THE MULTIPLE REALIZATION BOOK

THOMAS W. POLGER AND LAWRENCE A. SHAPIRO

Reviewed by Marion Godman

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Thomas W. Polger and Lawrence A. Shapiro
New York: Oxford University Press, 2016, £50.00
ISBN 9780198732891

Multiple realization is rather casually thought by many scientists and philosophers to be the saving grace of scientific autonomy. How else should we make sense of the nature of abstract and seemingly non-reducible items such as depression, preferences, and institutions? More generally, multiple realizability is sometimes understood to be a mandatory commitment if we want to defend the integrity and realism of a particular non-fundamental science—not least, cognitive science and psychology. Thomas Polger and Lawrence Shapiro are in fact psychological 'realists' (p. 184), but have long been multiple realization 'skeptics' (p. 135). In their highly valuable *The Multiple Realization Book*, they maintain that reduction is no threat to psychological realism and critically scrutinize the case for multiple realization.

There is, however, an important restraint in this project that perhaps is important to stress up front. The authors are not concerned to rule out multiple realization of psychological kinds entirely—neither *a priori* nor *a posteriori*. Instead, they are interested in what a test for multiple realization should look like and how likely widespread multiple realization is, given the current state of the art in psychological research. Still, given

Polger and Shapiro's well-established record in the area, it is not much of a spoiler to report that their verdict is that expectations of multiple realization are greatly exaggerated.

This welcome book-length venture compiles and expands on previous arguments by the two authors, and presents a strong challenge to what they see as current multiple realization *dogma*—perhaps 'complacency' is more apt—found throughout the philosophy of the non-fundamental sciences. The book also contains a helpful guide to teaching and learning: every chapter is accompanied by a list of key questions and references for those using the book to navigate the terrain more broadly. Above all, though, the clear prose and accessible examples should engage a diverse readership.

The first part of the book situates and describes the thesis of multiple realization. The authors begin with describing the alleged theoretical virtues of 'non-reductive physicalism' or, as the authors often prefer, 'realization theory', and how it compares with its rivals: 'dualism', 'identity theory', and 'behaviorism'. In their view, the two dominant positions of recent years, realization theory and identity theory, can both maintain that psychological states are real, causal, and explanatory (pp. 13-18). Yet the authors follow Hilary Putnam in thinking that realization theory does have a *prima facie* advantage over identity theory due to its broader scope, subsuming a potentially greater range of individuals from different species under its generalizations and psychological categories (like 'eye', 'pain', 'thought', and so on).

But how then is the multiple realization thesis, with all its promises, to be established? The authors propose that to avoid collapsing into behaviourism, a psychological or functional kind should be identified not simply with a mechanism or task performance, but with whatever 'cognitive process' (itself a pattern of behaviour) that comes to realize this task: 'What is realized is not identical with its realizer' (p. 21). However, as they are at pains to emphasize throughout the book, not any variation in the realization of cognitive processes will do for establishing multiple realization, or even possible multiple realizability: variation is cheap in this world; multiple realization is not. To this end, they offer the following recipe for *relevant difference* in realization and hence of multiple realization proper:

> (i) As and Bs are of the same kind in model or taxonomic system S1.
> (ii) As and Bs are of different kinds in model or taxonomic system S2.
> (iii) The factors that led to As and Bs being differently classified by S2 must be among those that led them to be commonly classified by S1.
> (iv) The relevant S2 variation between As and Bs must be distinct from the S1 intra-kind variation between As and Bs. (p. 67)

These conditions require some unpacking and what helped me most was the example of an artefact kind: the watch (pp. 69–73). In brief, mechanical and quartz watches both tell the time, and there are some 'taxonomic systems' of watchmakers that group them together and some that group them apart. According to the authors, the factors that lead them to be classified differently are the source of energy and the control of movement. In the case of mechanical watches, the source of energy consists of winding and the control of movement is performed by some sort of escapement; in the case of quartz watches, the source of power is stored chemically in a battery, which also controls the movement by means of so-called quartz oscillation. The release and control of energy are among the features that make these two different systems of watches devices for telling time, and so the third condition of the test is satisfied. Finally, this variation is distinct from any variation in, for example, the colour of watches, or in its running slow or fast. The latter distinctions would be intra-kind variations, which do not qualify as cases of multiple realization (see condition (iv) above).

Interestingly, the authors also motivate their frequent use of illustrations by means of artefacts like watches and corkscrews with the thought that 'multiple realization is much less common in naturally occurring systems' (p. 73). But one might instead wonder if the test's clear fit with artificial or technological systems

instead means it's so much the worse for their proposed test of multiple realization in natural systems! Still, there is a heavy reliance on functionalism in the (multiple) realization tradition more broadly, so their use of artefacts as models of multiple realization is probably fair. Polger and Shapiro do conclude their key chapter on the multiple realization test by locating and endorsing a case of real multiple realization in natural systems: the eye, at least as it is multiply realizable in compound insect eyes and in mammalian camera eyes (pp. 73–80). Still, one might wonder if there isn't an alternative conclusion to be drawn from the fact that the test seems unable to discover cases of multiple realization in many naturally occurring systems. It could be an indication that one needs to go beyond the reliance on functionally specified kinds or artefacts as models, if one wants to find important naturally occurring cases of multiple realizability (see, for example, Godman [2015]).

The next section of the book examines the evidence for multiple realizability given the proposed test. Polger and Shapiro first apply it to the case of neural plasticity. The most impressive case of neural plasticity discussed is the rewiring of the auditory cortex of ferrets in order to realize visual processing (von Melchner *et al*. [2000]). The authors nevertheless think this example falls short of multiple realization because the visual and auditory cortexes do *not* end up doing things in relevantly different ways. To the extent that the two cortexes differ somewhat in their visual processing, this can be reduced to intra-kind variation (thus falling short of criteria (iii) and (iv)). Making this case would be sufficient to fail the test, but the authors also try to show that it fails to comply with the test's first condition, and here I get the impression that they overshoot slightly. The authors recommend that the visual capacities do in fact differ between the rewired and normal ferrets because we should expect 'normal and rewired ferrets to perform identically in visual discriminations tasks' (p. 95). They do not display identical performance, so it is suggested that they do not belong to the same kind in the taxonomic system. But this way of explaining what it means to belong to the same psychological kind—requiring identical performance for sameness of kind—seems too demanding, in my view. This would undermine the study of those cognitive processes that are considered to be of the same psychological kind despite the performance varying amongst individuals (for example, visual processing or working memory). Indeed, quantitative psychology would not get very far without the existence individual variation in performance. So variation in performance should not in itself bar evidence of multiple realization of a psychological kind. But this a very minor quibble since the multiple realization test tends to be interpreted in ways that are both fair and plausible.

Chapter 6 considers recent claims for the multiple realization of memory and pain. Polger and Shapiro argue that these claims can be countered by neuroscientific and comparative taxonomic practices that favour kind-splitting over kind-retention. This also suggests that many highly general psychological kinds will not survive scientific scrutiny. The ideal of multiply realized kinds with broad scope is further undermined when the authors change their argumentative tack somewhat and instead of applying their test, they consider whether arguments based on equipotentiality, convergent evolution (Chapter 7), and computationalism (Chapter 8) make multiple realization more likely than not. Much of their multiple realization scepticism is convincing here. In particular, I found the new argument targeting recent computationalist claims for multiple realization compelling. The argument is simply that while we can single out abstract information-processing features from their neural realizors to facilitate experiment and understanding, there is no good reason to think that the psychological kinds are thereby also essentially abstract, informational (or what have you), and independently realizable. Such ontological license is not incurred unless one thinks the computational perspective of the mind is either mandatory or medium-independent (see, for example, Piccinini and Scarantino [2011]). But as the authors demonstrate, 'the apparent medium-independence of computational explanations owes to the fact that they model or describe their phenomena in topic-neutral or abstract ways

rather than to the abstractness or multiple realizability of their objects' (p. 166). They wrap up by offering some considerations in favour of identity theory: first, the constraints on evolutionary options for realizing complex psychological traits and, second, the co-evolution of neuroscience and psychology (pp. 167–71).

In the final two chapters of the book, Polger and Shapiro reflect on the image we are left with, post multiple-realizability in psychology. Identity theory holds that 'the best overall model of psychological and neuroscientific processes make substantial and important use of identities' (p. 35). While not all existing psychological posits will remain as kinds in future science in their view—some will be eliminated—the authors 'prefer an ontology of the cognitive sciences according to which psychological states are by and large Real' (p. 184). They rightly worry whether this can be achieved and whether their account can preserve 'the explanatory legitimacy and autonomy of psychology' (p. 177). To this end, they do not subscribe to Jaegwon Kim's exclusion argument, where physicalism compels us to always cite causes in terms of the neural process (p. 198). In many cases, they submit, a cognitive rather than a neural process will be a relevant 'difference maker' in the explanation. Still, I think what we would need at this point is not merely disclaimers (or arguments about the virtues of reduction), but rather something like a *positive* argument for the autonomy or realness of kinds in psychology. As far as I can see, such an argument is never made explicit in the book. For example, the Woodwardian interventionist account of causal explanation the authors adopt has little purchase in terms of granting the realism or autonomy that they are after (pp. 206–10). Instead, to go beyond the mere instrumental virtues of psychological, as opposed to neurological, categories, one might want to draw on the work on (natural) kinds in the non-fundamental sciences, which is precisely tailored to supporting a local scientific realism and is closely attuned to how kinds work in specific domains of enquiry (see, for example, work by Richard Boyd, Ruth Millikan, and Muhammad Ali Khalidi). All the same, my impression is that the position that one can have both considerable autonomy and scientific realism in psychology while also rejecting multiple realization (and granting widespread reduction) is rarely articulated these days. I have been swayed more decisively in that direction by this book.

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References

Godman, M. [2015]: 'The Special Science Dilemma and How Culture Solves It', *Australasian Journal of Philosophy*, **93**, pp. 491–508.

Piccinini, G. and Scarantino, A. [2011]: 'Information Processing, Computation, and Cognition', *Journal of Biological Physics*, **37**, pp. 1–38.

Von Melchner, L., Pallas, S. L. and Sur, M. [2000]: 'Visual Behaviour Mediated by Retinal Projections Directed to the Auditory Pathway', *Nature*, **404**, pp. 871–6.