Book Review

James Tabery (ed.), *Beyond Versus: The Struggle to Understand the Interaction of Nature and Nurture*. Cambridge, Mass: MIT Press, 2014, ISBN: 978-0-262-02737-3.

Historians and philosophers of science often view the persistence of the nature/nurture controversy as a sociopolitical phenomenon. After all, many prominent nativists have been known to express conservative values or a fondness for eugenic solutions to social problems. Their anti-nativist critics are likewise associated with left-leaning values or an advocacy for political reform. It would seem that these divisions have prevented behavioural researchers from moving "beyond versus" to investigate the interaction between heredity and environment. As appealing as this explanation for the stagnancy of these debates might sound, James Tabery forces us to rethink what is fundamentally at issue. Although sociopolitical motives account for part of the story, Tabery suggests that the more significant division is explanatory in character: opposing research programmes prioritize different questions, they employ distinct methodologies, they even, he claims, assign incompatible definitions to "interaction" and other key theoretical terms. On Tabery's view, the two sides of the nature/nurture controversy have been talking past one another for quite some time. With this analysis in hand, Tabery offers a philosophical framework aimed at bridging the longstanding divide. He further illustrates how a failure to correctly frame the scientific debate has stunted progress in the field of bioethics.

Above all, this book should be applauded for its ambitious scope. We live in an era when humanities research increasingly finds itself on the defensive regarding its social relevance. To the contrary, with its lucid account of scientific details and its application of historical and philosophical findings to matters of public interest, *Beyond Versus* offers a counterpoint to the perception of humanities research as obsessively inward-focused.

The book is divided into three sections. Part 1 is of central interest to historians as this is where Tabery characterizes the nature/nurture debate as an explanatory divide. This thesis is first defended in the context of the dispute between R.A. Fisher and Lancelot Hogben over Fisher's

use of the analysis of variance (ANOVA) to partition phenotypic variation into hereditary and environmental components. Fisher is portrayed as the first in a line of "Variation Partitioners" who employ this statistical technique. As Tabery explains, the success of ANOVA requires that hereditary and environmental factors do not interact (i.e. that they are additive). In other words, if it turns out that genetic strains respond differently across environmental treatments, then ANOVA cannot determine the overall contributions of heredity and environment. Fisher reportedly placed conservable faith in the results of his 1923 potato experiment, coauthored with Winifred Mackenzie, in which interaction effects were marginal. The generality of Fisher and Mackenzie's result was challenged by Hogben, who argued that one could not legitimately infer from their study how *unobserved* genetic and environmental factors might interact. In fact, Hogben seems to have been opposed altogether to the use of ANOVA to address this question, advocating instead for a better understanding of the underlying developmental mechanisms that generate a given phenotype. Tabery aptly labels this the "Mechanism Elucidation" approach.

The second flare-up occurred in the 1970s when Richard Lewontin vigorously opposed Arthur Jensen's use of twin studies to assess the influence of hereditary factors on IQ. Tabery is especially critical of previous philosophical discussions of this debate, which tend to portray these actors as simply ignorant or overly ideological. Tabery argues instead that Jensen, Variation Partitioner that he was, focused on a different sort of question from Lewontin, the Mechanism Elucidator. Jensen was reportedly interested in whether a particular program of remedial education could eliminate the IQ gap among students from different socioeconomic backgrounds. This was only likely to succeed, on Jensen's view, if an ANOVA could show that IQ had a significant environmental component – something that Jenson's data did not support. Lewontin responded by outlining a range of hypothetical interaction effects that had not been ruled out by Jensen's study. He went even further than Hogben in dismissing ANOVA as an entirely useless methodology – a claim that Tabery denies.

The third historical episode involves a dispute that transpired over the last decade between two "dueling meta-analyses." This time the issue turns on Terrence Moffit and Avaslam Caspi's use meta-analytic data to assess the effects of a particular gene on depression. This study was explicitly presented as an attempt to transcend the nature/nurture dichotomy by investigating the propensity for certain genetic backgrounds to respond differently to stressful life events. Although their

methods were statistical, Tabery regards this as an instance of Mechanism Elucidation since the authors reportedly saw their study as the first step in a deeper investigation of the genetics of depression. Their findings were challenged in 2009 by Kathleen Merikangas and Marcus Munafo, who published a genome-wide meta-analysis purporting to find no environmental influence and no interaction effect. These opponents align to some extent with previous Variation Partitioners, largely because of their choice to exclude a broad range of potentially informative studies from their meta-analysis. It would seem that their explanatory interests were focused rather narrowly on a specific pattern of variation and not on the more mechanistic question of how genetic backgrounds interact with environmental stressors.

This brings us to the end of Part 1 of *Beyond Versus* and already there is much to discuss. It seems noteworthy that Hogben must have adopted Fisher's concept of interaction when raising worries about his statistical technique. Lewontin also framed his criticism of Jensen in the language of reaction norms and their implications for ANOVA. The two meta-analytic studies likewise share a common understanding of "interaction" as a statistical term. This would suggest that opposing research programmes were not, contra Tabery, operating with distinct concepts of interaction and thus talking past each other. At most, I see evidence for two concepts of interaction –one statistical, the other developmental—being employed somewhat haphazardly by both Variation Partitioners and by Mechanism Elucidators at various stages in these disputes.

A brief word on remaining sections of the book. Part 2 draws on philosopher Ken Waters' concept of an actual difference maker to elucidate the explanatory goals of Variation Partitioners. An actual difference-maker is any factor that accounts for observed differences among members of some specified population. I agree to some extent with Tabery that Variation Partitioners would retreat, when pressed, to the claim that one should not speculate about the effects of *potential* difference-makers on *hypothetical* patterns of variation. However, I find it hard to believe that their explanatory ambitions simply ended there. We should keep in mind the ethical and technological limitations prohibiting experimental research on humans. Sometimes, an analysis of population-level variance is the only data at one's disposal. The key question, then, is whether analysis of variance can be used as a precursory estimate of the extent to which genetic and environmental factors interact, in the developmental sense, at least on a trait-by-trait basis. Tabery, by contrast, proposes that these two approaches can be

bridged by adopting what he calls ''population thinking about me-chanisms'' – a thesis which, I'm sure, will generate some philosophical discussion. Finally, Part 3 of the book explores some of the implications of Tabery's many insights for recent debates in bioethics. As Tabery shows, these debates can be significantly advanced by a more accurate understanding of the scientific details.

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