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The Mirage of a Space between Nature and Nurture

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out of such theories are useful and lead us to true predictions, and even so we do not take them to be literally true, so our approach can be depicted as being fictionalist. But with e.g. natural numbers used in those theories the situation does not seem to be analogous, for there is no clear general answer to the question: what are the natural numbers an approximation of in the empirical world?

At this point someone might object that even if we accepted Leng's fictionalism and the battle for the indispensability argument were lost, there would still be no conclusive argument that there are no mathematical objects. Leng's response is along the lines of Field's: the indispensability argument is the best one available so we are right in being persuaded that mathematical objects do not exist once this argument of Quine and Putnam has been successfully rejected: 'If we account for our successful scientific practices *without* assuming that our mathematically stated empirical theories assert truths about mathematical objects, then this provides us with a positive reason to *reject* the claim that there are any mathematical objects' (259).

Let me leave the discussion of this provocative issue at that, for lack of space. In conclusion, I would recommend Leng's *Mathematics and Reality* as philosophically inspiring, while at the same time quite enjoyable-to-read, book for everyone interested in the philosophy of mathematics—as well as a useful and nice reference book to be used in courses in philosophy of mathematics.

Reference

Shapiro, S. 1983. Modality and ontology. *Mind* 102: 455–481.

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The Mirage of a Space between Nature and Nurture

EVELYN FOX KELLER

Durham, NC, Duke University Press, 2010

viii + 108 pp., ISBN 9780822347149, US\$64.95 (hardback);

ISBN 9780822347316, US\$18.95 (paperback)

This is a frustrating book, mainly because there is no unifying thread of argument for its strong, pessimistic conclusion that 'genetics and environment are so deeply intertwined, so profoundly interdependent, as to make any attempt to partition their causal influence simply meaningless' (4). True, a number of arguments are offered but they

often belong to quite different contexts of discussion and hence none of them could be clearly presented or adequately developed in this very short text.

The book is supposed to introduce logical clarity and conceptual precision in the nature–nurture debate but some passages have just the opposite effect. For instance, the author says that it is not only wrong to think of development in terms of separable causes, but that it is also a mistake to envisage these causes as interacting. Why exactly is this a mistake? Well, because ‘the notion of interaction presupposes the existence of entities that are at least ideally separable—i.e., it presupposes an a priori space between component entities—and this is precisely what the character of developmental dynamics precludes’ (6). The phrases ‘ideal separability’ and ‘an a priori space between component entities’ remain totally unexplained.

Chapter 2, ‘From Trait to Trait Difference’, warns about the conflation between the causation of a trait and the causation of a trait difference, which is allegedly rampant in science, journalism, and philosophy, and which is claimed to impede our understanding of biological development. But no specific examples are given of mistaken inferences and confusions that spring from that conflation in, say, behaviour genetics, in which this fallacious thinking is claimed to be especially widespread.

Keller’s insistence on the distinction between causation of trait and causation of trait difference sometimes sounds too pedantic, as when she asserts that ‘it is not the allele itself that is responsible for the phenotypic difference but the difference between alleles’ (90). If the difference between phenotypes A and B is due to the difference between alleles C and D, what is the harm in saying that it was allele C that was responsible for the organism having phenotype A (rather than phenotype B)?

The author is certainly right that causal claims based merely on statistical correlation do not tell us anything about a specific causal scenario (developmental mechanism) through which a given cause brings about its effect, but again she provides no evidence for her complaint that many scholars are unable to appreciate this relatively simple point. She warns: ‘But to illuminate the nature of this process (the developmental process), studies of trait differences alone would not suffice’ (44). Of course, but isn’t this evident to everyone?

Chapter 3, ‘From Individual to Population’, addresses the distinction between the population and individual perspective. Keller announces at the beginning that she will show that this distinction has been massively ignored, even erased, by behaviour geneticists, evolutionary psychologists, and journalists. But this promise is never made good. In the end she only offers a very few sporadic and unpersuasive examples. And despite the sweeping claim about the dire situation of conceptual confusion among evolutionary psychologists, only one of them (Steven Pinker) is actually mentioned or cited in the bibliography.

Keller approvingly invokes old and well-known anti-heritability arguments of Richard Lewontin and Ned Block but surprisingly she feels no need to deal with criticisms of their views that appeared recently and that would seem to deserve at least some analysis. Her own largely negative remarks about heritability and behaviour genetics stay at a very superficial level of analysis and typically do not connect with the

most interesting contemporary debates in that field. Furthermore, some of her statements will raise the eyebrows of anyone acquainted with the relevant empirical studies.

For example, she dismisses heritability claims in the area of human behaviour genetics as meaningless on the grounds that genotype–environment (G–E) interactions are ubiquitous there, although this claim about the omnipresence of G–E interactions is strongly disputed by many experts, to say the least. Also, she is wrong in thinking that the presence of G–E interaction automatically undermines the possibility of partitioning the phenotypic variance into two components (genetic and environmental). In fact, if the contribution of interaction to the total variance is relatively small, the decomposition can still go forward.

Touching upon the topic of race and IQ, Keller says that growing up in a racist environment has a strong (presumably negative) effect on intellectual performance. No studies are cited in support of this claim. In point of fact, although the assumption that racism depresses IQ is indeed widely shared in some circles, many scholars argue that there has never been a convincing empirical evidence in the literature that such an effect exists, let alone that it is ‘strong’.

Amidst all the negativity and repeated rejection of the nature–nurture question as ‘meaningless’, does the book have some constructive proposals about what kind of research should engage the scholars and replace the pseudo-issue on which they have allegedly wasted their efforts for decades? Yes, but these positive ideas do not appear likely to open up a new and fruitful approach to the old questions.

Here is one new direction of research that Keller recommends: ‘So perhaps we should rephrase the nature–nurture question, and ask, instead, how malleable is a given trait, at a specified developmental age?’ (75). But this ‘new’ path of investigation is not really new. Ironically, it was the much criticized behaviour genetics that already made an important breakthrough in answering the question on Keller’s future agenda. It has been firmly established that many psychological characteristics (like intelligence and personality traits) become less and less malleable with age, with the impact of environmental differences ultimately reaching its lowest point in adulthood.

Another way of ‘reconceptualizing’ the debate that Keller favours is by ‘focusing not on the putative causal powers of such conceptual entities as genes, or even on the concrete and incontrovertibly real sequences of the DNA we inherit, but on the interactive dynamics of the extraordinarily resourceful molecular systems that evolution has bequeathed to us’ (78). There are two problems with this refocusing of the heredity–environment controversy. First, it is not clear what it is exactly that contemporary geneticists and others are accused of doing wrong in their daily research. And second, those who would like to take Keller’s approach seriously will surely wonder about how *specifically* they should go about in trying to follow her advice and concentrate on ‘the interactive dynamics of the extraordinarily resourceful molecular systems that evolution has bequeathed to us’.

All in all, for philosophers of biology there is not a lot of new ideas or food for thought in this book. But scientists, in particular, will probably find it unhelpful, or even off-putting, that most of the issues they might be interested in are addressed here too quickly, offhandedly, in the unnecessarily abstract or vague terms, and

without connecting them with the relevant empirical research. The widespread scepticism of scientists about the usefulness of philosophy of science will only be further strengthened in this case.

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An Epistemology of the Concrete: Twentieth-Century Histories of Life

HANS-JÖRG RHEINBERGER

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xx + 330 pp., ISBN 9780822345602, US\$89.95 (hardback);

ISBN 9780822345756, US\$24.95 (paperback)

Concreteness is a fascinating notion, one that is steadily gaining attention within philosophy and history of science as an interesting counterpart to the more illustrious notion of abstraction. The responsibility for resurrecting the concrete as a philosophical topic lies with several influences, ranging from the emphasis on embodied cognition that emerged within the cognitive sciences and philosophy of mind over the last two decades, to the philosophy and history of scientific modelling and technology, to the rediscovery of important continental thinkers hitherto disregarded within the philosophy of science. Hans-Jörg Rheinberger has played a prominent role in bringing those strands of thinking together, thus pioneering an integrated approach to the history and the philosophy of science and, most importantly, illuminating several long-standing philosophical debates with profound, creative and scientifically informed insights on the nature of experimental work. Within this wonderful volume, Rheinberger uses his understanding of the history of biology and his experience as a practising experimenter to build a sophisticated epistemology of scientific practice. This is an epistemology that embraces the blurred interface between the conceptual and the material, the discovered and the constructed, the rational and the serendipitous in science; and which highlights the role of ‘epistemic things’ (epistemologically relevant entities) and ‘experimental systems’ (the evolving practices and objects involved in experimentation) as fundamental to understanding scientific knowledge making, and particularly theorization. As Tim Lenoir points out in his excellent introduction, this book constitutes required reading for anyone interested in empirically informed philosophy of science, and the suggestions therein will shape attempts to integrate history and philosophy of science for decades to come.

The book starts with a celebration of three twentieth-century philosophers whose work centred on the epistemic and social characteristics of experimental science: Ludwick Fleck, Gaston Bachelard, and Georges Canguilhem. Rheinberger’s discussion goes well beyond a mere exposition of their views, turning into a forceful examination of the methodological and epistemic foundations of historical epistemology as an approach to the study of science. In this way, this section lays the foundations for