

Thought Experiments, Mental Modeling, and Experimental Philosophy

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There has been a lot of debate about whether philosophical intuitions play a significant role in contemporary philosophy, so much so that this question has come to dominate discussions of philosophical methodology. According to the now orthodox view, philosophical intuitions not only form part of our “standard justificatory procedure,” they are also part of what makes philosophical methodology unique (see, for example, Bealer 1998, Levin 2005, Goldman 2007). Herman Cappelen has recently challenged the orthodox view, arguing that there is no agreement about what philosophical intuitions are supposed to be and, more importantly, that philosophers simply do not need them anyway (Cappelen 2013). Max Deutsch has raised similar worries over the course of a number of recent articles, including his contribution to this volume, and joined Cappelen in using these worries to undermine the significance of experimental philosophy (Deutsch 2009, 2010). They are both right and wrong. They are right that philosophers have not been univocal about what philosophical intuitions are supposed to be, something that Timothy Williamson has also called to our attention, writing colorfully that their “main function is not to answer questions about the nature of evidence on offer but to fudge them, but appearing to provide answers without really doing so” (2007, 220). But they are wrong that judgments about cases play no significant role in philosophical practice, and therefore wrong about the philosophical significance of experimental philosophy, something I have argued for elsewhere (Alexander 2010, Alexander 2012).

Rather than rehash these arguments, I would like to try a different approach here, one that moves past talking about philosophical intuitions altogether and instead involves thinking more carefully about how they are generated, whatever they might be. This approach involves thinking carefully about thought experiments, how they work, and why they sometimes go wrong. Thought experiments are our stock-in-trade, the way that we support or test the kinds of modal claims that are central to philosophical discourse and debate, and what I would like to do here is to examine what we can learn about how thought experiments are supposed to work in contemporary philosophy by looking at how thought experiments are supposed to work in science, focusing on two views about thought experiments that emerge from the philosophy of science – what are sometimes called the “argument view” and the “mental model view.” The key insights of these two views are that thought experiments are arguments, and that conducting thought experiments allows us to mobilize certain cognitive resources and bring those cognitive resources to bear on important questions. These insights are present in Williamson’s recent observation that thought experiments “turn out to be fairly straightforward modal arguments, typically valid ones, with counterfactual conditionals and possibility claims as premises,” and his conviction that we “assess the premises by the same offline methods as for other claims of this sort” (2009, 433). And, understanding these insights will help highlight the role that philosophical intuitions play in contemporary philosophy, underscore the importance of experimental philosophy, and even provide new insights into ways that thought experiments might fail.

The Argument View

John Norton has been the leading proponent of the argument view, according to which thought experiments are nothing more than colorful arguments (1991, 1996, 2004a, 2004b; see also

Sorensen 1992 and Häggqvist 1996). Norton's principal aim is to give faithful account of how thought experiments are used in physics, and so he supports his view by reconstructing formal arguments that can be found in some of Einstein's more famous thought experiments, as well as other famous thought experiments from the history of physics. He reduces the cases used in these thought experiments to sets of propositions, adds to these sets certain background assumptions, and demonstrates that these premises and assumptions lead to the conclusions they are meant to support through recognized sorts of inductive or deductive inference. On the basis of these examples, he claims, "the workings and achievements of any thought experiment can be revealed and captured fully in an explicit argument which employs the same resources" (1996, 339).

To see how this supposed to work, let's take a look at one of his examples. One of the most famous thought experiments in physics involves Galileo's attempt to refute the Aristotelian claim that heavier objects fall faster than lighter ones, or more generally that objects fall at speeds proportional to their weights. Galileo's refutation comes in a dialogue between Salviati and Simplicio, and includes the following passage spoken by Salviati:

Tell me, Simplicio, whether you assume that for every heavy falling body there is a speed determined by nature such that this cannot be increased or diminished except by using force or opposing some impediment to it... [Simplicio agrees.] Then if we had two moveables whose natural speeds were unequal, it is evident that were we to connect the slower to the faster, the latter would be partly retarded by the slower, and this would be partly speeded up by the faster... But if this is so, and if it is also true that a large stone is moved with eight degrees of speed, for example, and a smaller one with four [degrees], then joining both together, their composite will be moved with a speed less than eight degrees. But the two stones joined together make a larger stone than the first one which was moved with eight degrees of speed; therefore this great stone is moved less swiftly than the lesser one. But this is contrary to your assumption. So you see how, from the supposition that the heavier body is moved more swiftly than the less heavy, I conclude that the heavier move less swiftly. (Galileo 1954, 66-67)

Norton contends that this thought experiment is rather obviously a *reductio* argument, and provides something like following reconstruction:

Suppose that objects fall at speeds proportional to their weights. This means that a heavier stone will fall faster than a lighter stone. It also means that connecting the two stones would cause the lighter stone to move faster and the faster stone to move slower, and this would mean that the composite stone will fall slower than the heavier stone would fall alone. But the composite is heavier than the heavier stone, and so should fall faster than the heavier stone would fall alone. But this is a contradiction, which means that our initial assumption is false: objects do not fall at speeds proportional to their weights.

The thrust of the reconstruction is this: thought experiments can be reconstructed as arguments, and what justification we have for believing their conclusions comes from the evidence these reconstructed arguments provide those conclusions. Timothy Williamson has advanced a similar view about the role that thought experiments play in contemporary philosophy, writing, "on our

account, a thought experiment... embodies a straightforward valid modal argument for a modal conclusion” (2007, 187).

Again, an example will help us to see how this is supposed to work. Quite possibly the most famous thought experiment in contemporary philosophy involves Edmund Gettier’s attempt to show that a person’s justified true belief need not count as knowledge. Gettier uses two cases involving Smith who has deduced a true belief that q from a justified false belief that p and, on that basis, formed a justified true belief that q . According to Gettier, despite now having a justified true belief that q , Smith does not know that q . Here is one of the relevant cases:

Suppose that Smith and Jones have applied for a certain job. And suppose that Smith has strong evidence for the following conjunctive proposition: (d) Jones is the man who will get the job, and Jones has ten coins in his pocket. Smith’s evidence for (d) might be that the president of the company assured him that Jones would in the end be selected, and that he, Smith, had counted the coins in Jones’s pocket ten minutes ago. Proposition (d) entails: (e) The man who will get the job has ten coins in his pocket. Let us suppose that Smith sees the entailment from (d) to (e), and accepts (e) on the grounds of (d), for which he has strong evidence. In this case, Smith is clearly justified in believing that (e) is true. But imagine, further, that unknown to Smith, he himself, not Jones, will get the job. And, also, unknown to Smith, he himself has ten coins in his pocket. Proposition (e) is then true, though proposition (d), from which Smith inferred (e), is false. In our example, then, all of the following are true: (i) (e) is true, (ii) Smith believes that (e) is true, and (iii) Smith is justified in believing that (e) is true. But it is equally clear that Smith does not KNOW that (e) is true; for (e) is true in virtue of the number of coins in Smith’s pocket, while Smith does not know how many coins are in Smith’s pocket, and bases his belief in (e) on a count of the coins in Jones’s pocket, whom he falsely believes to be the man who will get the job. (Gettier 1963, 122)

Williamson contends that this thought experiment is a modal argument, and provides something like the following reconstruction:

(1) It is possible for someone to stand in relation to some proposition p just as the protagonist of Gettier’s cases stand to the relevant propositions. (2) If someone were to stand in relation to some proposition p just as the protagonists of Gettier’s cases stand to the relevant propositions, then anyone who stood in relation to p just as the protagonists of Gettier’s cases stand to the relevant propositions would have a justified belief that p that is not knowledge. (3) Therefore, it is possible for someone to have a justified true belief that is not knowledge.

The idea that thought experiments can be reconstructed as arguments is a bold thesis, and philosophers of science have raised a variety of concerns about this view. One worry is that Norton simply has not done enough work to substantiate either his reconstruction thesis or his overall narrative eliminativism (Cooper 2005). He has shown that some of the more famous thought experiments in the history of physics can be reconstructed as arguments, but this is not enough to demonstrate that *all* thought experiments can be reconstructed in this way, a point made more salient by the fact that Tamar Gendler has even challenged the idea that the Galilean experiment

discussed above can be reconstructed as an argument (Gendler 1998). A second worry is that Norton cannot account for cases where people disagree about the results of a thought experiment; the most natural way of understanding this kind of disagreement is that even when people reconstruct the thought experiment as different arguments, they are still talking about the same thought experiment (Bishop 1999). A third worry is that it is not clear what constrains how we reconstruct thought experiments, and if we cannot fix the premises in a fairly straightforward manner, then it will be hard to assess whether the argument is good or bad, something that makes it hard to see why thought experiments would ever be preferable to non-colorful traditional arguments (Brown 2011). And a fourth worry is that thought experiments and arguments seem different from a phenomenological point of view; when we perform a thought experiment it does not seem to us that we are evaluating premises, running through a series of inferential steps, or drawing conclusions (Cooper 2005).

Most of these worries can be set aside rather quickly. It is probably best to think of the reconstruction thesis as a generic claim rather than a universal generalization, something that dampens somewhat the worry that Norton and others defend the argument view on the basis of a small set of cases; but, in any event, they have surely done enough to make the argument view a live option worthy of continued examination. And it really is no objection to the argument view that people can draw different arguments from the same fictional narrative. As we will see, even rich fictional narratives are open to different interpretations; but, while narrative incompleteness is one way that thought experiments sometimes fail, this hardly counts against the view that they are arguments. Brown's worry can be met in similar fashion. The fact that it can be hard to draw arguments from fictional narratives, and sometimes even harder to determine whether their premises are true or false, does not mean that thought experiments are not arguments; if anything, it simply points out that they are sometimes hard to use, something that perhaps should not be all that surprising.

Set against these first three worries, the phenomenological worry seems rather more significant since it suggests that there is something involved in performing a thought experiment that is not captured by the suggestion that they can be reconstructed as arguments. The target here is not really the reconstruction thesis at all, but rather Norton's eliminativism about the narrative content of thought experiments. According to Norton, since thought experiments can be reconstructed as arguments, the narrative details can be eliminated without compromising our ability to arrive at the conclusion; they play no significant epistemic or cognitive role, and merely provide the argument with colorful but inessential detail. This just seems wrong. As Tamar Gendler writes, "contemplation of an imaginary particular may have cognitive and motivational effects that differ from those evoked by an abstract description of an otherwise similar state of affairs" (2007, 68). According to this view, sometimes called the "mental model view," thought experiments allow us to mobilize cognitive resources that would not otherwise be available, or at least that are not mobilized when we are asked to evaluate a formal argument. The basic idea is that thought experiments cannot be reconstructed solely as arguments without losing something important because of the way that they mobilize cognitive resources, even cognitive resources that might be available for use elsewhere. This worry is more substantial, and understanding it means looking at the mental model view of thought experiments.

The Mental Model View

Nancy Nersessian (1993, 2002, 2007) has been one of the leading proponents of the mental model view, according to which thought experiments involve the manipulation of mental models in our imaginations (see also Mišcevic 1992, 2007). Nersessian draws extensively on work from cognitive science on the construction and manipulation of mental models, especially Johnson-Laird's work on the use of mental models in the comprehension of fictional narratives. The basic idea is that the narratives used in thought experiments prompt readers to construct mental models of the situations described in those narratives. These mental models are mental representations stored in short or long-term memory that differ from both propositional and pictorial representations, and thinking about the kinds of fictional narratives used in thought experiments involves operations performed directly on these mental representations rather than on, say, linguistic representations used to construct them. The features of the mental models are drawn from a highly organized sets of background beliefs that are abstracted from experience, presented in associative chains or chunks, and manipulating these models involves mobilizing a number of cognitive resources, including background knowledge, individual expertise, practical know-how, and so on.

Nersessian offers several reasons for resisting the move to look past the narrative content of thought experiments, perhaps the most compelling of which is that it is simply hard to square Norton's eliminativism about the narrative content of thought experiments with the way thought experiments are almost always presented in both scientific and philosophical literature; if Norton is right that the narrative content of thought experiments can be eliminated without compromising our ability to arrive at the conclusion, then why present them in narrative form in the first place? Nersessian suggests that the answer is that thought experiments invite readers to do something that formal arguments do not; they invite us to "follow a sequence of events or processes *as one would in the real world*" and "can reveal something in our experience that we did not see the import of before" (Nersessian 1993, 296-297). To see this, let's return to two examples discussed in the previous section. We can agree that it is possible to reconstruct these two thought experiments as arguments, something that Norton and Williamson ably show us how to do, and still wonder whether purely formal presentations of the arguments would help us see, for example, that "connecting the two stones would cause the lighter stone to move faster and the faster stone to move slower, and this would mean that the composite stone will fall slower than the heavier stone would fall alone" or that "it is possible for someone to stand in relation to some proposition p just as the protagonist of Gettier's cases to stand to the relevant propositions." The narrative content of the thought experiments allows us to see these things by prompting us to mobilize cognitive resources that would not otherwise be available, or at least that are not mobilized when we are asked to evaluate only the formal arguments themselves, and this is why thought experiments cannot be reconstructed solely as arguments without losing something important.

There is controversy about the details of Nersessian's account, something that should probably come as no surprise given how little agreement there is about the nature of mental content. Still the natural link between mental models and the imagination is something that gets picked up on by philosophers interested in the role that thought experiments play in contemporary philosophy. Williamson talks repeatedly about the role that imagination plays in conducting thought experiments, writing that most philosophers allow "that a judicious act of the imagination can refute a previously well-supported theory," and, "thought experiments do constitute arguments,

but the imagination plays an irreducible role in warranting the premises” (2007, 188). Moreover, writing against a kind of pernicious philosophical exceptionalism, Williamson writes that one of his main goals is “to subsume the epistemology of thought experiments under the epistemology of counterfactual conditionals and metaphysical modality... and thereby to reveal it as an application of quite ordinary ways of thinking, not as something peculiarly philosophical” (2007, 180). This claim against exceptionalism echoes a central theme of Nersessian’s work:

While thought experimenting is a truly creative part of scientific practice, the basic ability to construct and execute a thought experiment is not exceptional. The practice is highly refined extension of a common form of reasoning. It is rooted in our abilities to anticipate, imagine, visualize, and re-experience from memory. That is, it belongs to a species of thinking by means of which we grasp alternatives, make predictions, and draw conclusions about potential real-world situations we are not participating in at that time. (1993, 292)

While the role of imagination in conducting thought experiments is a central part of Williamson’s recent work on the philosophy of philosophy, perhaps no one embraces the role of imagination in philosophical thought experiments more than Tamar Gendler, who focuses on the role that thought experiments play in helping to make philosophical theories cognitively accessible. According to Gendler, thought experiments provide readers “with a powerful frame through which the target material... can be reconceptualized” (2007, 85). Put another way, thought experiments make cognitively accessible things that might otherwise not be.

Gendler provides two vivid examples of this way of thinking about philosophical thought experiments. Both examples involve thought experiments intended to help readers see what is wrong with “first-person exceptionalism,” the view that we are deserving of unequal moral consideration. Gendler’s first example is the Biblical story of David and Bathsheba. According to this story, David, the King of Israel, had taken Bathsheba from her husband, Uriah, and arranged to have Uriah killed. God, angry with David, sends Nathan with the following story:

There were two men in a certain city, the one rich and the other poor. The rich man had very many flocks and herds; but the poor man had nothing but one little ewe lamb, which he had bought. And he brought it up, and it grew up with him and with his children; it used to eat of his morsel, and drink from his cup, and lie in his bosom, and it was like a daughter to him. Now there came a traveler to the rich man, and he was unwilling to take one of his own flock or herd to prepare for the wayfarer who had come to him, but he took the poor man’s lamb and prepared it for the man who had come to him.

Nathan’s story makes vivid what is wrong with first-person exceptionalism, and allows David to understand something about his own actions; by inviting David to think about why the rich man’s actions are morally impermissible, the narrative allows him to understand that Uriah deserved equal moral consideration. Gendler puts the point nicely,

By framing the story so that David is not in a position to exhibit first-person bias with respect to what turns out to be his own actions, Nathan has enabled David to acknowledge a moral commitment that he holds in principle, but has failed to apply in this particular case. There is no ambiguity here about which commitment,

on reflection, David endorses: The story he has been told is fully effective; it reshapes his cognitive frame, and brings him to view his own previous actions in its light. (2007, 82)

Gendler's second example is Judith Thomson's famous Violinist Case:

You wake up in the morning and find yourself back to back in bed with an unconscious violinist. A famous unconscious violinist. He has been found to have a fatal kidney ailment, and the Society of Music Lovers has canvassed all the available medical records and found that you alone have the right blood type to help. They have therefore kidnapped you, and last night the violinist's circulatory system was plugged into yours, so that your kidneys can be used to extract poisons from his blood as well as your own. The director of the hospital now tells you, "Look, we're sorry the Society of Music Lovers did this to you—we would never have permitted it if we had known. But still, they did it, and the violinist is now plugged into you. To unplug you would be to kill him. But never mind, it's only for nine months. By then he will have recovered from his ailment, and can safely be unplugged from you." Is it morally incumbent on you to accede to this situation? No doubt it would be very nice of you if you did, a great kindness. But do you have to accede to it? What if it were not nine months, but nine years? Or longer still? What if the director of the hospital says, "Tough luck. I agree. But now you've got to stay in bed, with the violinist plugged into you, for the rest of your life. Because remember this. All persons have a right to life, and violinists are persons. Granted you have a right to decide what happens in and to your body, but a person's right to life outweighs your right to decide what happens in and to your body. So you cannot ever be unplugged from him." I imagine you would regard this as outrageous. (Thomson 1971, 48-49)

Just as Nathan's story allows David to reframe his own actions and represent the moral implications of his own actions in a way he might not have been able to otherwise, Thomson's case allows the reader to reframe attitudes about the relationship between mother and fetus and represent the moral implications of abortion in a way the reader might not have been able to otherwise. Both cases, then, provide a picture of how thought experiments involve imagination, and suggest that the narrative details of philosophical thought experiments cannot be eliminated without compromising our ability to arrive at the conclusions they are intended to support, even if those thought experiments could be reconstructed as arguments.

Thought Experiments and Experimental Philosophy

Let's suppose that all of this is right. Philosophical thought experiments can be reconstructed as arguments, but their narrative details cannot be eliminated without compromising our ability to arrive at the conclusions that they are intended to support. By putting philosophical cognition front and center, this way of thinking about philosophical practice actually underscores the significance of experimental philosophy because, whatever else it might be, or be taken to involve, experimental philosophy starts as the empirical study of how we think about philosophical issues. So we can agree with philosophers like Williamson, who counsel us to move past talking about philosophical intuitions, while at the same time redoubling our interest in experimental

philosophy; it is studying how our minds work when we think about philosophical issues that can help reveal what people actually think about the kinds of fictional narratives used in philosophical thought experiments, can help us to better understand what kinds of things influence how we think about these kind of fictional narratives, and can help us use thought experiments more effectively. In short, this way of thinking about the role of thought experiments in philosophical practice makes experimental philosophy more important rather than less.

It also underscores the cooperative nature of the relationship between experimental philosophy and the method of cases, and helps guard against the tendency to exaggerate the differences between experimental and more traditional approaches to philosophical questions. Contrary to popular caricatures of the movement, which tend to portray experimental philosophy as a revolutionary break from more traditional ways of thinking about philosophy, most experimental philosophers are actually interested in quite ordinary philosophical questions, but think that we need to sharpen the tools that we use to to answer those questions, including how we use thought experiments. Recent work on the nature of phenomenal consciousness provides a nice example. This work focuses on our folk psychological understanding of what is required in order for something to count as capable of subjective experience, and the empirical study of how people think about the kinds of fictional narratives used in this discussion has played a significant role in shaping this discussion. Many of the fictional narratives used in this discussion involve the attribution of experiential states to both humans and nonhumans, and an interesting pattern emerges when we look carefully at the way that different people think about these fictional narratives, a pattern that reveals a striking difference between our folk conception of subjective experience and traditional philosophical conceptions of phenomenal consciousness. It seems that our folk conception of subjective experience marks a difference between sensation and perception that is absent from traditional philosophical conceptions of phenomenal consciousness, and that ordinary mental state attributions are sensitive to whether or not those states involve pleasant or unpleasant sensations. These observations have sparked a great deal of controversy, but there is no denying how they have helped move forward philosophical discussion of the nature of phenomenal consciousness (for discussion, see Fiala et al. 2014 and Sytsma 2014).

Of course, even cooperative relationships can be complicated, and the relationship between experimental philosophy and how philosophers use thought experiments is complicated by the fact that what we think about fictional narratives is not always what we are intended to think about them and by the fact that there is a whole lot we do not yet know about what shapes how we think about them, something that I have argued elsewhere raises important methodological questions about what role thought experiments can and should play in philosophical practice (see, e.g., Alexander 2012). But even here the news is not all bad, and there is reason to hope that learning more about philosophical cognition and what kinds of things shape how we think about the fictional narratives used in philosophical thought experiments might help use them more effectively; after all, one way to see how things work, is to think carefully about what causes them not to work. So perhaps it is worth mentioning here one of the ways that studying philosophical cognition might help improve the way that we use thought experiments.

Perhaps the most controversial claim in experimental philosophy is the claim that different groups of people think differently about the kinds of fictional narratives used in philosophical thought experiments. And it is easy to see why this claim would generate so much critical attention; after

all, part of what seems to underwrite the use of thought experiments in philosophy is the idea that the fictional narratives used in these thought experiments help everyone see the same thing about the kinds of modal claims that drive philosophical discussion and debate. Some philosophers have responded by challenging evidence used to support the claim that different groups of people think differently about these narratives (see, e.g., Nagel et al. 2013); others have responded by appealing to specific difficulties that arise from the nature of fictional narratives and how we engage with them, for example, that information presented in fictional narratives is not always cognitively accessible to readers and that sometimes readers draw on information not presented in the fictional narratives themselves when forming judgments about what is being said. Tamar Gendler (2000, 2006) has already done great work bringing to light the first kind of difficulty, which she calls “imaginative resistance,” so let’s look briefly here at the second kind of difficulty, which we might call “narrative incompleteness.” Narrative incompleteness is a common feature in fiction, where many details about fictional worlds are left out of the presentation of those worlds, and for good reason; bringing them up would serve only to distract the reader from those details to which the author wants the reader to attend. There is latitude about how complete a narrative need be, of course, and room for both Hemingway and Joyce at the literary table; but the fact remains that writing fiction involves directing the reader’s attention to some details while letting others go unmentioned, and this means that readers will be free to fill in certain, but certainly not all, of these details for themselves. Ernest Sosa (2009) has used this feature of fictional narratives and how we engage with them to challenge the idea what experimental philosophers have found is evidence of genuine philosophical disagreement, arguing that what might appear to be evidence that people disagree about what to think about some fictional narrative might actually be evidence that people are just thinking about different fictional narratives. It is important to see that this observation about the nature of fictional narratives and how we engage with them cuts both ways, and so it is not clear that, or at least how, it will help someone interested in using fictional narratives to help people see things about the kinds of modal claims that drive philosophical discussion and debate. But it is also important to see that this observation underscores the relevance of experimental philosophy, since experimental philosophy is precisely what would be needed to help us determine what information people are responding to when they are being asked to respond to the kinds of fictional vignettes commonly used in philosophical thought experiments. This is just one way that studying how our minds work when we think about philosophical issues is philosophically relevant; by revealing what people actually think about the kinds of fictional narratives used in philosophical thought experiments, we learn what kinds of things influence how we think about these kind of fictional narratives, and knowing this can help us learn to use thought experiments more effectively.

Conclusion

Timothy Williamson has urged philosophers to move past talking about philosophical intuitions since there is no agreement about what philosophical intuitions are supposed to be. I agree, and have suggested that we reframe recent discussions about philosophical methodology in terms of thought experiments, how they are supposed to work, and why they sometimes go wrong. There is certainly more to say, but I hope to have done enough here to show that reframing discussions of philosophical methodology only serves to underscore the significance of experimental philosophy. If Williamson is right that philosophical thought experiments can be reconstructed as arguments,

but their narrative details cannot be eliminated without compromising our ability to arrive at the conclusions that they are intended to support, then the empirical study of philosophical cognition is more important than ever, and we should embrace experimental philosophy as the best way to refine and (sometimes) reform the way we use thought experiments in contemporary philosophy.

Acknowledgements

I would like to thank Bill Bechtel, Ingo Brigandt, Karim Bschr, Sara Green, Ron Mallon, Jennifer Nado, John Norton, Maria Serban, and Jonathan Weinberg for helpful comments on earlier drafts of this chapter.

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