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## Platonism and the A Priori in Thought Experiments

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This chapter presents and evaluates the Platonic account of thought experiments that is currently most prominently advocated by James Robert Brown. The introductory section will locate Brown's position within a general taxonomy of thought experiments. The second section will give an outline of Brown's own view and elucidate the main concepts involved in it. In the third section, Brown's two main arguments for Epistemological Platonism will be critically discussed. The fourth section is devoted to Brown's Platonic account of the laws of nature. Major problems and possible advancements will be explored. The fifth section discusses general objections to the Platonic epistemology. Finally, the sixth section will consider the viability of Platonism if it is restricted to *philosophical* thought experiments.

### 1. Introduction

A thought experiment is an experiment of a very special kind. Just by considering a particular hypothetical case in our mind we come to believe that a certain target category applies (or does not apply) to the case, or that something specific would happen if the case became reality. Apart from purely heuristic uses, thought experiments are widely regarded as potential sources of knowledge. This is a view that is shared by many philosophers and scientists. However, there is much disagreement about how thought experiments manage to generate knowledge, when they do. On the one hand, there is the empiricist view that thought experiments are sources of *empirical* knowledge. Ernst Mach famously claimed that our knowledge about what would happen if certain conditions obtained is based on our empirically informed instinct (Mach 1933: 27–28). More recently, Timothy Williamson put forward the similar view that our knowledge of counterfactuals is based on imagination that is strongly shaped by experience (Williamson 2007, Williamson forthcoming). Moreover, John Norton has claimed that thought experiments are nothing but disguised arguments with empirical premises (Norton 1996). On the other hand, there is the rationalist view. Its adherents believe that thought experiments can generate *a priori* knowledge. But again, there is much disagreement about the sources of this *a priori* knowledge. We can distinguish between *conceptualist*, *transcendental* and *platonic* views here. According to Conceptualism, thought experiments generate knowledge of analytic truths based on the thinker's conceptual competence (Ludwig 2007). According to Transcendentalism, thought experiments reveal the cognitive boundaries of worlds as creatures like us can experience them (Strawson 1966: 15). According to Platonism, thought experiments facilitate an intellectual perception (often called "rational intuition") of an abstract reality that exists outside of space and time (Brown 1991, BonJour 1998).<sup>1</sup> There is the further question of whether thought experiments (of a particular type) have the same epistemological status in all disciplines. Someone who answers this question in the negative might, e.g., believe that when we use philosophical thought experiments to investigate the

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<sup>1</sup> However, proponents of rational intuition need not be Platonists. Cf., e.g., (Bealer) 1998.

nature of some philosophical category, this will provide us with a priori knowledge. At the same time, she might also believe that when we use physical thought experiments in order to find out how material things would behave under certain counterfactual conditions, we can at most acquire empirical knowledge. I will call someone who gives a separate treatment to the epistemology of thought experiments within different disciplines a *separationist*.<sup>2</sup> The proponent of the opposing view will be called *unificationist*.<sup>3</sup>

Within this framework, James Robert Brown holds a remarkably radical position.<sup>4</sup> Brown claims that there are thought experiments of a special type (“platonic thought experiments”) that provide us with an intellectual perception of abstract reality. So, he is a *Platonist*. But at the same time he is also committed to *unificationism*. Brown believes that platonic thought experiments are at work in philosophy, mathematics, and physics (Brown and Fehige 2014: 2). Accordingly, we are able to grasp some of the laws of nature by an act of rational intuition that is independent of sensory experience.<sup>5</sup>

## 2. Brown’s a priori Platonism

Within his general classification of thought experiments (Brown 1991: 33), Brown distinguishes between destructive and constructive thought experiments. A *destructive thought experiment* is directed against an existing theory by either showing that the theory is internally inconsistent or by demonstrating that the theory is in tension with well-supported other beliefs (ibid.: 36). Among the constructive thought experiments I will just focus on the *direct* ones: They justify a new theory. The special case of *Platonic thought experiments* belongs simultaneously to the category of destructive and direct thought experiments. It is this latter kind of thought experiment that, according to Brown, generates a priori knowledge of abstract entities (ibid.: 77).<sup>6</sup>

Brown’s classification can be illustrated by some paradigm cases. The famous Gettier case in epistemology is a paradigm of a destructive thought experiment. According to the standard definition of knowledge, knowledge is justified true belief. The Gettier case defeats this definition by presenting a possible case of justified true belief that is not a case of knowledge. Here is one such case (taken from Malmgren 2011: 272): *Smith believes that Jones owns a Ford, on the basis of seeing Jones drive a Ford to work and remembering that Jones always drove a Ford in the past. From this and the fact that Jones works in Smith’s office, Smith infers that someone in his office owns a Ford. In fact, someone in Smith’s office does own a Ford – but it is not Jones, it is Brown. Jones sold his car and now drives a rented car.* Confronted with this hypothetical case, people tend to judge that Smith justifiedly and truly be-

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<sup>2</sup> Bealer (1998: 207–208) is a staunch separationist. He even wants to restrict the use of the term “thought experiments” to physical cases and distinguishes rational intuitions about whether a concept applies to a hypothetical case from physical intuitions (about what would happen) that are elicited by physical thought experiments.

<sup>3</sup> Häggqvist (2007: 58) commits himself to such a unificationist treatment of thought experiments.

<sup>4</sup> Cf. Koyré (1968: 75, 88) for a closely related view.

<sup>5</sup> Notice that Brown is not a radical unificationist. He is not committed to the view that all thought experiments are platonic.

<sup>6</sup> Rowbottom (2014) points out that it is not fully clear why Brown thinks that the distinction between direct and platonic thought experiments is a deep and substantial one. Whether a direct thought experiment is also of the platonic kind depends exclusively on contingent historical facts, i.e. whether there already exists a theory that is in conflict with the one established by the direct thought experiment.

believes but does not know that someone in his office owns a Ford. This intuitive judgment defeats the standard definition of knowledge without suggesting a correct definition of knowledge in its place. So, it is an instance of a destructive thought experiment that has no constructive power.

Brown's paradigm case of a direct thought experiment is Stevin's case of the inclined plane (cf. figure 1). *Suppose that a chain of weights is draped over a prism-like pair of inclined planes. The chain begins at A and ends at C. Would the chain rest or would it move either towards A or towards B? Stevin claims that the chain would remain in a static equilibrium. For imagine we would close the loop by adding further weights to the chain. The resulting closed chain would clearly remain at rest. But since closing the chain by adding further weights in this way does not add unbalanced forces, we realize that the chain reaching from A to C would not move, either.*

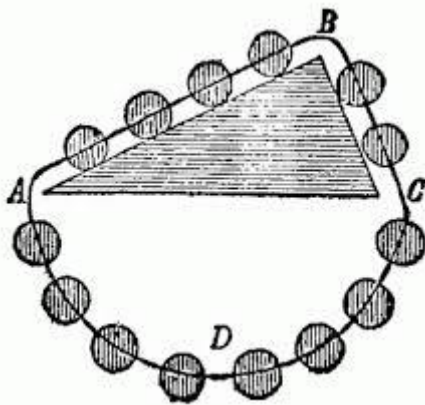


Figure 1

Stevin's case of the inclined planes is, according to Brown's classification, a direct thought experiment since it establishes a new theory, namely that weights over inclined planes remain in equilibrium, where there was no theory before.

Brown's paradigm case of a platonic thought experiment is Galileo's thought experiment about falling bodies (Brown 1991: 1–2; 43). It was meant both to refute Aristotle's view that the speed of falling bodies is proportional to their weight and at the same time to establish Galileo's new theory that all bodies fall at the same speed. In his *Discorsi* Galileo introduces his thought experiment in roughly the following way (cf. figure 2): *Suppose that we attach a heavy cannon ball to a light musket ball by using a rope and then release them together. When we apply the Aristotelian theory to this case we can derive a contradiction. On the one hand, the combined system will move with a slower speed than the isolated cannon ball since the slower moving musket ball slows down the cannon ball. On the other hand, the combined system is heavier than the isolated cannon ball, so it should fall faster than it. Hence, on the Aristotelian view, we can conclude that the combined system will move slower and faster than the cannon ball.* However, Galileo does not rest with refuting Aristotle's view. He thinks that, at this point, we can rationally perceive that there is only one way to resolve the paradox, namely by suggesting that all bodies fall at the same speed.

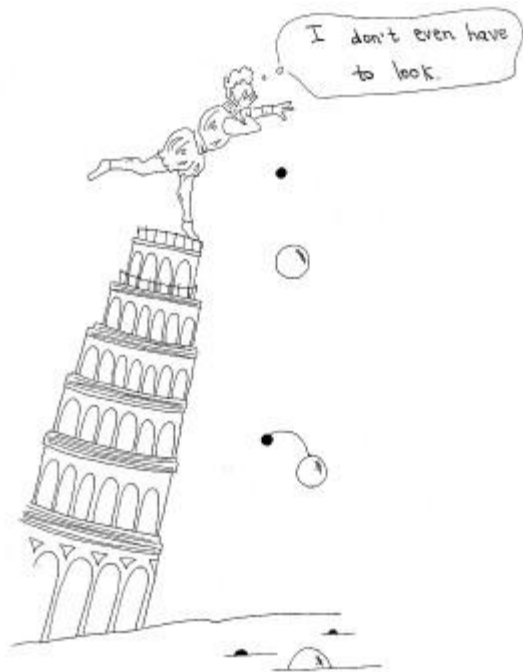


Figure 2

Why does Brown believe that platonic thought experiments like Galileo's involve some kind of substantial knowledge over and above considerations of logical consistency? First, if the only thing we bring to bear on the case are considerations about logical consistency, we could at best derive that *it is not the case* that the speed of falling bodies is proportional to their weight. But this would, e.g., be compatible with the view that the color of falling bodies has an influence on their speed. Hence, a further step is required to reach the conclusion that all bodies fall at the same speed. Second, it seems intuitively implausible that Galileo's new theory of free fall is a logical truth. (Brown 1991: 78) Anyway, substantial knowledge seems to be required even for the *reductio* of Aristotle's theory. Here is why: in his refutation of Aristotle, Galileo assumes that if we attach two bodies of different natural speed to each other, the combined system will move at a speed that is slower than the independently faster moving body. This might be a plausible claim. But it certainly does not follow from Aristotle's view that the speed of falling bodies is proportional to their weight. Why shouldn't the Aristotelian claim that the combined system of the two balls falls faster than any of its two component bodies? Moreover, that bodies with a different natural speed influence each other's speed is only plausible as long as they are connected with a flexible rope. But then it is unclear whether we are permitted to treat the combined system as a body of its own when we apply the Aristotelian theory to the case. Put it in a nutshell: the *reductio* of Aristotle's theory depends on substantial background knowledge. It remains to be seen whether this knowledge is empirical or a priori.

What is characteristic of a priori knowledge? According to the currently prevailing view that has its roots in Kant, a priori knowledge is only negatively defined, i.e., what is known *a priori* is known independently of sense experience (cf., e.g., Kant 1965: B2, Chisholm 1966: 73, Casullo 2003: 147). This negative definition rules out sense experience from the epistemically relevant entitling or warranting factors. It does not, however, exclude sense experience from

the causal or enabling conditions of knowledge. The distinction between entitling and enabling conditions (Burge 1993) helps to explain how we can, e.g., know a priori that red is a color. In order to acquire the empirical concepts RED and COLOR we clearly have to rely on sense experience. But this merely enables our concept acquisition. What warrants our belief that red is a color is only our competence with the concepts that are involved in this belief. There is also a broad consensus among current epistemologists that being known independently of sense experience does neither require infallibility nor indefeasibility by empirical evidence. In paradoxes, for example, typically all the assumptions seem to be a priori justified although not all of them can be true; or, to give an example of empirical defeasibility, the conclusion of someone's non-experiential mental calculation may be defeated by the observation of a conflicting expert judgment (Bealer 1998, BonJour 1998, Casullo 2003). Moreover, the negative definition of a priori knowledge allows for different positive sources of a priori knowledge, such as conceptual knowledge, innate or transcendental knowledge, or knowledge from Platonist rational intuition (Grundmann forthcoming). Brown subscribes to all the above-mentioned features of a priori knowledge: to the negative definition (1991: 77), to the moderate fallibilist account of the a priori (1991: 92), and to a pluralistic rationalism that allows for different sources of a priori knowledge (1991: 86–87).

What does it mean that the knowledge-entitling factors are independent of sense experience? The evidentialist suggests that this condition is satisfied if the relevant knowledge is not based on *empirical evidence* (Audi 2003: 101, Jenkins 2008: 436). Brown seems to be committed to this view (1991: 77). But real-life cases of intuitively empirical knowledge suggest that the evidentialist condition is not sufficient. Suppose you are on a hiking trip in the mountains and you want to cross a small river by jumping to the other side. In order to find out whether you would succeed in doing so you may use your imaginative skills to develop the consequences of your supposed jumping in the perceived situation. If your imaginative skills are reliable, imagination will provide you with empirical knowledge of what would happen if you jumped. You may also use these skills “offline”, without actually perceiving anything at all. In this case you start by imagining a certain hypothetical situation and then continue with imagining what would happen in that situation. Again, this procedure will result in empirical knowledge if your imagination works properly. When your imagination operates “offline” as in this case, the judgment about what would happen is not based on any evidence that is accessible from the agent's perspective. Nevertheless, the knowledge acquired in this way seems to be *empirical* rather than a priori since it is based on an empirically shaped faculty of imagination. This suggests that knowledge that is not based on empirical evidence need not be a priori. It is empirical if it is based on an empirically acquired skill (cf. Williamson 2013<sup>7</sup> and forthcoming).<sup>8</sup>

Let us now turn to Platonism, which is primarily an ontological view and only derivatively the epistemological view that there is a special, platonic kind of perceptual access to entities in the platonic realm. Within ontology we can distinguish between nominalism, Aristotelianism

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<sup>7</sup> In contrast to what I argue here, Williamson 2013 concludes that there is no epistemologically significant a priori/a posteriori distinction.

<sup>8</sup> In order to explain empirical knowledge from imagination the reliabilist can offer the following account: *knowledge-entitling factors are independent of sense experience if the reliability of the judgment does not depend on reliable sense experience*. For a reliabilist account of the a priori/a posteriori distinction, cf. Grundmann forthcoming.

and Platonism (cf. Armstrong 1989). According to nominalism there are only concrete, particular things in space and time. Aristotelianism claims that in addition to concrete particulars there are also universals, each of which is identical through all its particular instances. Although Aristotelianism accepts two different kinds of entities, i.e., particulars and universals, it ties the existence of universals to their instantiation in concrete particulars. In contrast, Platonism makes room for the existence of universals and other entities outside of space and time. This abstract domain of things contains mathematical entities, like numbers or sets, uninstantiated properties, and all kinds of necessary facts. Brown holds the unorthodox view that the laws of nature also belong to this domain of abstract platonic entities.

Brown's Platonist account of the laws of nature contrasts radically with the standard Humean view. The latter assumes that laws of nature are nothing but generalized conditionals of the form  $\forall x (Fx \rightarrow Gx)$ . If laws of nature are reducible to generalizations, it should be obvious that our knowledge of them must be empirical since it is based on inductive generalizations from the observed co-instantiation in particular cases. The Humean view gives rise to a number of standard problems. Simple versions lack, e.g., the resources to distinguish between genuine laws and accidental generalizations like 'All the things in my pocket are coins.' Moreover, it cannot explain why the observed regularity holds. But it also cannot account for the fact that laws support counterfactual conditionals. In the 1970s, Dretske, Tooley, and Armstrong independently put forward an alternative view of the laws of nature (DTA, for short). According to DTA, laws are relations between first-order universals. These relations are necessitating second-order universals. The core idea is expressed by the following formula, where the 'N' stands for the necessitation relation, F and G stand for first-order universals:  $N(F,G)$ . It is, however, crucial for this view that the necessitating relation is itself only contingently instantiated. So, its modal force is not absolute but restricted to a subset of all possible worlds. For this reason there are possible worlds in which the laws of nature differ from the actual world. Whereas the more naturalistically oriented philosophers Armstrong and Dretske reject Platonism, Tooley explicitly endorses the Platonic idea that laws exist even if they do not have any actual instances (Tooley 1977: 671, 686). Brown adopts Tooley's version of DTA. The DTA account seems to solve the main problems of the Humean account straightforwardly (Psillos 2002, Ch. 6). First, the distinction between laws and merely accidental generalizations corresponds to the distinction between  $N(F, G)$  and the mere generalization  $\forall x (Fx \rightarrow Gx)$ . Second, on DTA laws seem to explain why a particular regularity in the concrete world obtains. This is because  $N(F, G)$  implies  $\forall x (Fx \rightarrow Gx)$ . Finally, since  $N(F, G)$  is a modal truth it can support counterfactuals.

### 3. Brown's arguments for his Epistemological Platonism about physical thought experiments

Brown offers two arguments in support of his epistemological Platonism, i.e., his view that when we perform the relevant physical thought experiments, we gain a priori knowledge of certain laws of nature by rationally perceiving abstract reality. His *first argument* is a deficiency argument, according to which the knowledge we gain from the thought experiment cannot be explained empirically.<sup>9</sup> As Brown puts it:

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<sup>9</sup> Deficiency arguments show that by embracing a priori knowledge, the shortcomings of empiricist theories can be avoided. See Casullo 2003: 100–101.

My reasons for claiming this thought experiment [Galileo's, TG] provides a priori knowledge are rather simple and straightforward. For one thing, [...] there are no new empirical data being used when we move from Aristotle's to Galileo's theory of free fall. It's not a logical truth, either. (Brown 2004: 1129)

This argument can be reconstructed as follows (cf. Clatterbuck 2013: 311<sup>10</sup>):

- (1) We gain knowledge from Galileo's thought experiment.
- (2) We are provided with no new empirical input in the process of the thought experiment.
- (3) If knowledge is acquired independently of new empirical input, then it is a priori.
- (4) Thus, the knowledge acquired through Galileo's thought experiment is a priori. (1,2,3)
- (5) The conclusion of Galileo's thought experiment is not logically true.
- (6) Thus, the knowledge acquired through Galileo's thought experiment is non-logical. (5)
- (7) The thought experiment gives us non-logical a priori knowledge of physical facts. (4, 6)

Let us address three possible objections to this argument. First of all, premise (3) is doubtful. New *empirical* knowledge might be gained even if there is no new empirical *input*. This might simply be due to the fact that new conclusions are derived from old empirical data. This is exactly what Norton (1996) claims in his reconstruction of physical thought experiments. In Galileo's thought experiment of the falling bodies, one might use the empirical background premise that the speed that results from attaching two bodies that move at a different speed to each other will be intermediate. In Stevin's thought experiment, the relevant empirical background premise might be that there is no perpetual motion.

In reply to this objection, the Platonist has to admit that (3) does not survive scrutiny and has to be substantially revised. She must explicitly rule out that the knowledge newly gained from the thought experiment depends, at least in part, on old empirical background knowledge of the indicated kind. But this can be done. It is hard to believe that whoever gains the knowledge that all bodies fall at the same speed relies on knowledge about how in general the speed of combined bodies aggregates. The same applies to Stevin's thought experiment. To gain knowledge that the chain will remain at rest one need not rely on the general knowledge that perpetual motion does not exist.

Let us consider a second objection to premise (3). Knowledge can be gained independently of empirical input, or evidence, if it is based on belief-forming skills or capacities that have been informed and shaped by sense experience. In section 2 it has already been argued that not being based on empirical evidence (or input) is not sufficient for a priori knowledge. It will suffice if the underlying processes are informed by sense experience. As mentioned above, Williamson has made the case that imagination is a cognitive process of this kind (Williamson forthcoming). It is shaped by (generally reliable) experience, but generates counterfactual judgments that are not simply inferred from empirical premises. In imagination, we often con-

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<sup>10</sup> My reconstruction closely follows Clatterbuck (2013), except with respect to premise (5).

sider a hypothetical case and then develop substantial consequences about what would happen under these conditions. But developing the consequences in imagination is not the same as deriving a conclusion from premises. So this seems to be a theoretical option that conflicts with premise (3). Moreover, Williamson’s model of imagination might offer a good explanation of what really goes on in the thought experiments at hand. When we consider Galileo’s case of the falling balls we recognize *through imagination* that if the balls were to move at a different speed, then the slower moving ball would slow down the faster moving one. And when we consider Stevin’s case, we recognize *through imagination* that the closed chain would remain at rest. But if it is true that the reliability of imagination in these cases depends on reliable sense experience, the resulting knowledge is empirical rather than a priori.

There is also this third objection: if the argument were successful, it would at most establish that one gains non-logical a priori knowledge from thought experiments. This rules out logical sources of knowledge. But it is not sufficient to demonstrate that platonic perception is the relevant source at work. The argument’s conclusion is compatible with other non-logical sources as well, e.g., an innate cognitive module for “folk physics” (Gendler 2000).

*Brown’s second argument* for Epistemological Platonism about physical thought experiments is an argument from parity. It starts with the premise that Platonism in mathematics is uncontroversial. According to it, mathematical entities like numbers or sets are abstract entities that are accessible through rational intuition. If one adds the premise that laws of nature are abstract entities as well, as it is claimed by DTA, then it seems to follow that we can use the same Platonist method as in mathematics to get access to the laws of nature. In Brown’s words:

According to mathematical Platonism we can perceive the abstract entities in mathematics [...]. So, it’s possible to perceive abstract entities [...]. But laws are abstract entities, so they could be perceivable, too. (Brown 2004: 1131)

A charitable interpretation would reconstruct Brown’s argument as an inductive rather than a – obviously fallacious<sup>11</sup> – deductive inference, such that the truth of its premises makes the truth of its conclusion highly likely. Brown’s following remark suggests this reading:

Suppose Gödel is right: we can ‘see’ some mathematical objects (which are abstract entities). And suppose the Armstrong-Dretske-Tooley account of laws of nature is also right; laws are relations

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<sup>11</sup> On a deductive interpretation, Brown’s argument would run as follows:

- (1) Some abstract entities (i.e. mathematical facts) can be rationally perceived by us.
- (2) Laws are abstract entities.
- (3) Therefore, laws can be rationally perceived by us.

The general form of this argument is:

- (1’) Some Bs are C.
- (2’) All A are B.
- (3’) Therefore, all A are C.

The following instance of this general form is a counterexample to its validity:

- (1’’) Some light waves can be perceived by us. (T)
- (2’’) Ultraviolet light consists of light waves. (T)
- (3’’) Therefore, ultraviolet light can be perceived by us. (F)



among universals (which are abstract entities). Wouldn't it be a surprise and indeed something of a mystery if we couldn't 'see' laws of nature, as well? (Brown 1991: 86)

We can thus reconstruct Brown's argument as follows:

- (1) There are abstract entities that can be rationally perceived by us.
- (2) Laws are abstract entities.
- (3) Therefore, it is highly likely that we can rationally perceive laws.

But even on the inductive interpretation the inference remains dubious. Inductive generalizations rely on relevant similarities between its basis and the domain of generalization. This similarity seems to be absent in the present case. Although mathematical entities and, at least according to DTA, laws of nature are both abstract entities, there are crucial differences between them: (a) Whereas mathematical facts are necessary in the absolute sense, laws of nature hold only contingently. (b) Whereas laws of nature tell us what will happen if some antecedent condition becomes reality, mathematical equations describe an unchanging reality. If we take these differences into account, we cannot infer that laws of nature are accessible in the same way as mathematical truths.

#### *4. Objections to Brown's Platonism about laws of nature*

As the considerations above suggest, Brown's arguments for a platonic understanding of physical thought experiments are inconclusive. Moreover, his account of laws of nature is problematic in itself and in tension with his Platonist epistemology, as the following three objections suggest.

(1.) On DTA, laws are *contingent* relations among universals. So, whether a particular statement of a law is true depends on whether the claimed relation holds in the relevant modal neighborhood of the *actual* world. Knowing this, however, requires knowing what the actual world is like. But this knowledge cannot be gained on the basis of perceiving abstract reality alone. In addition, we need to rely on our *empirical* knowledge of the actual world. Hence, grasping the laws of nature cannot be a purely a priori matter.

Notice that this objection is significantly different from a general objection to a priori knowledge of contingent truths.<sup>12</sup> In the face of Kripke's seminal insight<sup>13</sup>, the existence of a priori knowledge of contingent truths seems no longer deniable in general. By using sentences like "The meter stick is one meter long" (when it is introduced as the standard), "I am here", or "Heat is the dominant source of heat sensations" we express propositions that are only contingently true. The standard meter could have been longer or shorter than it actually is; I could have been somewhere else; heat does not cause heat sensations in worlds without living creatures. Nevertheless, in all worlds in which I actually use one of the above sentences (with the same linguistic meaning as in our actual world) it turns out to be true. So, although the expressed propositions are false in at least some counterfactual worlds, the corresponding sentences are true in any world in which they are uttered. There is a semantic explanation of this

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<sup>12</sup> Thanks to Michael Stuart for drawing my attention to this possible misunderstanding.

<sup>13</sup> Kripke 1980: 54–56.

striking fact. In the above examples, the attributed property is part of those properties that fix the reference of the sentence's subject term in the utterance world (whichever it is). For this reason a competent speaker can know independently of any empirical knowledge about the utterance world that the expressed propositions are true *in this world*. But at the same time they are not true in every counterfactually possible world. For at least two reasons, such a Kripkean explanation is not available to the Platonist about contingent laws of nature. First, the Platonist explicitly commits himself to the view that the source of her knowledge is intellectual perception rather than semantic competence. Second, it is simply false that claims about the actual laws of nature are true in every possible world in which the speaker asserts them. We can easily imagine a world in which we assert that the laws of quantum physics obtain although they are false. According to DTA this imagined world should correspond to a real possibility. Unless we have at least some empirical knowledge about the world we live in, we cannot know any law of nature that holds in this world. So, even if one has to admit that a priori knowledge of contingent truths is possible in principle, one can still make the case that a priori knowledge of laws of nature is impossible as long as those laws do not hold across all possible worlds.<sup>14</sup>

(2.) DTA is also deeply problematic in itself. The following two objections are especially prominent in the literature. First, according to DTA the same property can play different causal roles in different worlds since lawful relations among properties hold only contingently. In consequence, the essence of a property cannot be captured by its causal role. So, the critics argue, it must be constituted by some primitive quiddity of the property that is not essentially related to the properties behavior. Many metaphysicians find this inexplicability of the nature of properties deeply mysterious (Mumford 2006, Ch. 6). Second, one of the apparent advantages of DTA over the Humean account of laws is that it seems to explain observable regularities. The explanation is given by an inference from the law to the regularity:  $N(F, G) \rightarrow \forall x (Fx \rightarrow Gx)$ . Van Fraassen most prominently objected that it is far from obvious why this inference should be valid. If we understand laws as irreducible relations among universals in the abstract realm, why should this imply that those properties are always co-instantiated in the concrete actual world (van Fraassen 1989)? Although there have been many attempts to give an answer to this problem, there is no consensus that the proponents of DTA have come up with a viable solution.

The proponent of Platonism might think that the main source of the current problems is the DTA account of laws rather than Platonism itself.<sup>15</sup> Indeed, what causes the trouble is the fact that, according to DTA, laws of nature remain – to a certain extent – contingent. And it is this specific contingency that is, as we have learnt above, incompatible with a priori knowledge and the causal individuation of properties. In contrast, Platonism is only committed to the claim that laws are made true by abstract reality. This is clearly compatible with the view that laws of nature are necessary in the unrestricted, absolute sense which rules out any kind of contingency. Currently, some philosophers, the so-called *necessitarians*, claim that laws are

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<sup>14</sup> Critical comments by Jens Kipper helped me to improve on this point.

<sup>15</sup> Thanks to Michael Stuart for pressing me on this point. In Stuart 2012 he already expresses some doubts about DTA as the correct account of laws.

absolutely necessary relations among properties (Ellis 2001, Bird 2005).<sup>16</sup> Admittedly, necessitarianism comes typically in a package with Empiricism and Naturalism, and not with Platonism. Ellis, e.g., believes that the necessary modal relations among properties together with the laws of nature are firmly rooted in the actual world we live in. So, he does not locate the necessary laws of nature in any abstract reality that is accessible only through rational perception. However, a Platonist version of necessitarianism does not seem to be an incoherent view, although I do not know of anyone who actually endorses it. If the Platonist adopts this approach she can avoid the preceding objections. But she will face a new one. Humeans usually argue for the contingency of laws by relying on the observation that conflicting laws are conceivable. If we can conceive of laws that conflict with our actual ones and if, furthermore, conceivability is a way of gaining knowledge of metaphysical possibilities, laws cannot be necessary in the absolute sense (Sidelle 2002). For example, we can conceive of light traveling twice as fast as it actually does, although this is incompatible with the theory of relativity. Now of course, a Platonic Rationalist might simply dispute that conceivability is a reliable guide to possibility. For, according to her, rational insight into modal facts primarily relies on rational perception rather than conceivability considerations. In any case, the Platonic Rationalist has to pay a considerable epistemological price for giving up conceivability as a reliable indicator of possibility altogether.

(3.) Finally, Brown does not address the question why, if the laws of nature are accessible to rational intuition, we have so little a priori knowledge of the fundamental laws of nature. Even if he were right about platonic thought experiments in physics, they seem to be the rare exceptions.<sup>17</sup> The bulk of the work of physicists is based on real-life experiments. This is strongly disanalogous to mathematics where, if Mathematical Platonism is correct, all the axioms are known by rational perception.

The above arguments suggest two things: First, the prospects of Brown's Platonist explanation of physical thought experiments are limited. Second, there might be a better explanation that relies on empirically informed imagination.

### 5. General Objections to Platonist Epistemology

Even if one accepts the above criticism, one might still feel attracted to the view that Platonism is the correct view of *philosophical* thought experiments. Admittedly, it is hard to understand how we should have a priori access to *contingent* relations between properties. Philosophy, however, is primarily interested in the essence of properties like, e.g., knowledge, truth, free will, or justice. Essential relations among properties hold in all possible worlds. In this respect, philosophical properties seem to be better candidates for rational perception than the laws of nature. Before turning to Platonism about philosophical thought experiments, we must

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<sup>16</sup> Of course, necessitarians face the obvious objection that laws are never exceptionless since interfering factors are always possible. In reply, necessitarians might claim that truly necessary laws are *ceteris-paribus* laws. Or, maybe more plausibly, they could simply restrict their claim to fundamental laws. For reasons of space, I cannot go into any of the details of this debate here.

<sup>17</sup> Cf. Häggqvist (2007: 51–53) for a similar observation.

deal with the question whether there are any fatal objections to Platonist Epistemology in general.<sup>18</sup> Here I will consider three objections.

(1.) A notorious objection to Platonist Epistemology is based on the worry that rational perception of an abstract reality is a completely mysterious process whose function is not even rudimentarily understood. Nobody has a good theory about how it is possible that we can have cognitive access to a domain of things that are outside of space and time. Plato himself suggested that the immortal soul has prenatal cognitive access to this domain that can later be remembered by the embodied soul. But apart from being deeply implausible for other reasons, this narrative does not provide a real explanation because it does not tell us how prenatal contact itself was possible in the first place. Plato's account only postpones the original problem.

Brown's reply to this objection is twofold (1991: 65–66). First, he claims that contrary to appearances, more mundane cognitive processes such as perception are not fully understood, either. Physics, cognitive science and neurobiology tell us a detailed story about how light waves are reflected by the perceptual object, how they stimulate the retina, how this stimulation is transformed into neural activity, and how this activity finally is transmitted within the brain. However, the last step from neural activity to conscious experience or perceptual beliefs still remains a mystery unless the problem of mind-brain interaction has been solved. Although this is true, the mystery of rational insight into abstract reality is, in contrast to what Brown suggests, not fully analogous to the mystery of perception. Within Platonist epistemology there is the mystery of the mind-brain interaction, but there is a second mystery about the interaction of abstract reality with the physical world of the body and the brain (compare Häggqvist 2007: 57). More important is Brown's second reply, according to which gaining knowledge in a certain way does not require that one has a sufficient understanding of one's respective way of knowing. Even in ancient times when people had queer and radically mistaken views about perception they were able to gain perceptual knowledge. Today, we are still lacking a good explanation of how introspection works. Nevertheless, introspective knowledge of, e.g., my current headache is among the paradigm cases of knowledge.

(2.) The second objection to Platonist epistemology is related to the causal conception of knowledge. Accordingly, *S* knows that *p* if and only if *S* has the true belief that *p* and this belief is caused by its truthmaker (Goldman 1992). Paradigm cases of knowledge, such as perception, memory or introspection, seem to satisfy the causal requirement. But for a number of reasons it seems impossible that the domain of abstract reality has any causal influence on the concrete natural world to which our beliefs about abstract reality belong. First, both domains are fundamentally different from each other in such a way that we cannot imagine how this kind of causal interaction might work. Second, the causal closure of the natural world seems to rule out any external influence (Benacerraf 1973). Third, causal relations involve some kind of counterfactual dependency. Usually, this is expressed by the following counter-

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<sup>18</sup> Here I don't address objections to philosophical appeals to intuitions that are independent of the specific commitments of the Platonist account, e.g., the objection from the variance of intuitions with irrelevant factors, or the objection from the absence of calibration, as they have recently been raised by experimental philosophers and methodological naturalists. Cf. for these objections Weinberg/Nichols/Stich 2001 and Weinberg 2007. For critical replies cf., e.g., Grundmann 2010, Horvath 2010.

factual conditional: if the cause had not occurred, the effect would not have occurred either. Now, consider the metaphysically modal facts that constitute abstract reality. Their modal status seems to be necessary itself. So, what is metaphysically necessary is necessarily necessary and what is metaphysically possible is necessarily possible. Since these modal facts could not have been different from what they actually are, the antecedent of the relevant counterfactual conditionals can never be true. Thus, all causal counterfactual conditionals are vacuously true when applied to the relation between abstract reality and concrete mental states or events. But vacuously true counterfactual conditionals cannot express any causal relations. So, abstract reality cannot have any causal influence on the natural world. This suggests the following argument:

- (1) Knowledge requires that a known fact is causally responsible for one's belief about it.
- (2) Abstract reality cannot have any causal influence on one's beliefs.
- (3) Thus, abstract reality cannot be known.

As recent debates in current epistemology have shown, the prospects of the causal theory of knowledge are dim. That a causal relation to the believed fact is not necessary for knowledge is suggested by many counterexamples, such as scientific predictions that constitute knowledge about future facts. So, the argument from the causal conception of knowledge fails.

(3.) In the vicinity of the argument from the causal conception of knowledge, there is a third objection to Platonist epistemology (cf., e.g., Field 1989: 26, BonJour 1998: 157, Casullo 2003: 144–145, Grundmann 2007). It starts with the assumption that knowledge requires an objectively reliable truth-connection between our beliefs and their truthmakers. This assumption is suggested by the conceptual analysis of knowledge. It is further assumed that the required truth-connection cannot be a bare fact but must be grounded either in a reductive relation between truthmakers and the relevant known beliefs or in a causal relation between them. Why should that be so? Imagine that beliefs about a particular domain of mind-independent facts are not typically caused by these facts. Then it seems easily possible that these facts could have been different (or that these facts change) without our beliefs being sensitive to this difference (or change). And this undermines the reliable truth-connection between facts and beliefs. If we now add the further assumption that abstract reality is neither reducible to the concrete natural world nor causally connected to it, we can conclude that knowledge of abstract reality is impossible.

Although this objection looks compelling at first glance, it relies on an assumption that is only plausible for knowledge of contingent facts, yet not for knowledge of modally robust facts, such as knowledge of abstract reality. As long as we just consider contingent truthmakers, it seems undeniable that without a reductive or causal relation between truthmakers and the relevant beliefs a reliable connection between them is impossible. Unless there is such a relation it can in fact happen that one relatum changes without the other. The reliable coordination of both must be metaphysically grounded, it seems. But now consider our beliefs about abstract

reality. If these beliefs happen to be actually true, and if they are generated in a way that is modally robust, then it simply cannot happen that they are false in nearby worlds. Why so? Because abstract reality is itself constituted in a modally robust way. Abstract facts do not vary from world to world. Since there is this deep modal difference between the concrete and the abstract world, a metaphysical grounding of reliable truth-connection is only needed for our beliefs about contingent facts, yet not for our beliefs about abstract reality – or so one might argue (for a more detailed version of this reply, cf. Pust 2004, Grundmann 2007).

The above discussion of general objections to Epistemological Platonism suggests that none of them is actually fatal. Epistemological Platonism, therefore, is an option that cannot be dismissed so easily. Let us thus explore whether Platonism provides a fruitful account of the analysis of philosophical thought experiments.

#### *6. The Platonic view of philosophical thought experiments*

Philosophers try to give an account of the nature or essence of core philosophical categories. They want to answer Socratic questions such as, e.g., what knowledge, truth, meaning, freedom of the will, or justice really are. So, their primary goal is knowledge of essences rather than the counterfactual behavior of things. In order to test received views about a category's essence philosophers typically ask themselves whether a considered hypothetical case would be an instance of the target category. This is the philosophers' paradigmatic use of thought experiments. Philosophical thought experiments such as the above-mentioned Gettier case have two striking features. First, they seem to provide a priori knowledge. Just by considering the given case description we know that Smith has a justified true belief but does not know that someone in his office owns a Ford. In order to gain this knowledge we need not rely on any past experiences of the actual world. Further empirical knowledge over and above the case description is simply irrelevant to our ability for determining that Smith has a justified true belief but does not know (Ichikawa and Jarvis 2009, Malmgren 2011, Grundmann and Horvath 2014). Second, philosophical thought experiments are not committed to the actual existence of instances of the target category. It might turn out that, on the resulting account of knowledge (or free will), there simply is no knowledge (or free will) in the actual world. These observations are very friendly to Platonism with respect to philosophical thought experiments. It may thus seem quite natural to hold that philosophical thought experiments provide us with an intellectual perception of abstract reality.

Conceptualism, however, gives a much more parsimonious explanation of philosophical thought experiments. Concepts do not only have conditions for their correct application, they are also plausibly associated with application dispositions of those who possess them. With respect to a particular class of concepts, the so-called semantically transparent concepts<sup>19</sup>, application conditions and application dispositions match each other across possible worlds, at least under ideal circumstances. If this story is basically correct for key philosophical con-

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<sup>19</sup> These concepts are such that whoever possesses them knows (at least in the sense of practical knowledge) their application conditions across possible worlds. Semantically transparent concepts contrast with, e.g., natural kind concepts, indexical concepts, proper names, or partially understood concepts whose application conditions are (partly) fixed by external factors that need not be known by the subjects who possess them.

cepts, we can use our application dispositions to determine the extension of a concept across possible worlds and thereby, inductively, gain an understanding of the essence of the concept's referent. There is some evidence that favors this conceptualist account of philosophical thought experiments over the Platonist one. Paradigm cases of philosophical thought experiments are destructive rather than constructive. Confronted with a Gettier case we realize that justified true belief is not sufficient for knowledge. But we do not directly discover what knowledge might be instead, or in addition to that. On the platonic account we would expect a direct grasp of the true relation between our target properties. In contrast, conceptualism predicts only particular correct judgments about the extension of a given concept in a possible case. Knowing fragments of its extension does not directly suggest the true definition of the target concept. It only provides an inductive basis for testing prevailing definitions. The best explanation of this fact is that this knowledge is generated by conceptual competence rather than by Platonic insight.

### *7. Conclusion*

The above considerations suggest the following conclusions concerning the epistemology of thought experiments. First, there are good reasons against treating physical and philosophical thought experiments alike, i.e., to endorse a separationist strategy. Physical thought experiments about the counterfactual behavior of spatiotemporal bodies ultimately involve empirical knowledge, e.g., based on one's imagination. Second, Brown's platonic account turned out deeply problematic when it is used to explain how rational insight into the laws of nature is possible. Third, philosophical thought experiments seem to generate a priori knowledge of philosophical properties. But in this case, Conceptualism seems overall superior to Platonism, even though there are no knockdown objections to the latter.

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