



REVIEW: James R. Brown, *The Laboratory of the Mind*

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REVIEWS

James R. Brown. *The Laboratory of the Mind: Thought Experiments in the Natural Sciences*. 2nd edition. x + 226 pp. London: Routledge, 2010.*

Michael T. Stuart[†]

Originally published in 1991, *The Laboratory of the Mind: Thought Experiments in the Natural Sciences* is the first monograph to identify and address some of the many interesting questions that pertain to thought experiments. While the putative aim of the book is to explore the nature of thought experimental evidence, it has another important purpose which concerns the crucial role thought experiments play in Brown's Platonic master argument. In that argument, Brown argues against naturalism and empiricism (Brown 2012), for mathematical Platonism (Brown 2008), and from the Platonist-friendly, abstract universals posited by the Dretske-Tooley-Armstrong (DTA) account of the laws of nature to a more general, *physical* Platonism. *The Laboratory of the Mind* is where he takes this final step.

The main philosophical question that motivates Brown's study is the following: how do thought experiments reveal novel truths about the physical world without the need for additional empirical input? As a response, Brown develops a Platonic account of thought experiments that explains their epistemic power by portraying some of them as (occasionally foggy) windows into the Platonic world of forms. Brown's account supplied so much grist for the philosophical mill that it merited a second edition, which includes updated arguments, two additional chapters, a new preface, and a rejuvenated afterword.

Brown first acquaints the reader with thought experiments by providing a bevy of examples. These lay the foundation for his taxonomy, which groups thought experiments based on function. The most important category is the Platonic thought experiment, which "destroys" one theory while simultaneously establishing another in a way that takes us beyond the setup or execution of the thought experiment (p. 41). These special thought experiments work by "establishing (in the imagination) the thought-experimental phenomenon" (p. 43, brackets in the original). It is the phenomenon that we mentally experience which refutes some theory, and it is the same phenomenon that provides

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evidence for a new theory by suggesting something about the laws of nature. However, to appreciate the appeal of Brown's position fully, we need to view it in relation to that of his philosophical counterpart, John D. Norton.

Norton is convinced that thought experiments are epistemically no different from arguments (Norton 1991; 1996; 2004a; 2004b). Since everyone accepts that arguments are capable of producing new information from old, Norton claims that we should adopt the "default" empiricist view that thought experiments are merely arguments. As we've seen, one way Brown opposes this account is by describing thought experiments as processes that produce phenomena, and then trying to show that producing phenomena is not the same thing as making a step-by-step propositional inference. To this end, Brown introduces a new type of thought experiment he calls a *counter* thought experiment (introduced in his new Chapter Three). These are thought experiments that work by denying the phenomena of another thought experiment, which they do by presenting contrasting phenomena of their own. Since they work on phenomena, using phenomena, their function must be orthogonal to the parts of a thought experiment that may be reconstructed as an argument. Since 2004, Norton's position has become more flexible, identifying thought experiments not only as deductive and inductive, but informal arguments as well, which may or may not be identifiable because of tacit premises or inferences. But as it still limits thought experiments to manipulations of propositional content, Brown's account will appeal to any who see mental reasoning as non-propositional.

After discussing counter thought experiments, Brown introduces his mathematical Platonism in Chapter Four. He anticipates the usual twofold response from empiricists: Platonism does not respect the causal theory of knowledge, and it proposes no theory of its own to explain how Platonic perception works or when it goes wrong. To the first, Brown presents several convincing counterarguments to the causal theory of knowledge. Further, he claims that quantum mechanics allows for knowledge that cannot (even possibly) be tied to physical measurement or observation.¹ Brown concedes that the second objection is serious, but argues that our ability to perceive abstract truths is no more mysterious than our apparently innocuous ability to arrive at abstract entities (thoughts, beliefs, etc.) from sensory input.

Given mathematical Platonism, Brown begins to argue for physical Platonism. There are two non-mutually exclusive ways to view Brown's argument here: (1) *Analogical*: in the same way that mathematical picture proofs allow us to "see" mathematical objects and relations, thought experiments allow us to "see" the laws of nature (p. 98); and (2) *Inference to the best explanation*: to explain successful thought-experimenting in science, we must posit Platonic

¹ For more on this, the reader should refer to Brown's Platonic interpretation of quantum mechanics given in Chapter Eight.

access to the laws of nature (p. 124). Both of these strategies are in “harmony” (p. 107) with “the best account of laws of nature” (p. 72), the DTA account. This account portrays laws as necessary relations among abstract universals. Assuming harmony with Brown’s Platonism, we should ask: is this really the best account of laws of nature? Perhaps not. Since 1991, the DTA account has lost quite a bit of ground to other realist accounts, including dispositional essentialism and property and structural realism. These accounts ground events and objects in more fundamental metaphysical entities like categories, essences, structures, properties, etc.² The question becomes: could these accounts be adopted in support of Platonism? Someone like Brown could certainly argue that we have Platonic access to the dispositions, properties, structures, or essences that these accounts postulate. This is especially obvious in the case of structural realism, a position which sometimes advances abstract universals and emphasizes the metaphysical priority of relations (see Stein 1989, 59).

But even if we allow for the possibility of Platonic perception and the existence of universals, there remain some interesting questions. While Brown claims that we see the laws of nature using thought experiments, what he really wants to say is that we see the universals that figure into those relations (p. 98, 107). I wonder if the necessary relations into which the universals figure are *entailed* by the universals themselves. If so, this works quite nicely with Peacocke’s (2000) and Bonjour’s (1998) views of the *a priori*. If they are not entailed, do we learn about them empirically, Platonically, or both? Since we can grasp mathematical objects, and there is no empirical way to find the relations between them, we must also be able to grasp the relations Platonically as well. So if Brown’s analogy holds, we should be able to grasp the relations between physically instantiated universals in the same way. Brown cites experiment as a separate path to knowledge of the relations between universals. Are these two paths always open, and which has priority when they conflict? The same questions arise with respect to the entailment between a law of nature and its corresponding physical regularity: is this entailment deductive, perceived, observed, or some combination of all three?

There is another issue concerning Platonic thought experiments and laws of nature, which is related to the possibility of a unified account of thought experiments. Rachel Cooper (2005) argues that we should strive for an account of thought experiments that ranges over all fields of inquiry, not just science. If there are Platonic thought experiments in fields outside of physics and mathematics, those fields must have their own laws of nature for the Platonic

² See, e.g., A. Chakravartty, *A Metaphysics for Scientific Realism: Knowing the Unobservable*, (Cambridge: Cambridge University Press, 2007); B. Ellis, *The Metaphysics of Scientific Realism*, (Acumen: Durham, 2009); S. French, The Interdependence of Structure, Objects and Dependence, *Synthese* 175(1) (2010): 89-109; and A. Bokulich and P. Bokulich, eds., *Scientific Structuralism*, (Dordrecht: Springer, 2010).

thought experiments to see. Brown hints early on (p. 31) that the lack of thought experiments in chemistry might be due to the absence of laws in that discipline. If chemical laws are reducible to physical laws, it seems natural that there should be no Platonic thought experiments in chemistry. But what about philosophy? Philosophy is full of thought experiments meant to disprove one theory and simultaneously establish another. By Brown's logic, this should imply that there are necessarily related abstract universals in the domains of metaphysics, epistemology, ethics, etc., to which these thought experiments give access. Brown may be happy to admit laws of metaphysics and personal identity and so on, since when it comes to abstract entities, the Platonist's motto is "the more the merrier." However, admitting laws here might make a Platonic account of laws less appealing to those already on the fence.

In the remainder of the book, Brown applies his theory to scientific episodes and actors from the pre-Socratics to quantum mechanics. One episode features Einstein, who is justifiably known as one of the most important thought experimenters since Galileo. An issue here concerns the standard interpretation of Einstein as an ageing verificationist, who nonetheless employed unverifiable thought experiments. This would make him methodologically inconsistent. Brown provides a reconstruction of Einstein's meta-philosophical stance on the relation of theory to evidence which harmonizes Einstein's use of thought experiments with his other writings. Yet, it is interesting to note that Einstein expressed vehement distaste for even the use of the phrase "thought experiment" when applied to his arguments (see Kühne 2005, 227-29). This suggests that more work needs to be done to square Brown's account of Einstein with Einstein's own, perhaps misdirected remarks (but see Ierodiakonou and Roux 2011, 1-27).

Whether you will be romanced by Platonism or not, this book is invaluable reading for anyone with overlapping interests in the history and philosophy of science, or the traditional debates of metaphysics and epistemology. Empiricists will find a stimulating opponent, rationalists will find ammunition for their cause, and all will appreciate the clear prose and lasting philosophical issues with which Brown has almost single-handedly fathered the growing subfield that now studies thought experiments.

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