

Notes to §II.B.3.

1. See e.g. Fodor [1981b]; Block [1980].
2. Or perhaps, potentially, an electronic state of an intelligent computer. What makes it an image is its functional rôle, not its physical instantiation.
3. Ryle, 1949 chap.VI. As we noted in §I.B.2, despite his attachment to 'ordinary language' Ryle's iconophobia, his objection to pictorialism, leads him to avoid everyday terms such as "image" and "imagery" almost entirely. But careful reading reveals him to be quite iconophilic and even F [see Ryle, 1979 chap.3].
4. 'Imagery' certainly occurs in all modes [see e.g. Schlaegel, 1953; Lindauer, 1969], and non-visual imagery may be of considerable theoretical interest [see Newton, 1982], but it has received regrettably little study. Our own discussions must perforce follow the herd and concentrate mainly on the visual.
5. Ryle, 1949 pp.238-9.
6. 1969 §1.
7. To a very limited extent, indeed, they do exist, as in the production of artificial flavourings, etc.. But this is perhaps more akin to mixing pigments than painting a picture.
8. Squires [1968] specifically chooses Lucretius (rather than the more usual Locke, Hume and 'Descartes') as his opponent. But it is not clear that even he realizes that there are two distinct types of pictorialism.
9. I take this gedanken experiment from Wright [1983], but he ascribes it to J.R. Smythies. The refinements are my own.
10. It should be noted that our external eyes would have to be different too, for they are not functionally equivalent to TV cameras. This is because a significant amount of perceptual processing takes place within the retina itself, so that, unlike the signal from a camera, the signal down the optic nerve does not directly encode the point to point distribution of light in the optical image [see e.g. Michael, 1969]. But clearly the external eyes could be suitably simplified.
11. 1958.
12. Nor, indeed, for the well attested mnemonic properties of imagery [see Paivio, 1971; Bugelski, 1977].
13. For a fuller discussion of the shortcomings of

quasi-pictorial imagery as the basis of memory see Pylyshyn [1973].

14. e.g. Kosslyn, 1973; Kosslyn, Ball & Reiser, 1978; Finke & Pinker, 1982

15. e.g. Shepard & Metzler, 1971; Shepard & Cooper, 1982; Robertson & Palmer, 1983.

#### Notes to §II.B.4.

1. See §II.B.2 above.

2. Pylyshyn [1978]. The point of this expression is that Pylyshyn holds a view of psychology as explanation in terms of computational manipulation of mental representations. To explain a psychological process is to detail the computations and representations involved in it, but the nature of the representations themselves is only to be explained by a 'lower level' science (physiology, or, if we are dealing with Artificial Intelligences, electronics). Pylyshyn's principal objection to imagery seems to be that if images can be "cognitively penetrated" (i.e. internally modified at the psychological level, by beliefs - or other propositional attitudes - in virtue of their content) then imagery cannot be a fundamental form of mental representation. Fundamental representations should only be "penetrable" by physiological causes, and imagery, rather than being an explanatory concept, would itself stand in need of explanation in terms of computations on the truly fundamental representations [see Pylyshyn, 1980, 1981, 1984]. (Block [1983b] has run this argument in reverse: If imagery, as is quite arguable, is not very "penetrable" then it probably cannot be reduced to lower level representations. In that case computational/psychological explanations may not take us very far, and the true key to the mind is probably physiology.)

If one is not committed to the basic picture of psychology as computation (as I am not) then this argument will have little force. But even if one does accept this paradigm (as Kosslyn does) it is far from clear that it might not be useful to be able to talk about different levels of cognitive representation within a computational system. Imagery might be claimed to relate to the fundamental mental representations somewhat as high level computer languages relate to the machine code in which they are written ('high level' statements reduce to machine code routines, but machine code reduces directly to electronic states). "Cognitive penetration" effects might then be likened to the workings of hybrid high level/machine code programs. To counter such a position "cognitive penetration" would have to be shown to be thoroughly ubiquitous (all the real work of the program done in the machine code sections) and it is not at all clear that this