**The Imagery Debate.** Michael Tye. Cambridge, Massachusetts: MIT Press, 1991, 172 + xiv pages, $24.50 hard.

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This book is a philosopher's examination of the dispute, which raged amongst cognitive psychologists in the 1970s, and has continued to sputter on since, about the nature of mental imagery. As Tye sees things (and, indeed, as the textbooks generally have it) on the one side of the issue we find Stephen Kosslyn and certain close associates, arguing that mental images are best understood on analogy with pictures; and on the other side we find Zenon Pylyshyn, ably seconded by Geoffrey Hinton, arguing that the pictorial analogy is thoroughly misleading, and should be replaced by an analogy to descriptions. Tye's consideration of this debate, attempting to clarify and arbitrate a tangled mess of argument and to explore the implications of what he takes to be the proper outcome, is generally excellent. If you want to understand the strengths of the arguments of Kosslyn, Pylyshyn, and their allies, then this book is to be recommended very warmly.

If on the other hand, you really want to understand the underlying mechanisms of imagery, then Tye's conclusions should be treated with great caution. He is masterly in argument and exposition, but less than reliable as to facts. Surprisingly, this is even true when he confines himself to facts of philosophy. In chapter one Tye trots quickly through the relevant views of some of the historically more important philosophers (Aristotle, Descartes, Hobbes, Locke, Berkeley, Hume, Kant) and asserts that they all believed introspection tells us that mental images are like pictures. Now it is perfectly true that virtually every pre-twentieth century theorist who considered the matter thought of images as picture-like, but I know of no reason (certainly Tye presents none) to think that they held this view on *introspective* grounds, and there are excellent reasons to think otherwise. Even Hume, who had less compunction than most philosophers in using introspectively based arguments, did not here do so. What is more, as Tye goes on to show, introspection actually provides no grounds whatsoever to support the picture theory. It tells us that we sometimes have quasi-perceptual experiences, but nothing about the mechanisms which subserve them. I hardly think all the great thinkers of the past would have failed to notice this. It seems almost certain that they thought that imagery involves something picture-like because they held an, often implicit, theory that *vision* essentially consists in something picture-like entering or being imprinted

upon the eye (hence "impression"). This theory, which goes back to the pre-Socratics, was confirmed in the minds of Descartes and his successors by the discovery of the retinal image.

Tye is rather more reliable when it comes to considering the widespread rejection of the picture theory from the early twentieth century (although his reading of J.B. Watson is implausible — cf. Thomas, 1989), and he carefully critiques the general philosophical arguments which were made against pictorialism. In particular, the claim that images can have a particular sort of vagueness or non-specificity impossible for pictures receives a whole chapter's consideration. Although forms of this argument have been influential, I had thought it long dead and buried at the hands of such as Hannay, Fodor, and Block. Tye digs it up again and, with great ceremony, drives a stake firmly through its heart.

Tye's historical inaccuracy is merely symptomatic. It does not affect the rest of his argument. However, when he comes to contemporary psychological positions, what he gets wrong or, more often, leaves out, is more consequential. The work of Shepard, Paivio, Finke, Anderson, Neisser, Palmer, Marks, to mention but a few of the more important imagery theorists from within cognitive psychology, is given short shrift, if it is mentioned at all. Coverage of the relevant empirical literature is even more selective.

It would not seem altogether unfair to surmise that the reason why Tye ends up favoring Kosslyn's position may be that he has relied very heavily on Kosslyn's writings as his guide to the empirical situation. He is somewhat inclined to present what he calls the theory of "interpreted symbol filled arrays" as his own solution to the imagery problem, and as some sort of compromise between the picture and description theories. But "no compromise" was the essence of Pylyshyn's position, and I doubt that Tye would seriously want to deny that the theory which he gives us is much more than a tidied-up version of Kosslyn's "quasi-pictorial" theory (circa 1983). However, Tye does greatly clarify the notion of a quasi-picture, drawing out its homology with the "2½ D sketch" of Marr's influential visual theory.

Tye is more original in bringing out some of the implicit commitments of quasi-pictorialism. He argues fairly convincingly that the "pixels" which are supposed to compose quasi-pictures (or 2½ D sketches) should be thought of as informational — as symbols — rather than as inherently qualitative, and that the theory demands that we think of mental states as, at most, *constituted by* brain states rather than strictly *identical* with them. He also tries to reconcile such a physicalism with the "folk psychological" view of an image's intentional content as potentially causally efficacious.

But the deficiencies of Tye's treatment of the empirical literature may render such sophisticated exercises irrelevant. For instance, he seems quite unaware that nearly all the experimental phenomena which persuaded psychologists of the cognitive reality of mental imagery — its mnemonic effects; mental rotation; selective interference; and the mental scanning and size/inspection time effects which Kosslyn himself discovered — have since been demonstrated in congenitally blind subjects, who seem unlikely, to say the least, to be capable of recalling visual sense impressions. Although their performances very likely involve *haptic* imagery there does not seem to be much scope for giving haptic mode explanations consistent in form with the visual mode accounts suggested by quasi-pictorialism (Thomas, 1993).

Tye also seems to be unaware of the findings concerning images of "ambiguous figures" such as the notorious **duck–rabbit**. Although it is generally not hard to find the alternative interpretations of such pictures when they are in front of us,

Chambers and Reisberg (1985) found that subjects were quite unable to locate more than one interpretation in their mental images, even though it could be shown that these images carried sufficient information to specify the alternative interpretation. Admittedly, things seem less clear-cut in the light of subsequent research. It has been shown that some types of image reinterpretations are not especially difficult, and that even the types called for in the original experiment sometimes seem to be achievable under especially favorable conditions (Peterson, Kihlstrom, Rose, and Glisky, 1992). Nevertheless, an important disanalogy between images and pictures has still been demonstrated, and it is not easily assimilable by the quasi-pictorial theorist.

These two sorts of findings ought to be grist to the mill of description theorists, but in fact they arrived too late to make any significant impact on the actual debate between Pylyshyn and Kosslyn, which had long since moved almost entirely to the sort of metatheoretical level at which philosophers like Tye are likely to feel most at home. Kosslyn and Pylyshyn share a commitment to a metatheoretical framework we might call computational representationalism (henceforth CR), in which mental contents, including images, are held to be identifiable with the data structures being manipulated by the program which the brain, considered to be a computer, is supposed to be running.[1] Tye takes CR for granted throughout his discussion, despite the fact that CR is well-known to face serious theoretical difficulties, most notably concerning how it might accommodate such fundamental mental properties as intentionality and consciousness. Part of the reason why imagery aroused so much interest in the 1970s was that new empirical findings (and the phenomenological truths to which they redirected attention) seemed to raise an important challenge to CR, which was concurrently coming into fashion (see Block, 1983). The theoretical efforts of Kosslyn, Pylyshyn, and their various allies are best seen as alternative programs for reconciling the phenomena of imagery with the CR framework.

Which should a good CR believer follow? Kosslyn and Pomerantz (1977) argued that although description theory might in principle be able to account for the empirical findings,[2] in practice its explanations were strained and ad hoc where pictorialist explanations were (relatively) elegant and natural. Picture theory could have (and often actually had) predicted the phenomena and suggested the experiments, whereas description theory had no such heuristic value but was only capable of providing after-the-fact rationalizations. Pylyshyn (e.g., 1978) was able to raise a few empirical examples of his own to similarly discomfort the pictorialists, but the motivation for his campaign was clearly his view that quasi-linguistic representations (what psychologists like to call "propositional" and philosophers call "sentential" or "mentalese" representations) are the only forms of mental representation compatible with CR. Tye's principal achievement, in my view, is to have clearly

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[1]In more recent work Kosslyn has attempted to re-cast his theory in neurological rather than computational terms. Tye gives little attention to these developments, and it is not clear whether they are meant to constitute simply a fleshing out of the original computational theory, or whether they entail a rejection of CR. If the latter is the case, then it is not obvious that Kosslyn's current position has the coherence which Tye (granting him the coherence of CR itself) manages to demonstrate in the earlier work.

[2]Later findings, by Finke and others, that certain visual illusions can be induced through imagery, may be less easy to reconcile with description theory, although the findings themselves have been challenged (for review see Finke, 1989).

demonstrated that this is false, despite the sophistication with which Pylyshyn propounds it. Although Tye accepts mentalese as the most *basic* form of representation in CR, he argues persuasively that other auxiliary forms, notably quasi-pictures of the type proposed by Kosslyn, are admissible and may very well be functionally valuable within a computational system. In effect, then, Kosslyn is vindicated.

As we have seen, the *empirical* case against quasi-pictorial theory is considerably stronger than Pylyshyn (or Tye) has realized. But that does not diminish the force of Kosslyn's and Tye's critiques of descriptionism. It seems to me that we now find ourselves in a situation where *neither* of the extant programs for reconciling imagery phenomena with CR can deal with the full range of the evidence without resorting to highly implausible and ad hoc maneuvers. Given also that, *pace* Fodor, CR no longer seems to be "the only game in town" in cognitive science, it seems to me that the time might be ripe for looking beyond CR for our account of imagery, and regarding imagery research once again as a significant challenge to this framework. Non-pictorial, non-CR imagery theories certainly exist. There are several extant versions (all, admittedly, in a somewhat underdeveloped state) of what I call "perceptual activity theories" the best known being that of Neisser (1976). I have discussed and advocated this sort of theory elsewhere (Thomas, 1993). Tye, however, betrays no awareness of the possibility of any sort of imagery theory beyond pictorialism and descriptionism. His book is aptly titled. It is about the (or, at least, an) imagery debate. It may not be about imagery.

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