

## *The Photographic Fallacy in the Debate about Mental Imagery*

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There has been considerable debate among philosophers and psychologists about whether the internal representations of imagery represent in the manner of pictures or in the manner of language. One side, *pictorialism*, holds that an internal imagery representation of Reagan is like a picture of Reagan. The other side, *descriptivism*, holds that an internal imagery representation of Reagan is more like a string of words denoting or describing Reagan. My aim here is to expose a widespread fallacy on the part of the descriptivists. In the course of so doing, I try to clarify the pictorialist position, and show how it can undercut what appears to be a category of evidence for the other side.<sup>1</sup>

### I

I will begin by describing an instance of the fallacy I have in mind. Zenon Pylyshyn, a leading descriptivist, describes Piaget's finding that when four-year olds are shown a tilted beaker containing colored water and are later asked to draw or describe what they saw, they typically indicate that the surface of the fluid was perpendicular (or even parallel) to the side of the beaker, as in Figure 1, rather than

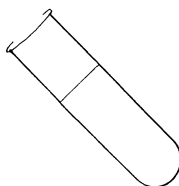


Figure 1

horizontal. Pylyshyn argues that this phenomenon provides evidence for descriptivism over pictorialism ([11]; see also [9]). His argument

is that if the child's visual representation were pictorial, it *could not fail to specify* the angle between the surface of the liquid and the beaker—at least it could not fail to specify whether the angle was 90 degrees (perpendicular) or 180 degrees (parallel) or some totally different angle. And assuming that the child's visual representation *did* specify the angle, why would it specify it *wrongly* in this systematic way? Though pictorialists, according to Pylyshyn, cannot explain this phenomenon, descriptionalists, he argues, can. According to the descriptionalist, the child's visual representation is a description. Since the child lacks the adult description 'geocentric level,' he uses the descriptions that he does have, such as 'perpendicular' and 'parallel,' and since the side of the beaker is salient, he comes up with such descriptions as 'perpendicular to the side of the beaker.'<sup>2</sup>

Note the following error in Pylyshyn's reasoning. Even if a photograph of the beaker could not fail to specify whether the fluid surface is perpendicular or parallel or some totally different angle to the side of the beaker, still *other* types of pictorial representation need not specify the angle. Consider Figure 2. It specifies that there is liquid in the



Figure 2

beaker, but it leaves the angle of the surface entirely open. A theorist who hypothesizes that the child has an internal pictorial representation with no determinate surface angle (as in Figure 2) can combine a pictorialist perspective with the basic idea of Pylyshyn's account in terms of the descriptions the child has readily available. If the child has the descriptions 'perpendicular' and 'parallel,' but not 'horizontal' or Pylyshyn's 'geocentric level,' then that may affect how the child *draws* the line. Pictorialists can and should allow that drawing is a task that requires the child to make use of his conceptual machinery, and is not a matter of "copying" an internal object. So the available descriptions can affect how the child draws the liquid line even if his internal representation of the liquid is pictorial. According to the theorist who hypothesizes a representation like Figure 2 in the child's head, what the child draws has as much to do with how he solves a certain problem (the problem of drawing), especially what concepts he brings to bear, as it has to do with his internal representation of the beaker.

Though a photograph (of the right sort) would reveal the angle, other sorts of pictures can be non-committal about such things. Indeed, it is not hard to see that for any of a wide class of visual features, one can find (or invent) a type of pictorial representation in which that visual feature need *not* be determinate. It is common for the pictorialist's opponents to pick one or another run-of-the-mill visual feature, and then use it in an argument against pictorialism, supposing that the pictorialist's pictorial representations must be determinate with respect to *that* very feature. The view apparently presupposed (though rarely stated) by those who do this is that pictures must be determinate with respect to *every* visual feature. I call this supposition the *photographic fallacy*; for it is tempting (though in fact mistaken) to link this idea of a representation which is determinate in every visual respect (i.e., determinate under every visual description) to photographic representation.<sup>3</sup>

## II

The granddaddy of photographic fallacies concerns the hen's famous speckles (or the tiger's famous stripes). It goes like this: a picture of a speckled hen must have a determinate number of speckles; a mental image of a speckled hen does not; so a mental image of a speckled hen is not pictorial. As Fodor points out (in response to Dennett): a picture can represent speckles or stripes, even if there is no determinate number of speckles or stripes on the picture.

Fodor's argument in its entirety is this:

It simply isn't true that a picture of a striped tiger must be determinate under such descriptions as 'has  $n$  stripes.' Of course, the *tiger* has to have precisely  $n$  stripes for some  $n$  or other (barring problems about the individuation of stripes), but there are all kinds of cases in which a picture of an  $n$ -striped tiger may not show any definite number of image stripes. Blurring is the main (but not the only) problem. (Footnote: Think of an out-of-focus photograph of a page of type. There is a definite answer to 'How many letters on the page?' Need there be a definite answer to 'How many image letters on the photograph?') What *is* true, what does follow from what Dennett calls "the rules of images in general," is that if what you've got is an image, then necessarily there will have to be *some* visual description under which it is determinate. For a picture in a newspaper, e.g., the pertinent description is one which specifies a 'gray-matrix'—an assignment of a value of black or white to each of the finitely many points that comprise the image. So far as I can see, this is the *only* kind of visual description under which newspaper pictures are *always* determinate. Whether a given such picture happens also to be determinate under some *other* visual description (as, e.g., has  $n$  stripes) will depend on such matters as what it's a picture of, the angle from which the picture was taken, how good the resolution is, etc.<sup>4</sup>

Now I agree with Fodor that a picture need not have a determinate number of stripes. But I do not think what he says on behalf of this claim is very convincing (see [12]). To the extent that Fodor gives us an argument here, it seems to rest on the fact that there is no determinate number of stripes on the photo if the photo is blurred. One wants to know why blurring is so different from another matter which Fodor treats as irrelevant, the fact that stripes (on the picture as well as on the tiger) can merge with one another in a way that makes it difficult to decide how to count them. Blurring and merging are rather similar difficulties in the individuation of picture stripes, so how can it be that one is irrelevant while the other is crucial? Indeed, it would be perfectly reasonable for Dennett to reply to Fodor as follows:

What I mean to say is that barring problems of individuation of picture-stripes, such as when they blur or merge at some places, a picture that represents something as striped must have a determinate number of picture-stripes. The indeterminacy of number of stripes on a mental image of a striped tiger has nothing to do with blurring or merging or any other individuation problem. Rather it is a matter of the image representing stripedness more like the way the sentence "The tiger was striped" does than like a picture.

Fodor *asserts* that a picture does not have to have a determinate number of stripes, and, as I shall argue, his position is correct, but he gives us no reason to believe him.

I propose to approach the striped tiger in a rather roundabout way: by concentrating on another photographic fallacy deployed by Dennett, his adaptation of Shorter's "man with a hat" argument ([4], [14]).

In picturing, according to Dennett, we have three options: we can represent a man as having a hat, we can represent him as having no hat, or we can be explicitly non-committal, e.g., by picturing his head as obscured by a tree. In descriptive representation, we have these options too (except that when we are explicitly non-committal we *say* that we are not going to say whether the man has a hat or not). However, in descriptive representation, according to Dennett, we have a fourth option: we can simply say "The man stood on the corner." In so saying, we just do not go into it: we are *inexplicitly* non-committal. It is this option of being inexplicitly non-committal that distinguishes description from depiction: the former has it; the latter does not.

Though Dennett does not mention it, it is obvious that for this kind of account to work, it must be limited to a specified set of properties. A drawing can picture a hat without going into details about the specific

gravity or thermal conductivity of the pictured hat, and such properties of pictured hats can be left open without being blocked by a tree in the foreground. I am doubtful about the existence of a class of properties that must either be specified by a picture, or else blocked—"visual properties"—as I have been calling them. But I will continue to put these doubts aside in order to point out another problem in Dennett's argument.

The crux of Dennett's argument is that imaging is like describing as opposed to picturing: imaging has the crucial option of being implicitly non-committal.

We can and usually do imagine things without going into great detail. . . As Shorter points out, my not going into details about hair color in my imagining does not mean that his hair is colored 'vague' in my imagining; his hair is simply not 'mentioned' in my imagining at all. . . If I write down a description of a person, it would be absurd for anyone to say that my description cannot fail to mention whether or not the man is wearing a hat. . . Similarly, it would be absurd to insist that one's imagining someone must go into the question of his wearing a hat. . . Imagining is depictorial or descriptorial, not pictorial.<sup>5</sup>

The trouble with Dennett's argument is that some kinds of pictorial representations do in fact have the option he reserves for descriptorial representation: not going into it. Consider an ordinary stick figure used to depict a person. It does not depict a person with no hat, no shoes and no belt; rather, it does not go into the matter of clothing at all, just as "The man is tall" does not go into the matter of clothing. So Dennett's way of drawing the pictorial/descriptorial distinction is simply mistaken.<sup>6</sup> We have many types of pictorial representations that are conventionally (or even non-conventionally) non-committal in various ways. Stick figures are the most obvious example, but many styles of sketching and painting abstract from all sorts of properties that can reasonably be thought of as visual. For example, a perfectly ordinary sketch of a person can show a hand in full view (nothing obscuring it) without specifying a determinate number of fingers. And this is not a matter of convention, as in the case of stick figures. Contour maps and perhaps some types of graphs also are pictorial yet non-committal with respect to a host of visual properties. Most strikingly, black and white photos do not depict their subjects as black, white, and gray; rather, they are non-committal about color. And if anything is a visual property, color is.

Perhaps Dennett will want to restrict his argument to *some* visual properties. But what will they be? Not *color*, for reasons just mentioned, and similar points apply to size and shape. (For example, leaving out cues, such as comparison objects, can render a photograph of an object

non-committal about its size.) Further, even if Dennett could somehow justify some choice of visual properties, such a restriction will not resuscitate the “man with a hat” argument. For a picture can be explicit about *some* visual properties. e.g., size, shape, and color, while being *in*-explicitly non-committal about all sorts of *other* visual properties, such as having a hat or a belt or shoes—indeed, all the visual properties *other* than size, shape and color. So Dennett’s claim to be able to form an image of a man without being explicit (or explicitly noncommittal) about his hat, feet, or whatever, will cut no ice at all.

Now that we have seen the flaw in the man with a hat argument, let us see if our discussion yields any insight into the striped tiger argument. Both arguments have to do with determinacy: determinacy of number of stripes in one case, and possession of a hat in the other. In the stripe case, the question is “More than 20? Less than 5? Is there a fact of the matter?” In the hat case the question is whether there is a fact of the matter as between one and *zero* hats. Does the difference in *number* make for a difference in *type* of problem? Well, the difference in number certainly does make a difference in one respect. A pictorialist might try rebutting the striped tiger argument by insisting that there is a determinate number of image stripes, but they are too fleeting, too shifty to be easily counted. No such move will be at all plausible in the hat case. How could one fail to count *one* thing?

What this shows is that Dennett’s claim that a mental image of a tiger can have an indeterminate number of stripes has a point of vulnerability not found in his claim that an image of a man can be indeterminate with respect to hattedness. I will ignore this point of vulnerability, for I am after a more interesting flaw in the striped tiger argument. Let us give Dennett *both* of his indeterminacy claims: a mental image of a man can be indeterminate with respect to hattedness, and a mental image of a tiger can be indeterminate with respect to number of stripes (genuinely indeterminate, not just too shifty to count). One question is: is there anything about *pictures* that makes for a difference between the determinacy required of stripes as opposed to hats? In other words, we are yielding to Dennett on the issue of indeterminacy of *mental image* stripes (and hats as well), concentrating on another premise of his argument: that if mental images are indeterminate (inexplicitly indeterminate, that is) with respect to stripes/hats, then mental images are not pictorial. With respect to *this* question, it seems obvious that there is no important difference between the hat case and the stripe case.

An apparently more significant difference between the two issues has to do with the difference between properties of whatever the picture represents on the one hand, and properties of the picture itself on the other. In the striped tiger argument, it is the determinacy of the

number of stripes on the picture itself that is in question, not the number of stripes on the *represented* tiger. It is completely obvious that a picture of a tiger need not *represent* a determinate number of stripes. For example, a perfectly good tiger picture will not tell you how many stripes are on the *other* side of the tiger (the side blocked from view by the tiger's body) or on a part blocked from view by a tree. Fodor's blurring example is directed against the determinacy of the *picture's stripes, not the tiger's stripes*.

In the man with the hat argument, it is the existence of a *represented* hat that is in question. The determinacy of whether the picture *itself* is wearing a hat is not in question. So the two determinacy arguments seem totally different. But this appearance is misleading. Recall that Dennett does not argue that there must be a matter of fact about whether the pictured man is represented as wearing a hat; rather, he argues that *either* there is such a matter of fact, *or else* the hat's position must be obscured, for example by a tree or by the border of the picture. And this is just the sort of point at issue in the striped tiger case. The picture stripes in question are *just the stripes on the tiger part of the picture that are not obscured or blocked*. So the issue in one case is determinacy of number of non-obscured hats, and in the other case it's determinacy of non-obscured stripes. In both cases, Dennett argues that for the mental image to be a genuine picture, there must be a determinate answer. The represented/representing difference does not make for a difference in the force of the arguments.

Why, then, is the man with a hat argument so much easier to refute than the striped tiger argument? The answer, I suggest, is that we have a *convention* for picturing people without committing ourselves to items of clothing (namely stick figures), while we have no *corresponding convention* for representing stripedness without committing ourselves to number of stripes. But once one sees the parallel between the two arguments, it is obvious that there *could be* such a convention. We could make one up without thereby changing our conception of a picture. And here we have a crucial flaw in the striped tiger argument. Even if (contrary to fact, in my view) our current practice is one in which a picture that represents something as striped must itself have a determinate number of picture stripes, there is nothing in the *nature of pictures* that requires that this be so. Indeed, there is a quasi-conventional device used in comic strips in which squiggly lines represent lines of print (e.g., when Spider-man is reading a newspaper). The squiggly lines represent letters, but there is no determinate number of letters on the page.

Perhaps someone will object that such conventionalized pictures are only *partly* pictorial. But with such an objection, we see the photographic fallacy stripped naked. How many of our perfectly ordinary

pictures are “fully” pictorial in the objector’s sense? Why should a pictorialist be committed to such “fully pictorial” pictures.

### III

Descriptionalists often take pictorialists to be committed to features of the way certain types of photographs are produced or function. For example, descriptionalists have made heavy weather of the putative fact that images resist *reparping*. Geoffrey Hinton asks people to imagine the outlines of two equilateral triangles of equal size, one upright and the other inverted, with its tip at the midpoint of the base of the upright one. Subjects are asked how many parallelograms they can see. The structure just mentioned can equally well be described as two overlapping parallelograms that slant in opposite directions, and have colinear ends. But many people find these parallelograms difficult to “image,” given the original description. Hinton takes this as strong evidence against pictorialism.<sup>7</sup>

But Hinton’s argument depends on a straw version of pictorialism, one that is reminiscent of the photographic fallacy. Perhaps mental images are more like pictures that one *draws*, rather than like photographs or other pictures that one merely looks at. I do not mean to imply that imaging involves any analog of muscle movement, but rather that in the process of imaging, many of us may not be able to easily avoid seeing the product *as* falling under the concept which guides the process. As one draws a picture, one sees it a certain way. Of course, one can pause, step back, and see the drawing differently. But perhaps many of us cannot do this so easily with a mental image. Mental images could be pictorial in their mode of representation even if we were *never* able to “step back” and see them differently.

As it happens, different people can reparse mental images to different extents. Many subjects *can* reparse the image described above. Indeed, one can predict reparsing ability quite well from rather simple tests. Form an image of the outside of your house. Does your image specify a color for the roof? A ‘yes’ correlates well with reparsing ability (see [15]). There are large differences among people in their imagery abilities—ranging from eidetic imagers (described briefly below) to people who claim no mental imagery at all. It seems most unlikely that these differences are due to fundamental differences among people in the type of representations underlying images. Hence it seems unlikely that there is anything in the nature of images that hinders reparsing.

Further, there are images that most subjects can reparse. For example, turn a capital N on its side, and what do you see? Another example: consider a rectangle 3 units by 1 unit standing upright, and



imagine another rectangle of exactly the same size and shape laid horizontally across its middle, in a symmetrical fashion. How many squares are in the resulting figure? Most people have no trouble seeing this figure as a square with four adjacent squares, one on each side.

Moreover, there are many examples in the experimental literature of cases in which novel information is recovered from mental images. For example, Shepard and Chipman ([13]), in a famous experiment, asked subjects to set 105 pairs of 15 pre-selected States in rank order from most similar to least similar. The subjects ranked the pairs in much the same way whether they had pictures in front of them or whether they had to (as the subjects spontaneously said) "use their mental images" of the shapes of the States. Further, subjects could easily make novel judgments from their mental images (again, according to their own testimony), for example, about whether Alabama is more like Idaho (in shape) than Maine is like Colorado.

Thinking of mental images as more like pictures that one draws than like pictures one looks at suggests a different account of the phenomenon discussed earlier in connection with Pylyshyn's point. Recall that children misdraw the surface of the water in a tilted beaker. If forming a visual representation is like drawing a picture in the mind, and if what descriptions one has available influences what and how one draws, the available descriptions might influence *how the child forms* his visual representation. So the child may have a pictorial visual representations that *actually* represents the water as parallel or perpendicular to the side of the beaker.

This suggestion receives support from data on children who have eidetic imagery. An eidetic imager can, for example, look at two different pictures at different times and superimpose them in his mind's eye, telling the experimenter what the superimposed picture looks like. One amazing (adult) subject could superimpose million-dot matrices. The stimuli were matrices one thousand squares on a side, in which each of the million squares contained a randomly placed dot. Two such matrices were prepared that were identical except in a small fraction of the squares arranged so as to form a figure or a letter. (Such pairs, devised by Bela Julesz, are known as random dot stereograms.) If a normal person looks at such a pair through a device that displays one matrix to one eye and the other matrix to the other eye, the figure or letter is seen as projected out of the page. The eidetic imager just mentioned could look at one matrix with one eye, and view the second matrix with the other eye hours later, then superimpose them in her imagination, and correctly report the letter or figure ([17]).

Children with eidetic images show the same sorts of typical childhood distortions in describing the visual properties of imaged scenes and in drawing them as do normal non-eidetic children ([6]).

Eidetic children usually report their images as projected onto the surfaces on which they saw the stimulus. About a quarter report being able to move the image to a coplanar surface. Neisser and Dirks (reported in Neisser, 1979) asked such a subject to *trace* her image (of a picture of an elephant) on a piece of paper. The result was a typical stereotyped drawing of the sort you get when you ask children at that developmental stage to draw elephants (and not at all like what the same child produced when she traced on a piece of tracing paper placed over the original elephant picture).

Such results suggest that the production of a visual representation—of perception or imagery—is a “constructive” process involving the conceptual system of the representer, and not a mechanical copying process of the sort that takes place in a camera.<sup>8</sup>

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#### NOTES

<sup>8</sup>See [1] for selected articles on both sides of the debate. I want to avoid at the outset any implication that the pictorial/descriptive distinction is anything like exhaustive.

Indeed, I doubt that the pictorial/descriptive distinction is even a half-way decent taxonomy for mental representations. The distinction is of importance only because it is the best we can do *now*. One of the benefits one hopes for from the controversy is a better (and more finegrained) taxonomy of mental representations. See [3] and the introduction to [1].

<sup>2</sup>An obvious question for Pylyshyn is: Why doesn't the child produce the description 'parallel to the ground'? This amounts to the same thing as Pylyshyn's 'geocentric level.' I will ignore this problem with Pylyshyn's account, since my aim is to illustrate a different fallacy.

<sup>3</sup>The style of photography that is dominant in the West derives from a prior conception of realistic depiction. Quite different, but equally good conceptions of realistic depiction would lead to quite different styles of photography. See [16].

<sup>4</sup>From the section on imagery in [5], pages 77-78 in the version reprinted in [1].

<sup>5</sup>Page 54 in [1]. Incidentally, it is clear from context that when Dennett speaks of imagining, he is talking about *imaging*. Obviously, *imagining* need not be pictorial, since one can imagine something in words.

<sup>6</sup>See the introduction to [1] for more detail.

<sup>7</sup>Hinton defends this view in [7]. The particular experiment I mentioned is described in [8].

<sup>8</sup>I am grateful to Susan Brison, Dan Dennett, and Steve Pinker for comments on an earlier draft.