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or radical empiricism, the view that all other knowledge-claims have to be justified on the basis of subjective mental states, especially perceptual experiences of simple sensory qualities (p. 71ff).

In his two final chapters, on Causation and Explanation, and Freedom and Necessity, Strawson essays a slightly closer focus than in the brief essays which precede. On causation, he makes an interesting attempt to change the face of the received Humean view, and “put it in its place”. He emphasizes the observability of causal transactions in perfectly ordinary experiences of bringing something about, and of being affected (e.g. pushing and pulling, and being pushed or pulled), and he suggests that “we should regard mechanical transactions as fundamental in our examination of the notion of causality in general” (p. 118). Our concepts of material substances are of things with characteristic dispositions to act or react in various ways. Although of course we learn from experience of the detailed facts about which sorts of things do what, the general notion of causality is already “lodged with us”, as a Kantian a priori concept or category (p. 123-4).

There is much wisdom—and much characteristic Strawsonian deftness of phrasing—in this book, but I confess to some doubts about its appropriate readership. I do not think it will be readily understood by those with no previous experience of philosophy (as the Preface claims), for I fear the level of approach will be found mostly too high, implicitly presupposing much that has gone before in the development of the subject. On the other hand, it will be rather unsatisfying to the specialists, for Strawson makes no attempt here at comprehensive discussion of recent work. Perhaps, though, second and third year undergraduates (even graduates?) will find certain chapters useful in orienting their approach to the topics discussed.

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***The Imagery Debate***, by Michael Tye. Cambridge, Massachusetts: The MIT Press, 1991. Pp. iv + 172. £ 19.95.

Do frogs have lips? In thinking of an answer to this question, many people form a mental image of a frog and scrutinise it to find the answer. But what are they doing when they do this? The imagery debate that Michael Tye addresses in this book is between two kinds of answer to this question: the “pictorialist” answer that images are in important ways like pictures, and the “descriptionalist” answer that they are more like descriptions. Versions of these views have been held both by philosophers and psychologists. Tye’s book aims to disentangle the various claims made by pictorialists and descriptionalists and to defend a theory which incorporates elements from the description and picture theories.

The book falls naturally into three parts. Chapters 1-2 discuss imagery in the history of philosophy and the standard philosophical objections to the picture theory of imagery. Chapters 3-5 outline versions of the picture and description theories in current cognitive science and Tye's own preferred theory. Chapters 6-8 tackle three separate topics in the theory of imagery: indeterminacy, "qualia" in mental imagery, and the causal role of the representational content of mental images. An appendix offers (as an illustration of a claim made in chapter 3) a computer programme that displays an image on a screen and rotates it.

Tye deals briskly with the treatment of imagery by philosophers of the past. Most of these philosophers based their views of imagery on "introspectively based armchair theorising" (p. 3) of a kind Tye finds dubious. In particular, he argues that contrary to what many of these thinkers supposed, introspection alone cannot show pictorialism to be true. Introspectively, having a mental image may be more like having a perceptual experience than it is like (say) having a belief. But this does not show that pictorialism is true, since "whether perceptual experiences *themselves* involve pictures is an open question" (p. 13).

Tye's concern here is with the idea that the *vehicles* of imagery are pictorial. For one could consistently hold that the phenomenology of perception is (in some sense) "pictorial", but that its underlying mechanisms take the form of descriptions; even if perceptual experiences were stored and processed as sentences in the head, perceiving may still not *seem* like believing. And the same could be said of imagery. It is arguable that the historical figures Tye discusses were not concerned with the nature of the vehicles of imagery, but with its phenomenology and its role in conscious thought. Nonetheless, Tye's claim that introspection alone cannot reveal the nature of these vehicles is surely correct.

The purpose of chapter 2 is to eliminate a number of traditional philosophical objections (made by Ryle, Dennett and others) to pictorialism, to prepare the way for Tye's sympathetic later discussion of that theory. He also considers the main alternatives to the picture theory offered by philosophers—behaviourism, descriptionalism, adverbialism and eliminative materialism—and finds them wanting.

Tye is clear and incisive in his discussion of these philosophical debates. The main concern of the book, however, is with theories of imagery in current cognitive science. Accordingly, chapters 3 and 4 contrast Stephen Kosslyn's version of pictorialism with the descriptionalism of Zenon Pylyshyn and Geoffrey Hinton. Kosslyn's view is that mental images are "quasi-pictures", while Pylyshyn and Hinton claim that images are "structural descriptions": complex linguistic expressions with propositional content. A key difference between quasi-pictures and structural descriptions is that in quasi-pictures the representation of an object involves representation of just the object and (some of) its parts. If *R* is a quasi-picture of an object *O*, then all the parts of *R* that represent something will represent parts of *O*, and certain relations between the parts of *O* will be represented in *R* by the relations between *R*'s parts. For example: consider a map of Britain that contains dots representing (say) the locations of London and Manchester;

this quasi-picture of Britain has parts which represent some parts of Britain, and the spatial relations between those parts are implicitly represented in the relations between the parts of the representation. But the structural description “Manchester is north of London” contains a part—the relational expression “is north of”—that does not represent a *part* of Britain, but explicitly represents a relation between some of its parts. In structural descriptions, properties and relations are explicitly represented, but in quasi-pictures they are implicitly represented in the representation of objects and their parts.

In chapter 5, Tye presents his own theory of imagery, which draws on elements of both theories, without endorsing either. He rejects the claim that images are structural descriptions (p. 90) but also is unhappy with Kosslyn’s pictorialism, on the grounds that it cannot adequately handle imagistic representation of the third dimension (p. 85). His own account takes its lead from the similarities between imagery and visual perception. Inspired by Marr’s theory of vision, Tye claims that images are “interpreted symbol-filled arrays” that resemble Marr’s  $2\frac{1}{2}$  D sketches in the way they represent depth. Images are “arrays” in the sense that they are constituted by cells stored in a medium, common to imagery and vision, and spatial relations between parts of represented objects are represented by the relations between the cells in the array (p. 94). This aspect of Tye’s theory resembles Kosslyn’s. The arrays are “symbol-filled” in the sense that each cell can contain vectors of symbols that represent the colour, intensity, texture (etc.) of the imaged object (p. 91). Finally, these arrays are “interpreted” in the sense that a “sentential interpretation having the content ‘This represents an *F*’ is affixed” to the image of an *F* (p. 90). These last two aspects of Tye’s theory resemble descriptionism, because they allow the theory to help itself to the explicit representation of properties and relations.

The debate between pictorialism and descriptionism can be sharpened by considering the most powerful objection to pictorialism, the claim that images have a certain indeterminacy which pictures lack. This is the topic of chapter 6. The problem, as posed by Dennett and others, is illustrated by the fact that I can form an image of a striped tiger without forming an image of a tiger with a particular number of stripes. But any picture of a striped tiger must picture it as having a particular number of stripes. So how can mental images be pictures?

Tye is careful to distinguish various versions of this argument, and rebuts them all. The claim that pictures can never be indeterminate with respect to the representation of some property is clearly too strong, and an argument that assumes it is easily refutable. But even in its most plausible version, the indeterminacy argument relies on the premise that pictures can only represent some property *P* of an object *O* indeterminately if they are blurred or indistinct, or represent *O* in a way in which *P* is not visible (p. 107). Tye points out that this premise is false: a black-and-white picture of a postbox neither represents that it is red nor represents that it is not red. But its redness is not represented in a blurred or indistinct way, and nor is it represented as not visible.

Tye also makes the important observation that the issue of indeterminacy can work against descriptivism too: for there is a limit the amount of indeterminacy that an image can have. I cannot form an image of two objects together without imagining some of their spatial relations too. But this is not so with descriptions.

Tye's concern in the second part of the book is with the vehicles of imagery. What about the phenomenology of imagery? How do images seem to us, and how is this to be explained? It could be claimed that images seem the way they do because they involve the apprehension of "qualia": non-representational phenomenal properties. In perhaps the most controversial chapter of the book, Tye denies that there are any such qualia in mental imagery. Elsewhere Tye, following Harman ("The Intrinsic Quality of Experience" *Philosophical Perspectives* 4, ed. J. Tomberlin, Ridgeview 1990) has published a similar attack on qualia in visual experience. Here he applies these arguments to the case of imagery. Tye's view is that imagery, like perception, can be accounted for purely in terms of its representational content.

Tye's views on qualia are of interest independently of the imagery debate: Tye presents a challenge to those who believe in perceptual and image qualia and, if he is right, his conclusions have far-reaching implications for the philosophy of mind. Similarly, the final chapter on the causal role of the contents of images engages with general issues in the philosophy of mind. In drawing the Eiffel Tower from memory, I may form an image of it. It seems plain that the representational content of my image is causally relevant to my action. But there are well-known arguments which suggest that the content of a mental state can never play such a causal role. Tye thus treats the problem of the causal role of image content as an instance of the general problem of the efficacy of content, and adopts a solution similar to that advanced recently by Gabriel Segal and Elliott Sober ("The Causal Efficacy of Content" *Philosophical Studies* 63, 1991, 1-30).

Tye's book is an extremely useful addition to the literature on imagery. It is very clearly and concisely written, and manages to cover a large amount of material in a small number of pages. Philosophers approaching the subject for the first time will find the exposition and assessment of the psychological literature very useful, and the chapters on indeterminacy and qualia are important contributions to a number of current philosophical debates.

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