correlate for belief (Astington & Gopnik, 1991); Perner argues for the existence of such a correlate, which he calls "prelief" (Perner et al., 1994; Perner, 1995). Nonetheless, in the final analysis Gopnik and Perner are both clearly committed to the equivocal argument

just mentioned. They explicitly include desires in their lists of representational states, and they explicitly—prominently—declare that the child comes to understand representational states at four years. Unless desire is to be treated as a special case, more difficult to understand than representational states as a whole—a view neither Gopnik nor Perner endorse and against which there seems to be good developmental evidence (see below)—the conclusion that desire understanding should change between ages three and four follows naturally.

The problem with Gopnik's and Perner's argument is that premise (1) is warranted only on one understanding of representation, while premise (3) is warranted only on the other understanding. The argument is thus an equivocal one and invalid, as I will now show.

Gopnik's and Perner's arguments for (1) depend on several experiments well-known in the theory-of-mind literature, and which have received broad attention in both psychology and philosophy. One classic is Gopnik's and Astington's "Smarties box" experiment (1988; also Perner *et al.*, 1987). Children are shown the easily recognizable opaque candy container for the English confection "Smarties" and are asked what they think is in the container. Naturally the children answer "Smarties". The container is then opened to reveal not Smarties, but a pencil. Children are then asked a series of questions, including "When you first saw the box, before we opened it, what did you think was inside it?" and (in the Wimmer & Hartl, 1991 version) "What will [your friend] say is in the box?" Three-year-old children, but not four-year-old children, typically respond "a pencil" to both these questions.

Leaving aside the interesting methodological and theoretical issues this experiment raises, suffice to say that it, and others like it, are widely taken to suggest that the following competencies emerge at about four years of age: (a) an appreciation that other people may have false beliefs (Wimmer & Perner, 1983; Perner *et al.*, 1987; Flavell *et al.*, 1990); (b) an appreciation that one's own beliefs may have been false in the past (Gopnik & Astington, 1988; Wimmer & Hartl, 1991); and (c) an appreciation that things may appear to be other than they are (Flavell *et al.*, 1983; Flavell *et al.*, 1986; Gopnik & Astington, 1988; Friend & Davis, 1993). That these developments should occur at roughly the same time is not surprising: they all seem to tap a basic understanding of the possibility of misrepresentation (but see Vinden, 1996, for another view); and for many researchers, indeed, the child's coming to understand misrepresentation at that age is seen as the surest sign of her coming to understand representation then (Perner, 1991b; Flavell *et al.*, 1990; Astington, 1993; Olson, 1988; but see Chandler & Carpendale, 1998).

The important thing to notice here is that all these experiments tap abilities associated *exclusively with indicative representations*. Desires cannot be false; desires cannot be misrepresentations. This kind of evidence, then, only warrants the first step of the argument described above if "representation" is construed indicatively. But for step (3) to be plausible, "representation" must be understood contentively; hence, the equivocation. The same problem may be put another way: The experiments cited show (at best) that the child comes to understand the nature of misrepresentation at around age four; but this understanding has *no* bearing on the child's understanding of desire; the evidence so far supplied provides no reason to

suppose that the child's understanding of desire ought to be transformed at this age. And in fact it is not.

3.3. Some failed research

Gopnik performed a number of experiments aimed at discovering the expected three–four shift in desire [4]. Astington, Gopnik, and O'Neill (1989, reported in Astington & Gopnik, 1991), for example, performed an experiment to see if children were as poor at recalling their past unsatisfied desires as they seem to be at recalling their past beliefs. [Searle (1983) regards false beliefs and unsatisfied desires as structurally similar in that they both involve unmet "conditions of satisfaction".] Children were shown two toys that looked very different but could not be distinguished by touch, and asked which toy they preferred. The toys were then dropped together into a bag and the child was allowed to withdraw only one. The child was then asked whether she got the toy she had wanted. While almost 80% of three-year-olds correctly described their unsatisfied desires, they performed no better than chance on the standard (Gopnik & Astington, 1988) test for recollection of past false beliefs.

One might object that there is no good way, in this experiment, to tell that the children aren't simply reporting on their *present* desire for the toy they didn't get. In the standard false-belief recollection tasks, the belief is shown to be false and thus *changed* before the child is asked to recall it. The child sees the Smarties box, and it is opened to reveal a pencil; the child's belief about the contents is thereby changed. The children are then asked what they had (falsely) thought was in the container before it was opened. In Astington *et al.* (1989), on the other hand, the child's desire is not necessarily changed when the unwanted toy is withdrawn, and thus reporting their present dissatisfaction would be a successful response strategy. One might argue that it is this disanalogy, and not a fundamental difference in their level of understanding desire and belief, that explains the three-year-old's good performance on the desire task and poor performance on the belief task.

Perhaps with the idea of addressing this problem, Gopnik and Slaughter (1991) actually worked to induce a change of desire in children—for example, by presenting them with two books, allowing them to choose one, and then reading it to them so that they then desired to hear the other book. They found that three-year-olds have some difficulty with reporting their past desires in this task, but not as much difficulty as with the false-belief tasks. Notice, however, that this is no longer a test of their recollection of an *unsatisfied* desire, so again the parallel to false belief is not complete. It is interesting to see how hard it is to get the right kind of symmetry between a false-belief task, like the Smarties task, and any kind of desire task [5].

In another experiment, Gopnik and Seager (1988; again reported in Astington & Gopnik, 1991) showed children two books, a child's book and an adult's book, and asked which book an adult would choose. A slender majority (57%) of three-year-olds claimed that the adult would choose the child's book. Four- and five-year-olds, on the other hand, said this only 36% and 28% of the time, respectively. Gopnik and Seager draw a parallel between these percentages and

similar percentages one sees on the false-belief tasks. They take the experiment as evidence that young children don't understand that different people can have different desires. This conclusion, however, is contravened by the results of other studies suggesting that children do have an understanding of the diversity of desires (Flavell *et al.*, 1990; Repacholi & Gopnik, 1997; Bartsch & Wellman, 1995), and one wonders whether the results might be an artifact of children not having a very good idea of what kinds of *books*, specifically, adults might care to read.

Perner did not as actively (or at least not as publicly) engage in experiments directed toward finding a three–four shift in the child's understanding of desire. One experiment he did perform suggests that three-year-olds generally understand that people are happy when they get what they want and unhappy when they don't (Hadwin & Perner, 1991; see also Yuill, 1984; Wellman & Banerjee, 1991; Wellman & Bartsch, 1988; Harris *et al.*, 1989). In fact, the bulk of studies on the child's understanding of desire have found no important shift between ages three and four. Besides the studies cited so far suggesting that by age three children understand (a) people's diversity of desires and (b) their emotional reactions to the satisfaction or dissatisfaction of their desires, other studies suggest that three-year-olds also understand (c) that desires can fail to match up with the world (Lillard & Flavell, 1992) and (d) that desires prompt action to obtain the object desired (Wellman, 1990; Wellman & Bartsch, 1988; Bartsch & Wellman, 1989). That children understand desire substantially earlier than they understand belief is also suggested by their natural speech patterns (Bartsch & Wellman, 1995; Bretherton & Beeghly, 1982).

Probably because of his treatment of representation, however, Perner (1991b) seems committed to discovering a three–four shift in the child's understanding of desire. The best he can find is the Gopnik and Seager (1988) experiment criticized above and a couple of experiments on understanding the difference between intended actions and accidental ones (Shultz *et al.*, 1980; Astington, 1991). Moore *et al.* (1995) also find something like a three–four shift in the child's ability correctly to distinguish "want" from "need". Of course, a skeptic might reply that it's not surprising that *something* changes in the child's understanding of desire around age four; what is more surprising, perhaps, is how *little* change there is.

3.4. Broader occurrence of the mistake

Gopnik's and Perner's work on the three–four shift is broadly accepted in the theory-of-mind literature and characterizations of the state of the field tend to feature their work prominently. For example, the latest issue of *Child Development* (as of this writing) contains these two quite standard summaries of recent work in theory of mind:

> By about 4 years of age children are able to understand and predict the behavior of those who hold false beliefs (Perner *et al.*, 1987; Ruffman *et al.*, 1993; Wimmer & Perner, 1983), can represent their own prior false belief (Gopnik & Astington, 1988), and distinguish appearances from reality

(Flavell *et al.*, 1983). Astington and Gopnik (1988) suggest that the mastery of these diverse cognitive skills reflects the emergence of a deeper mental capacity which Perner (1991b) identifies as metarepresentation (Johnson, 1998, p. 1117).

Between the ages of 3 and 5, children begin to move from egocentric thinking to appreciating that other people's perceptions and beliefs do not always correspond to their own. Over this period, children demonstrate marked improvements in visual perspective taking (Flavell, 1988), in differentiating the apparent and actual identity of visually ambiguous objects (Flavell *et al.*, 1983, 1987), in recognizing the false beliefs of other people (Wellman, 1990; Wimmer & Perner, 1983), and in recalling their own false beliefs (Astington, 1993; Astington & Gopnik, 1988, 1991). Many theorists explain 4- and 5-year-olds' new adeptness at these tasks as evidence of emergence of "metarepresentation" or a "representational theory of mind" (Astington & Gopnik, 1991; Flavell, 1988; Leslie, 1987; Perner, 1991b, 1992; Wellman, 1990) (Rosen *et al.*, 1998, p. 1133).

These authors do not explain what they mean by "representation" here. They seem happy to let Gopnik and Perner speak on their behalf.

Even some who do not buy into the standard story of a three–four shift in understanding representation may be committed to an argument analogous to the equivocal one described in Section 4.2. Henry Wellman (1990), for example, believes that three-year-olds genuinely understand mental representation (although Rosen *et al.*'s remarks cited above misleadingly appear to suggest the contrary). Wellman, like Gopnik and Perner, puts desire on his list of representational states and then ignores it in his more detailed discussions of representation (Wellman, 1990; Bartsch & Wellman, 1995). Since Wellman has studied the child's understanding of desire more extensively than most and has even given it a central role in his developmental account, this fact is especially surprising. In his most abstract treatments of representation, Wellman characterizes representations contentively, as states with "internal mental content" (Bartsch & Wellman, 1995, p. 14). Wellman writes,

> In adult understanding as philosophers treat it, a person's desires are typically construed as similar to beliefs. Thus, both desires and beliefs are called propositional attitudes. Beliefs are beliefs about a proposition: Joe believes that that is an apple. In this construal, beliefs are understood as representational. "Joe believes that that is an apple" means something like that Joe has a cognitive representation of the world and in that representation the designated object is an apple. A person's desires can be construed similarly, that is, as desires about propositions, about possible represented states of affairs. "Joe wants an apple", then, is understood as something like, "Joe wants that there be an apple and that he obtain it" … Since a person's desires are also representational in this sense, it is feasible to talk of desires for not-real, nonexistent imaginary things. We say things like

"Joe wants a unicorn" or "Joe wants to be the best ski jumper ever".
(Wellman, 1990, p. 210)

Although Wellman also emphasizes a simplified, nonrepresentational understanding
of desire he thinks is available even to two-year-olds (Wellman, 1990, pp. 210–211;
Bartsch & Wellman, 1995, pp. 13–14), he clearly thinks that the adult under-
standing of desire is fully representational: desires are mental states taking full
propositions as their contents.

Since on Wellman's view, the child comes to understand representation at
around three years of age, one would expect the child's understanding of desires
at that time to become representational like the adult's, thus enabling the child to
talk of desires for "not-real, nonexistent imaginary things". In discussing the three-
year-old's transition from a nonrepresentational to a representational understanding
of mind, however, Wellman leaves desires out of the picture altogether. He repeat-
edly emphasizes that there are two sorts of representation: reality-oriented represen-
tations like beliefs and fictional representations like imaginings and dreams
(Wellman, 1990, Chapter 9). Desires do not fit into either of these categories and
are not mentioned. Thus, for example, in discussing the child's understanding of
representational diversity, Wellman remarks that "even three-year-olds understand
representational diversity, but they understand only the diversity allowed by imagin-
ings and by a hit-or-miss understanding of misrepresentation" (Wellman, 1990,
p. 255). He says this in spite of the fact that he earlier presented studies (Wellman,
1990, Chapter 8) that, he argued, showed that the two- or three-year-old child could
understand that people can have and act on desires different from the child's own,
thus giving evidence of an understanding of representational diversity that falls
under neither of these two categories. His discussion of the acquisition of an "active,
interpretive understanding" of representation at four years of age similarly ignores
desire: Although the child's understanding of false belief and the appearance–reality
distinction are discussed at length, no attempt is made to examine the child's
understanding of the active, interpretative dimensions of desire or even to discuss
what such dimensions might be.

3.5. Another view?

A view of representation that seems to be gaining popularity in theory-of-mind
research since the failure in the early 1990s to find a convincing three–four shift in
the understanding of desire is neither a contentive *nor* an indicative one, but
something somewhere in the middle, on which beliefs, photographs, maps, and
other contentive items with a mind-to-world direction of fit are regarded as repre-
sentations as well as (at least some among) images, fantasies, pretenses, and dreams,
which have no direction of fit, but *desires* are either explicitly excluded from the list
of representations or conspicuously unmentioned (Leslie, 1987, 1988, 1994; Lillard
& Flavell, 1992; Olson & Campbell, 1994; Woolley & Bruell, 1996; and sometimes
Wellman, 1990). This approach to representation has yet to be justified or spelled
out in any detail. A little philosophical work by those sympathetic to such a view
might be useful in making explicit what exactly the commitments of such a

view are—and whether there is really a coherent, workable view here at all. Influence may run in the other direction as well. If it turns out that there are important developmental symmetries between understanding mind-to-world representations and some of these other representations—symmetries that *don't* hold between either of these types of representation and desire—then perhaps there is a useful category here that philosophers have missed and ought to begin to incorporate in their own work on understanding the human mind.

4. Representational art as a test of understanding indicative representation

Those who interpret "representation" contentively have insufficient evidence to warrant the conclusion that children come to understand representation at age four, given the breadth of the class of representations and the narrowness of the evidence base, as I have argued. But what if we read "representation" indicatively? Should we see children as coming to understand *indicative* representations at age four? In this final section I will review some of the evidence for this conclusion, and I will suggest in rough outline an experiment that may help decide the issue.

4.1. Insufficient evidence that four-year-olds understand indicative representation generally

As I have remarked already, the preponderance of developmental psychologists writing on the child's theory of mind see the child as coming to understand false belief and the appearance–reality distinction at age four, or possibly a little before. Various objections have been raised against this claim (e.g. Hala *et al.*, 1991; Fodor, 1992; Leslie, 1994; Lewis & Osborne, 1990), but I will not attempt to assess their merit here. What I would like to focus on instead is whether, even accepting these experiments at face value, we have sufficient warrant to conclude that the child at age four comes to understand indicative representation *generally*. I think that the evidence is slender.

The first point to note is that the claim that the child comes to understand indicative representations at age four is *broader* than the claim that the child comes to understand the indicative nature of belief at age four. More things than beliefs have indicative content. Popular candidates include assertions, maps, models, fuel gauges, drawings, and photographs, to name a few. If the child comes to understand indicative representation *in general* at age four, and not simply something about the capacity for *minds* (or eyes) to be mistaken or tricked (what the false-belief and appearance–reality tasks seem to test), we should expect some analogous transformation in the child's understanding of at least some of these other things at around four years of age. Although Judy DeLoache and Deborah Zaitchik have performed experiments that are sometimes viewed as tests of this hypothesis, I do not believe that their data warrant a conclusion one way or another about the timing of the child's understanding of indicative representation in non-mental domains.

Judy DeLoache's work on this topic (e.g. 1989a, b, 1991) has primarily been on the child's understanding of models. In her classic experiment, she showed children a full size room with various items of furniture and a scale model of the room with

miniature versions of the same furniture, arranged analogously, and she pointed out the correspondences to the children. She then introduced the children to "Big Snoopy" and "Little Snoopy" who liked to do the same things: if Big Snoopy was on the chair in the big room, Little Snoopy would be on the chair in the little room, and so forth. This correspondence was demonstrated for the children several times, and they were asked to place Little Snoopy in the appropriate place, given Big Snoopy's location. The crucial test was this: the children were shown Little Snoopy hiding somewhere in the little room, and were told Big Snoopy would hide in the same place in the other room. The children were then instructed to find Big Snoopy (and were then requested to retrieve Little Snoopy as a memory control). If a child went directly to the analogous hiding place in the full size room, she passed the test. If she searched randomly, she failed the test. Children were able to pass the task right around their third birthday. DeLoache's conclusion: they understand that the model (indicatively) "represents" or "stands for" the room (1989b). Since the children are only 36–38 months old, this is seen as an argument against viewing the three–four shift as a shift in the understanding of indicative representations.

Perner (1991b) has pointed out the flaw in this reasoning: understanding correspondence is not equivalent to understanding representation. Note, for instance, that correspondence between A and B is a symmetrical relationship, while A's representing B is an asymmetrical relationship. Adapting an example of Perner's: in the tract-home suburbs of California, all the houses in a neighborhood are generally built according to one of several floor plans. If I live in one such house, and I visit my neighbor whose house is built from the same floor plans, I know exactly where the bathroom is. The houses, like DeLoache's models, correspond, but they certainly do not represent each other. Children, then, conceivably could understand the correspondence between the room and model without understanding that one has the *function* of corresponding to, and thus indicatively represents, the other.

Deborah Zaitchik's work (1990; see also Perner & Leekam, 1990, reported in Perner, 1991b) on the child's understanding of photographs is often cited as evidence for the generality of the child's transformation in representational understanding at age four. Zaitchik first familiarized children with a Polaroid camera, allowing them to take a picture and letting them watch the photo come out of the camera and develop. She then performed a skit with Sesame Street characters. She laid Ernie out on a mat in the sun and had Bert take a picture of him, which was turned face down and allowed to develop without the child seeing it. While the photo was developing, Big Bird came by and sat down on the mat. The children were then asked, "In the picture, who is lying on the mat?" Four-year-olds did well on this task; three-year-olds did not. Zaitchik argues that this experiment shows that the child comes to understand pictorial representations at the same time she comes to understand false beliefs—and thus that we can characterize the child as coming to understand the nature of indicative representations in general at around four years of age [6].

Other interpretations of Zaitchik's results suggest themselves, however. Understanding the operations of a Polaroid camera is neither necessary nor sufficient for

understanding the nature of indicative representations. That it is not necessary is obvious: people who live in cultures without cameras will not understand Polaroid photos, but it would be wild to assume that they therefore do not understand indicative representation. The child has been given only the most rudimentary instruction in how this machine works. She might think that the picture will update to portray the current state of its subjects, or she might think that the picture portrays the way things were when it was developed, as opposed to when it was taken. Nor does knowledge of the working of cameras require the knowledge of indicative representation: the child can understand the correspondence between the photograph and the state of affairs at the time the picture was taken without understanding its *representational* nature, by an argument similar to the one presented against the DeLoache studies. If the child comes to understand Polaroids at about the same time she comes to understand false belief, I see no reason to suppose this to be anything more than a coincidence. In fact, Virginia Slaughter (1998; see also Parkin & Perner, 1997) finds no correlation between the performance of three- to five-year-olds on false-belief tasks and their performance on a Zaitchik-like photo task.

Setting aside the Zaitchik and DeLoache studies, then, the evidence for or against the claim that children come at age four to understand indicative representation generally, as opposed to indicative mental representations in particular, has been quite slender. A good test of this hypothesis is needed.

Some initial questions we might consider are: When does the child come to understand that models, or model toys, or very simple maps are *supposed* to match up with the things they represent and thus can be inaccurate? When does the child understand that gauges and thermometers can misregister the properties they are supposed to detect? Dretske (1988) and Perner (1991b) have rightly emphasized the understanding of misrepresentation as the *sine qua non* of understanding the normative component of indicative representation. Unless the child understands the possibility of misrepresentation, one could argue that the child is simply picking up on the correspondence between the representer and the represented, not the essential fact that the representer is supposed to match up with the represented.

Lindsay Parkin and Josef Perner (1997) and Deborah Dalke (1998) have recently performed some experiments testing the ability of children to understand misrepresentation outside the domain of the mental. In Parkin's and Perner's experiments, children are tested on their ability to understand that a *sign* (an arrow) might misrepresent reality, and their performance is compared with their performance on a standard false-belief task. So, for example, a story is told in which a train can either be at an engine house or in a tunnel. The child is introduced to a sign that is supposed to point to where the train is and a driver who has seen the train. The child then watches the train move from one location (where the sign indicates and the driver has seen) to the other (where the sign does not indicate and the driver has not seen). The child is then asked (a) where the train really is and either (b) where the sign shows the train to be or (c) where the driver thinks the train is. The child who answers (a) and (b) correctly—i.e. says that although the train is really in the tunnel, the sign shows the train as being at the engine house—is scored as having

understood the misrepresentational capacity of signs. The child who answers (a) and (c) correctly is scored as understanding that beliefs can be false. Parkin and Perner not only find a three–four shift in the child's understanding of misrepresentation in signs, but also find a high correlation between children's performance on the sign task and their performance on the standard false-belief task, even when age and their performance on a Zaitchik-like photo task are statistically factored out. That the false sign and the false-belief tasks should be found to be equally difficult is a little surprising, since the direction the sign indicates can be read right off the sign, whereas what the driver believes cannot be read right off any of his expressions. Still, perhaps this only shows how inattentive three-year-olds are to data suggesting the existence of misrepresentation—something also dramatically brought out by Gopnik's and Astington's (1988) data suggesting that children will not report previous false beliefs, even if those beliefs were verbally expressed only moments before. Dalke (1998) finds a similar three–four shift in the child's performance on several tasks involving misleading maps, but also finds good performance by three-year-olds on a test of their ability to distinguish a "correct" or "right" map from an incorrect map, suggesting perhaps an earlier nascent competence at understanding misrepresentation [7].

4.2. The child's understanding of art as possible evidence

Another place in which it seems natural to look for an understanding of misrepresentation, outside the domain of the mind, is in the child's understanding of the pictures she draws. The child's first drawings tend to be simple scribbles, but by age three or four, most children begin to produce what are commonly called "representational" drawings (Golomb, 1992; Winner, 1982; Arnheim, 1974; Freeman, 1980). These drawings, often of people, have distinguishable limbs and facial features, which are verbally labeled by the child as such. Although talk of "representation" is just as common among those discussing child art as among those discussing the child's understanding of mind, there has been insufficient effort to connect these two fields and see what light they might shed on each other, even by those whose interests cross the two areas (but see Freeman, 1995; Freeman & Lacohée, 1995; Charman & Baron-Cohen, 1992, 1993; Thomas et al., 1994; Robinson et al., 1994, for some beginnings).

If it is right that an indicative understanding of representation comes to the child at age four, then a transformation in the child's understanding of her artwork ought to take place at around that time. It may be no accident that theory-of-mind researchers interested in child art have tended to push for earlier competence, perhaps in light of the three-year-old's "representational" approach to art (Sullivan & Winner, 1991, 1993; Freeman et al., 1991; Freeman & Lacohée, 1995), but they have not to my knowledge pursued the connection in any detail. (Freeman (1991, 1995) offers some interesting programmatic remarks relating some aspects of the child's theory of mind with the child's theory of art, but does not directly address the question of when the child comes to understand indicative representation in art.)

It is possible that the three-year-old or young four-year-old who shows little sign of understanding indicative representation according to the traditional tests may create "representational" drawings yet not understand their representational nature, i.e. the fact that, if one draws Daddy, some features of the drawing ought to correspond with features of Daddy—if Daddy has two eyes the drawing ought not to have three, on pain of being a misrepresentation of him. To my knowledge, the child's understanding of this fact about drawings has not been systematically tested [8]. Anecdotal remarks suggest that at least five-year-olds understand that drawings can be "wrong" if they don't match up in the right way with the things they depict, and a view of early school-age children as determined to get their drawings "right" is assumed in some theories of artistic development (e.g. Willats, 1984; Gardner & Wolf, 1987). Golomb and Winner both provide examples (though they mean to draw something different from the passages here quoted than the child's understanding of the duty of the picture to match up with reality):

James, age 5;4, draws a tadpole man with arms extending from the head. He looks at it attentively and remarks: "Never seen hands coming from the head." (Golomb, 1992, p. 55)

Conversation between an adult and a five-year-old:

Adult: "Which is prettier, a flower or a picture of a flower?"
Child: "A flower".
Adult: "Always?"
Child: "Yes".
Adult: "Why?"
Child: "Because artists sometimes mess up." (Winner, 1982, p. 112)

It might be useful, then, to see at what age it is possible to elicit such remarks from a child, at what age they begin to criticize drawings that "get it wrong" about the objects they depict. Were we to find a three–four shift in this domain, that would, I think, provide powerful confirmation of the claim that children come at age four to understand indicative representations generally. Failure to find an appropriate three–four shift, on the other hand, would suggest that the three–four transition is, at best, confined to the domain of indicative mental representations.

A few potential pitfalls should be noted. First, there is what might be called the "Picasso problem". It is hardly straightforward business to discern when an artistic representation is a misrepresentation and when it is merely a simplification, a convention, or a creative distortion. If Picasso puts both of his subject's eyes on one side of her head, do we want necessarily to say that he is *misrepresenting* his subject as having both eyes on the same side? Similarly, if the child draws a "tadpole" figure with legs and arms proceeding directly from what would appear to an adult to be the head, we may not want to leap immediately to the conclusion that this is a misrepresentation and hold the child at fault for not admitting this. Although adult "stick figures" look nothing at all like people, it is simplistic to say that they are misrepresentations. Even if, ultimately, no general principle can be discovered that informs us exactly when a drawing should be regarded as a misrepresentation, adults

do tend to regard some drawings as accurate representations, at least in some respects, and others as inaccurate. The project would be to discover when children acquire this same tendency.

A less obvious pitfall lies in the distinction between the child's noticing a lack of correspondence and the child's noticing a genuine misrepresentation. DeLoache's tasks, described above, suggest that the child understands that one thing may correspond to another from at least the age of three (earlier with photographs: DeLoache, 1991), but as I argued, this ought not be viewed as tantamount to understanding representation. One must therefore be careful to sort out mere observations of a lack of correspondence from genuine criticisms of a drawing as misrepresentational. (The Golomb quote above, in fact, is ambiguous in this way.) It is not enough simply to notice that the picture of Daddy has three eyes while Daddy only has two. One must recognize that the picture's *job* is to have the same number of eyes as Daddy, and that the picture (but not Daddy) is therefore flawed.

Yet another pitfall is suggested by the second quote above: deviation from intention or from convention may be seen as "messing up"—e.g. if a line goes off the page—without being understood as misrepresentational. It therefore needs to be made clear exactly why the child criticizes any particular drawing. If the child criticizes a drawing of a cow with six legs, is this because the drawing doesn't correspond as it should to the features of cows, or is it simply that a certain convention—four legs per cow—has been violated?

Avoiding all these pitfalls in coming to understand the child's view of drawing would be no trivial task, but the rewards in understanding how the child thinks would, I believe, be substantial.

Acknowledgments

Notes

[1] Perhaps Fodor sometimes fails to notice the degree of difference because he is focused primarily on belief, a topic on which Dretske's account is not vastly different from his own.

[2] Ruth Millikan's distinction between "indicative" and "imperative" representations lines up nicely with my distinction between indicative and contentive accounts of representation (1993, pp. 98–99). On indicative accounts of representation, only what Millikan would call indicative representations are representations. On contentive accounts, both her indicative and imperative representations are regarded as representational. Most of Millikan's discussions of representation are discussions of indicative representations.

[3] An interesting intermediate case is representations of the way things *would be*. Such representations leave room for accuracy or inaccuracy of a sort, although they are not about the way things are. So, for example, one might misrepresent a unicorn as having a second horn, or one might make

inaccurate claims about how the interview would have gone had you not spilled your coffee. This would seem to be a fertile field for further exploration in the literature on representation.

[4] That this was her goal is not only evident from the experiments themselves, but also has been confirmed in personal communication (1995).

[5] Moore *et al.* (1995) similarly try to construct a desire task parallel to the false-belief task. In their task, children are placed in competition with a toy character ("Fat Cat") to complete a three-piece puzzle. Both the child and the character begin the game with a puzzle piece for the body of a frog. Each needs to acquire, next, a head piece and, finally, the eyes. In order to win pieces, players must draw cards from a pack: a white card indicates that no action is to be taken, a red card indicates that one may take a head if a head is not already possessed, and a blue card indicates that one may take the eyes if one already has a head. The children and Fat Cat draw cards, and the child earns a head, but the puppet does not. Now, presumably, the child wants a blue card so that he may complete the puzzle. At this point, the child is asked two test questions: (1) which color card does Fat Cat want now? and (2) which color card did you want last time? These questions are intended to test that the child can understand both another person's desire that is different from his own and that his own previous different desires were different. Three-year-old children are found to pass this test in approximately the same proportions that they pass false-belief tests. This experiment is no more supportive of the thesis of a three–four shift in understanding the representational nature of desire than are Gopnik's experiments (and Moore *et al.* do not regard it as supporting this thesis). First, the parallel with false belief is not complete. These are not tests of *unsatisfied* desires, and perhaps are better compared to the child's understanding that people can have different beliefs when the facts of the matter are unknown, which seems to develop earlier than their understanding of false belief and to be in place by three years (Wellman, 1990). Second, the task seems sufficiently complicated that it might introduce extraneous task-specific difficulties that could mask the three-year-old's ability to understand conflicting desires (an understanding suggested by Flavell *et al.* 1990; Repacholi & Gopnik 1997; Bartsch & Wellman, 1995). Moore *et al.* also perform an experiment finding that four-year-olds but not three-year-olds predict that another child recently scared by an animal will not choose a sticker depicting that animal over another sticker even if the animal sticker is significantly larger and more attractive than the other. They interpret the results as suggesting that three-year-olds will not ascribe desires conflicting with their own strong desires, but so broad a conclusion seems unwarranted. Three-year-olds simply might think that the increased attractiveness of the animal sticker will compensate for a somewhat negative association with the animal depicted. (Even an adult might think this.)

[6] Zaitchik, however, later argues that three-year-old children do have some tentative, wavering representational understanding of false belief (Zaitchik, 1991).

[7] Liben and Downs (1989) have also studied children's understanding of representation in maps. They don't find any noteworthy understanding of maps before the school years, perhaps because of task-specific demands.

[8] Annette Karmiloff-Smith's (1990) study of children's facility at intentionally distorting their drawings is a start, but it does not specifically address the children's view of their own distortions. Thomas *et al.* (1994) and Robinson *et al.* (1994) explore facets of the child's ability to distinguish pictorial representations from the objects represented (asking children, for example, whether a picture of a flower smells pretty), but their research does not address the issue of misrepresentation. It becomes less surprising that the work I suggest has not systematically been done once one recognizes the variety of pitfalls in it, some of which are described in the paper. One cannot simply ask "what is wrong with this picture?" and get an unambiguously interpretable reply.

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