

Wittgenstein, would at least be grammatical. Of greater consequence is Genova's deliberate interference with the quotations. On the one hand she purports to 'have tried to preserve the appearance of his text', but at the same time she prints in bold 'his use of masculine pronouns to underscore the point that not all native speakers or philosophers are men' (p. xiii). But this is not a case in which you can have your cake and eat it too. Among philosophers, there can be few more legitimate targets of feminist critique than Wittgenstein's noxious attitude towards and foolish comments about women. But, of course, the generic use of masculine pronouns was universal until quite recently, among suffragettes no less than among misogynists like Wittgenstein. Worse, Genova's feminist gesture deteriorates into deconstructivist farce when it is combined with her acceptance of Anscombe's mistranslation of *Mensch* ('human being') by (emboldened) 'man', creating an impression of linguistic sexism for which there is no basis in the original text. There is a general lesson here for anglophone practitioners of the emerging feminist interpretations of Wittgenstein: German nouns have a grammatical gender which differs from the division of the sexes.

Genova's book manifests philosophical ambitions that are novel, serious and attractive. She breaks new ground by placing Wittgenstein's conception and practice of philosophy in a wider context of cultural criticism. But her treatment could have benefited from taking to heart more of the analytic scholarship of the topic. Her book also reinforces my view that in shedding light on Wittgenstein's revolutionary ideas one is well advised to avoid his tendency to move from one suggestive remark to the other by way of association. As far as Wittgenstein interpretation is concerned, the motto should be: write what he did, not as he did!

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***Science Without Laws***, by Ronald Giere. Chicago, IL: University of Chicago Press, 1999. Pp. x + 285. H/b \$17.50.

Ron Giere's most recent book collects many of the articles that he has published in the last few years, on topics ranging from the present status of science and technology studies and feminist analyses of science, to epistemological realism and the legacy of the logical positivistic tradition. The book is divided into three parts. The first part contains overviews directed at a general academic audience; the second part brings together a number of substantial discussions of the nature of scientific theorizing addressed to an audience of more specialized science studies scholars; and the final part includes essays on epistemological and philosophical issues directed to a yet more specialized audi-

ence of philosophers of science.

The book is in many ways a milestone in the evolution of Giere's thought, and it is frankly disappointing that its reception by the philosophical community so far seems to have failed to appreciate this. On at least three different issues, the book constitutes a significant statement of the gradual shift in the thought of this major philosopher. One is a general move towards pragmatism's epistemology; another is a gradual shift away from a corseted version of the semantic view of scientific theories and towards a more liberal 'model-based view' of scientific theorizing; and finally there is a move towards an intelligent mix of realism and instrumentalism. All these are, in my view, very positive and encouraging developments; they are particularly heartening and inspirational for those of us working towards similar goals.

Included in the volume there is a revealing new essay, published here as chapter four, 'Naturalism and Realism'. I shall begin by discussing this piece, in conjunction with chapter eight, 'Philosophy of Science Naturalised', for they set the framework for Giere's epistemological views. While Giere's previous book (*Explaining Science*, Chicago, IL: University of Chicago Press, 1988) defended a robust version of naturalism for the study of science, *Science Without Laws* embraces a pragmatically modified form of naturalism. Naturalism is the view that there are no justifiable a priori principles in science. Giere's version of this view, *methodological naturalism*, takes naturalism to be merely a fruitful tool with which to study science; that is, a *programme* for understanding science, not a *thesis* about science. This is to be contrasted with *metaphysical naturalism*, according to which naturalism is an a priori truth about science.

The problem with metaphysical naturalism is well known: its very statement seems to entail a contradiction. Methodological naturalism, on the other hand, is not self-contradictory, for it doesn't *state* anything about science. But what justification is there for it? It certainly cannot justify itself. For how is 'fruitful' itself to be understood? By means of a suitable a priori notion? If so, the methodological form of naturalism would collapse into its metaphysical form. If not, how may we justify the claim that naturalism is indeed fruitful? The solution adopted by Giere is to go pragmatist at the point of justification: that is, to renounce the need for ultimate or categorical justification. Thus pragmatism goes hand in hand, for Giere, with an instrumental conception of rationality. Methodological naturalism is then rationally justified because it is the appropriate means to our end of understanding scientific practice.

Hence Giere's new form of naturalism mixes in pragmatist ingredients. This move is welcome, but in my view falls short of what is required. Although Giere is not explicit about this, he seems to understand pragmatism merely as the type of rationality grounded by methodological naturalism. A thorough pragmatist would, I think, beg to differ. For a thorough pragmatist, naturalism is just one among many profitable ways of looking at science: different philosophical positions dovetail more or less appropriately with different areas of

science, and with different problems raised by science. As an illustration—not one used by Giere—a pragmatist could argue that in some contexts (such as biology or physics) naturalism may be more appropriate than platonism, while in other contexts (for instance, pure mathematics) platonism may be more appropriate. In other words, Giere's attachment to universal (methodological) naturalism does not square with a thorough pragmatism as well as he may wish.

A second shift in Giere's thought is evident in chapter six, 'The Cognitive Structure of Scientific Theories'. This chapter was originally published as an article in 1994, and it is here reprinted with several modifications. In particular, in the 1994 article Giere explicitly defended the 'model-theoretic view' of scientific theories, while in the present chapter of *Science Without Laws*, he refers to the 'model-based view'. This terminological difference expresses, in my view, a significant and important conceptual change. Although Giere continues to pay lip-service to the origins of the tradition, and although he continues to subscribe to the general dictum that 'scientific theories are just sets of models', he seems to have definitely moved away from the so-called 'semantic view of theories' tradition. This is perhaps more conspicuously brought out by the footnote comment (p. 251, footnote 6.1): 'I now prefer the term "model-based view", which is more neutral regarding the role of formal model theory in the application of the view. Harré shares my skepticism regarding the usefulness of formal model theory for understanding scientific, as opposed to purely mathematical, theories.' And, as it turns out, Giere's 'model-based view' is decidedly opposed to a model-theoretic view. For instance, in chapter six Giere, following cognitive scientists, takes models to function neither as set-theoretical predicates nor as mathematical structures, but as concepts. And in chapter seven, following geophysicists, he takes concrete physical pictures to be models. It is clear then that, in this respect, Giere's model-based view differs radically from all available forms of the semantic view, including its set-theoretical (Suppes, Stegmüller) and phase-space formulations (van Fraassen).

This rejection of the available forms of the semantic view also serves to explain Giere's dislike for isomorphism as the relation between models and real systems. Isomorphism is only well-defined as a property of mathematical structures and cannot in general be applied to *concepts* or *physical objects*. Instead, Giere's well-known proposal is the relation of similarity or resemblance. Unfortunately this does not seem to fit in well with the 'model-based view' either. In what way is, say, my concept of 'robin' similar to an actual robin? Only in the trivial sense in which anything is, to some degree and in some respect, similar to anything else. And does a picture represent in virtue of its resemblance (if any) to its object? Giere's model-based view is actually more consonant with the unanalysed notion of 'fit', which appears increasingly more often in Giere's works. It does at least make sense to say that a particular bird fits, or that it fails to fit, my concept of robin. Similarly, a picture can be said to fit its object. I claim that Giere's apparently ambiguous use of 'similarity',

'resemblance' and 'fit' is better understood as the result of a gradual shift in his thought. This is taking him progressively away from the categories of the semantic view tradition ('set-theoretical predicate', 'structure', 'isomorphism') and its cousins ('similarity', 'resemblance'), and towards a more liberal 'model-based' view of theories that employs the notion of fit.

Another interesting issue that appears in chapter six is the shift in Giere's views from a realist understanding of theories *simpliciter*, to a more complex and sophisticated mix of realism about models, and instrumentalism about theoretical principles. Giere believes that theoretical principles (such as Newton's three laws, or Einstein's relativity principle) are not typically statements about the real world, but are rather directions for the construction of (representational) models. These principles constitute powerful heuristics for the building of models, but are not themselves intended to say anything (true or false) about the world; they are not propositional. By contrast, Giere defends a robust representationalism about scientific models (for instance in his discussion in chapter two, 'Explaining Scientific Revolutions'). This seems to me a promising position, and I have in fact defended a similar view in some of my work.

The other chapters in this book serve to emphasize some of these issues and to raise new ones. For instance, chapter nine defends modal realism against van Fraassen's constructive empiricism. Chapter ten sympathetically addresses feminist philosophies of science, and chapter eleven is a sketchy but interesting history of the inter-relations between logical positivism and American pragmatism. All in all, *Science Without Laws* is a good and interesting book, that displays the dynamism of the evolving views of a leading philosopher of science of our time.

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*The Emergent Self*, by William Hasker. Ithaca: Cornell University Press, 1999. Pp. xi + 235. H/b £32.50.

The overall aim of *The Emergent Self*, William Hasker tells us in the Preface, is to present and defend a particular stance on the mind–body problem—a thesis which he calls 'emergent dualism'. Emergentism, as Hasker himself concedes, is not a doctrine of which it could be claimed that there is really any unitary, stable and widely agreed upon characterization; but there has been at least a kind of ontological consistency running through the various treatments it has received over the years, in that what is alleged to be emergent is generally conceived of as being a *property* or feature of a complex, causally intercon-