Imagination Through Knowledge[1]

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Abstract
Imagination seems to play an epistemic role in philosophical and scientific thought experiments, mindreading, and ordinary practical deliberations insofar as it generates new knowledge of contingent facts about the world. However, it also seems that imagination is limited to creative generation of ideas. Sometimes we imagine fanciful ideas that depart freely from reality. The conjunction of these claims is what I call the puzzle of knowledge through imagination. This chapter aims to resolve this puzzle. I argue that imagination has an epistemic role to play, but it is limited to the context of discovery. Imagination generates ideas, but other cognitive capacities must be employed to evaluate these ideas in order for them to count as knowledge. Consideration of the Simulation Theory's so-called "threat of collapse" provides further evidence that imagination does not, on its own, yield new knowledge of contingent facts, and it suggests a way to supplement imagination in order to get such knowledge.

Keywords: Imagination; Thought Experiments; Simulation; Other Minds; Threat of Collapse

1. Introduction

Imagination, as I shall use the term, is a cognitive activity that involves forming a quasi-sensory mental representation (Walton, 1990). Imagining is distinct from believing, desiring, perceiving, remembering, and any combination of these mental states. In other words, imagination is a distinctive cognitive attitude, i.e., a content-bearing representational state with a distinctive functional role. This conception of imagination as a distinctive cognitive attitude is not universally accepted (Langland-Hassan, 2012), but it is the predominant view in the imagination literature (Schroeder & Matheson, 2006).

[1] The idea for this paper was conceived at the *Knowledge Through Imagination* workshop at Claremont McKenna College. I am grateful to Amy Kind and Peter Kung for organizing such an

Even with the restrictions stipulated above, imagination is an incredibly diverse category of mental activities. It includes deliberate and spontaneous imagination, creative and recreative imagination, propositional and non-propositional imagination, objectual and active imagination, conscious and non-conscious imagination, among other kinds (Gendler, 2011; Van Leeuwen, 2013). There is no single, unified account of imagination, nor is there a generally accepted, exhaustive taxonomy of the varieties of imagination. Moreover, the varieties of imagination listed above overlap unsystematically.

Thus far, imagination has resisted comprehensive, systematic characterization. The primary reason is that many fields study imagination, including philosophy of mind, psychology, aesthetics, epistemology, and phenomenology. The features of imagination emphasized by a particular field differ and, in some cases, conflict with the features highlighted by other fields. For example, the capacity of imagination phenomenologists study bears little resemblance to the sort of imaginative activity that psychology and philosophy of mind investigate. The latter fields posit non-conscious imagination, but this idea would be nonsensical in a phenomenological framework. The sort of imagination posited in one field often has little in common with imagination in other fields. The result is that no single mental activity can do the job of imagination in all of these domains.[2]

The diversity of kinds of imagination makes it difficult, if not impossible, to answer questions about imagination *per se*. This collection addresses the question of whether and how

[2] Amy Kind (2013) offers a persuasive argument for this idea. She considers the role of imagination in fiction, pretense, mindreading, and modal epistemology. She argues that the features that are essential to imagination in one domain (e.g., affective responses to fiction) are irrelevant in other domains (e.g., modal epistemology). Moreover, in some cases the essential features of imagination are *incompatible* with the essential features of imagination in the other domains (e.g., the offline role of imagination in mindreading and the online role of imagination in pretense). See also Walton (1990, p. 19).

we can have knowledge through imagination. This question seems intractable without specifying a particular kind of imagination. In this paper, I shall focus on both *deliberate* and *spontaneous* imagination. Deliberate imagination is the kind of mental activity involved in philosophical and scientific thought experiments, whereas spontaneous imagination is the sort of mental activity involved in daydreams and dreams. Because deliberate imagination is at least *prima facie* a promising prospect for knowledge through imagination, I shall focus on whether and how we can have knowledge through either deliberate or spontaneous imagination.[3]

More specifically, I shall discuss whether deliberate and spontaneous imagination can give us *new* knowledge of *contingent* facts about the world. Presumably everyone acknowledges that imagination can highlight what we already know. The more interesting question is whether imagination plays a more robust epistemic role, that is, whether it yields *new* knowledge. Furthermore, imagination *may* play a role in coming to know necessary truths or truths about what is possible. This is the subject of an important and interesting debate about the source of our knowledge of modal truths (Gendler, 2004; Hill, 2006). However, my focus here will be on the role of imagination with respect to new knowledge of contingent facts. Hence, there are two questions to answer. Does *deliberate* imagination give us new justified, true beliefs about contingent facts, and does *spontaneous* imagination give us new justified, true beliefs about contingent facts?

I shall argue that although it seems that deliberate imagination is a better candidate for providing knowledge, deliberate and spontaneous imagination are equal with respect to their capacity to generate knowledge. *Neither* capacity is sufficient to bring about new knowledge of

[3] The concept of knowledge in use here is the ordinary notion of justified true belief. I do not presuppose any particular theory of epistemic justification.

contingent facts about the world.[4] An important step in this argument is the claim that imagining is distinct from the epistemic evaluation of the ideas imagined. I shall provide evidence for this conclusion by considering the cognitive capacity of mindreading. Mindreading consists in attributing mental states to another person in order to explain and predict her behavior. It is the process through which we get knowledge of other minds. Consideration of imagination-based accounts of mindreading shows two things: (a) deliberate and spontaneous imagination are insufficient for knowledge of other minds, and (b) both can be supplemented, in a particular way, to get knowledge of other minds. The lessons from mindreading apply more generally to the puzzle of knowledge through imagination.

The layout of this paper is as follows. In the next Section, I present a more detailed discussion of deliberate and spontaneous imagination. In Sections 3 and 4, I discuss knowledge of other minds through imagination. In Section 5, I extrapolate from knowledge of other minds to the general puzzle about knowledge through imagination. In Section 6, I consider the lessons for knowledge through imagination and situate my view in relation to other views on knowledge through imagination.

2. Deliberate and Spontaneous Imagination

As stated above, imagination is a distinctive cognitive attitude, i.e., a content-bearing representational state with a distinctive functional role. This is a fairly typical conception of imagination (Schroeder & Matheson, 2006). Imagining is distinct from believing, desiring, perceiving, remembering, and any combination of these mental states. Moreover, belief, desire,

[4] See also Peter Langland-Hassan's discussion of deliberate and spontaneous imagination in this volume, which considers a related skeptical challenge to knowledge through imagination.

perception, and remembering can occur in the absence of imagination, and imagination can occur in the absence of these attitudes. Although these mental states may occur together and influence each other in a particular psychological episode, they are conceptually and psychologically distinct attitudes. This will turn out to be an important fact in my argument. The question I am interested in answering is whether imagination itself generates knowledge.

Before we can answer that question, we need a more careful explanation of the distinction between deliberate and spontaneous imagination. My characterization of deliberate and spontaneous imaginings is based on Kendall Walton's distinction (Walton, 1990, pp. 13-16). Deliberate imaginings are conscious quasi-sensory mental events that are under our voluntary control. They are under our control in the sense – and to the extent – that we can choose whether to imagine (initiation) and how the imagining goes (elaboration). An imagining is *fully* deliberate when both the initiation and elaboration are under our control and only *partly* deliberate when one of these elements is not under our control. A paradigmatic case of deliberate imagination is making up a bedtime story. When your child asks for a bedtime story you choose to imagine, and you choose the plot, the characters, and other details.

Deliberate imagination is, or at least it seems to be, useful for finding practical solutions to problems. When we are unsure about how a colleague will react to some news – that the faculty voted him to be the next department head – we deliberately imagine various strategies for breaking the news to him. We imagine blurting out the news as soon as we see him, softening him up with a joke about the joys of administrative duties, leaving an anonymous note in his mailbox, etc. Deliberately imagining the conversation seems to help us figure out which news-breaking strategy will work best.

Spontaneous imaginings are quasi-sensory mental representations over which we have relatively little control. An imagining is *fully* spontaneous when both the initiation and elaboration are not under our control and only *partly* spontaneous when one of these elements is under our control. Spontaneous imaginings include mental events such as daydreams and dreams, in which we simply find ourselves immersed.[5] Whereas we consciously, voluntarily control the initiation and development of fully deliberate imaginings, this is not the case for fully spontaneous imaginings, which seem to have a life of their own. When we spontaneously imagine winning the lottery, it is as if we are experiencing a fictional account of what it is like for us to be lottery winners. We are, in a sense, participants rather than creators of our fully spontaneous imaginings.

Unlike deliberate imagination, a subject typically does not utilize spontaneous imagination to solve some task or practical problem. We sometimes simply find ourselves in a free-flowing imaginative engagement. The sense that we are mere spectators rather than creators of our spontaneous imaginings is part of what makes them enjoyable, surprising, engrossing, or scary. Spontaneous imaginings may be quite vivid. However, we need not be consciously aware of our spontaneous imaginings. Imaginings, as I am understanding them, simply are quasi-sensory mental representations, and spontaneous quasi-sensory mental representations are representations that occur more or less independently of our volition. In some cases we are aware of our spontaneous quasi-sensory mental representations, but we need not be. Imagination is analogous to perception in this particular respect. Philosophers and psychologists recognize the existence of conscious and non-conscious perception. Just as we may or may not be consciously aware of our *sensory* mental representations, we may or may not be consciously aware of our

[5] Walton (1990, pp. 16, 47) argues that dreaming is one form of spontaneous imagination. See also Ichikawa (2009).

quasi-sensory mental representations. Thus, spontaneous imaginings may be conscious or non-conscious.[6]

Deliberate imagination and spontaneous imagination are not entirely discrete categories. The paradigm case of deliberate imagination is one where both the initiation and elaboration are fully under our control, i.e., when we can choose whether and how to engage in the imaginative episode. The paradigm example of spontaneous imagining is one where we have no choice over the initiation or elaboration of the imaginative episode. Beyond these paradigm examples, things are more complicated. Imaginings can be more or less deliberate and more or less spontaneous. We can have more or less control over either initiation or elaboration. Moreover, a single imaginative episode may involve both deliberate and spontaneous imagination, and an imaginative episode of one kind can turn into the other kind. These complications suggest that the distinction between deliberate and spontaneous imagination is fuzzy at the borders. Nevertheless, the distinction is straightforward in the paradigmatic cases. These nuances will not affect my argument, and for simplicity I will use paradigmatic cases of deliberate and spontaneous imagination in the rest of the paper.

3. Imagining Other Minds

We get knowledge of other minds through mindreading. Mindreading consists in attributing a mental state to a target in order to understand the target's behavior and anticipate future behavior. The majority of theorists studying mindreading subscribe either to the Theory Theory

[6] Unconscious imagining perhaps is unorthodox, but there is a strong precedent for it. For further development of the idea of non-conscious imagining, see Church (2008); Goldman (2006); Nanay (2013); Van Leeuwen (2014); Walton (1990).

(TT) or the Simulation Theory (ST) or some hybrid version of the two.[7] Theory theorists argue that we understand others by employing a folk psychological theory about how mental states inform behavior. With our folk psychological theories, we infer from a target's behavior what his or her mental states probably are. And from these inferences, plus the psychological laws in the theory connecting mental states to behavior, we predict the next behavior of the target (Carruthers & Smith, 1996; Davies & Stone, 1995a). The capacity that underlies the theorizing of TT is supposition, which is distinct from imagination.

At this point, a brief aside is necessary to defend the distinction between imagination and supposition, as this distinction is relevant for my argument and the comparison to other views in Section 6. Alvin Goldman (2006) distinguishes between suppositional imagination (*S-imagination*), which involves merely supposing, positing, or assuming that P is the case, and enactment imagination (*E-imagination*), which involves mentally enacting what it would be like if P were the case.[8] S-imagination has no sensory aspect to it, whereas E-imagination consists in the creation of quasi-sensory mental representations. Applying this distinction to theories of mindreading implies that the TT involves S-imagination, and the ST involves E-imagination. I think using the terminology this way is a mistake. On my view, imagination is distinct from supposition.

First, supposing does not generate affective responses like imagination does (Kind, 2013). Imaginatively engaging with fiction, daydreaming, dreaming, and deliberate imagination

[7] There are other accounts of mindreading as well, e.g., Dennett's Rationality Theory and Maibom and Godfrey-Smith's Model Theory (Dennett, 1987; Godfrey-Smith, 2005; Maibom, 2009). The TT and ST dominate the literature, though.

[8] Currie and Ravenscroft (2002) offer a different way of distinguishing supposition and imagination, according to which supposition involves belief-like imagining but not desire-like imagining, and imagination involves belief-like and desire-like imagining.

can produce affect. Imagining Desdemona's fear of Othello produces in us fear and anxiety. Daydreaming about a romantic getaway with one's significant other causes one to feel joy. Deliberately imagining the death of a loved one produces considerable negative affect. Moreover, the difference in our affective responses to imagination and supposition is not due to the content of what we imagine. Supposing that Desdemona fears Othello, or that one will go on a romantic getaway, or that one's loved one has died simply does not generate affect. Perhaps this is because imagination involves elaborating a scenario, filling in some of the details of what it would be like, whereas supposition does not involve such elaboration. In any case, one difference between imagination and supposition is that supposition does not generate affect but imagination often does.

A second difference is that we can suppose blatant contradictions, e.g., that we have squared the circle, but we cannot imagine blatant contradictions. Some may think that we can imagine blatant contradictions, but this is only because we sometimes mistake *imagining ourselves imagining* – meta-imagining – for imagining (Sorensen, 2006). That is, we imagine ourselves imagining that we have squared the circle and mistakenly conclude that we are imagining a squared circle. Conflating meta-imagining with imagining may lead some to conclude that we can imagine blatant contradictions. However, this is a mistake. We cannot imagine blatant contradictions. Or, if we can, it is difficult and rare (Gendler, 2000; Weatherson, 2004). However, it is quite easy to suppose blatant contradictions. We often do this in philosophical discussions, for example, in *reductio ad absurdum* arguments.

Finally, conflating supposition and imagination inaccurately minimizes the difference between theorizing and imagining. Theorizing, the sort of cognitive activity we engage in when doing science or mathematics, is based on supposition. If we do not distinguish between

supposition and imagination, then we lack a sharp distinction between theorizing and imagination. Theorizing and imagination are different cognitive activities, though. Theorizing in empirical matters consists in employing something like the hypothetico-deductive model, whereas imagination does not. Imagination essentially involves forming quasi-sensory mental representations, whereas theorizing does not. Moreover, this view that supposition is a kind of imagination implies that the cognitive activity in dreaming or daydreaming is different only in degree, not in kind, from the cognitive activity involved in, say, constructing models in theoretical physics. This is implausible, though. Thus, for many reasons, I regard supposition as distinct from imagination, and hence I do not characterize the TT as imagination based.[9]

In contrast to the TT, the ST offers an imagination-based account of mindreading. The ST holds that we understand others via imaginative simulation. That is, we imagine ourselves in the target's situation, and we imagine what our mental states would be and how we would behave in that situation. On the basis of this imaginative simulation, we attribute to the target beliefs and desires, which we use to explain and predict the target's behavior. Simulation-based mindreading is one of the paradigmatic examples of imagination, and many theorists regard the ST as an intuitively plausible account of how we understand other people. It clearly is relevant to the discussion of knowledge through imagination.

The ST provides an explanation of how we can get knowledge of other minds through imagination.[10] Imagining what it is like to do, feel, and experience what a target does, feels, and experiences can give us knowledge of the target's mental states and future behavior. More specifically, we observe the target's behavior and retrodictively simulate what the target's mental

[9] See Gendler (2006) and Weinberg and Meskin (2006) for further arguments that supposition is distinct from imagination.
[10] See Heidi Maibom's contribution to this volume.

states could have been to cause the observed behavior. Then we run the imagined mental states through our own cognitive machinery. If it is a successful retrodictive simulation, we take the resulting imagined mental states and attribute them to the target. On the basis of those attributed mental states, we make further predictions about what the target will do (Davies & Stone, 1995b).

The following example illustrates the simulation heuristic. Suppose I see John making fun of Mary. I wonder why he is doing that, so I imagine myself engaged in his behavior. I imagine that I dislike Mary and want to humiliate her. I imagine that I like Mary and want to get her attention. I imagine that I am indifferent about Mary and simply want to entertain myself. I evaluate the plausibility of these imagined mental states given the observed behavior, and I conclude that I would behave as John is behaving if I liked Mary. I attribute this motivation to John, and from this attribution, I predict his future behavior. I predict that John will continue to pester Mary until she loses interest, at which point he will use a different strategy to try to keep her attention.

The simulation routine described above is a manifestation of *deliberate* imagination. In the mindreading literature, the simulation routine described is characterized as "high-level" simulation. It involves quasi-sensory information, is consciously accessible, voluntary, subject to the agent's control, and targets mental states of a relatively complex nature, e.g., propositional attitudes.

In addition to high-level simulation, simulation theorists also posit "low-level" simulation. Low-level simulation is a manifestation of *spontaneous* imagination. Low-level simulation also is quasi-sensory, but is relatively automatic. Whereas for high-level simulation, the development of the simulation is under voluntary control, for low-level simulation both the

initiation and development of the simulation are not under the subject's control. Though the low-level simulational process often occurs below the level of consciousness, the product of the simulation is consciously accessible. Low-level simulation targets mental states of a less complex nature, e.g., basic intentions, sensations, and basic emotions.

In the ST literature, it is widely accepted that the mechanism for low-level simulation is the mirror neuron system.[11,12] Mirror neurons are the subject of much debate in psychology and philosophy. These neurons, some argue, are the basis of our abilities to interact socially, understand others' thoughts and emotions, and communicate using complex language. Some have gone so far as to claim that, "the discovery of the mirror neuron system will do for psychology what DNA has done for biology" (Oberman & Ramachandran, 2009, p. 39). My own view is that mirror neurons are not nearly as important as *that* (Spaulding, 2013), but the issues about the relative importance of mirror neurons need not detain us here. For our purpose, all that matters is their role in low-level simulational mindreading.

Mirror neurons are multi-modal neurons that fire during the execution and observation of particular behaviors. Scientists have discovered several mirror neuron systems in the human brain. The empirical evidence suggests that humans have action, emotion, and sensation mirror neuron systems. The action mirror neuron system is found in the premotor cortex and the posterior parietal cortex, regions involved in sensory guidance of movement and the production of planned movement. Action mirror neurons activate when a subject performs a particular

[11] Mirror neurons were originally discovered in the brains of Macaque monkeys. The existence of mirror neuron systems in monkeys has now been confirmed by a variety of methods (fMRI, transcranial magnetic stimulation, single cell recordings). There is good evidence that there are mirror neuron systems in human brains, as well (Gallese, Keysers, & Rizzolatti, 2004; Keysers & Gazzola, 2009; Rizzolatti & Craighero, 2004).

[12] Both ST proponents and theorists studying mirror neurons have argued that mirror neurons are strong evidence in favor of ST (Gallese & Goldman, 1998; Goldman, 2006, 2009; Gordon, 2005; Hurley, 2005; Iacoboni, 2009). Though see Spaulding (2012) for an argument to the contrary.

action and when the subject observes a target performing that same action. The same neurons that produce and guide an action, e.g., grasping an object, selectively activate when the subject observes a target grasping an object (Rizzolatti & Craighero, 2004).

There are similar mirror neuron systems for experiencing and observing certain emotions. When I experience *disgust* and when I observe another person experiencing disgust the same collection of neurons in the insula activates (Calder, Keane, Manes, Antoun, & Young, 2000; Wicker et al., 2003). Corresponding findings hold for the experience and observation of *fear* (Adolphs, Tranel, Damasio, & Damasio, 1994), *anger* (Lawrence, Calder, McGowan, & Grasby, 2002), *pain* (Singer et al., 2004) and *touch* (Keysers & Perrett, 2004). In each of these cases, groups of neurons are endogenously activated when the subject acts, emotes, or feels a certain way, and these same groups of neurons are exogenously activated (at an attenuated level) when the subject observes or even simply imagines another acting, emoting, or feeling in those same ways.

Mirror neurons are unique because, though many neurons fire for a wide variety of stimuli, only mirror neurons selectively activate for the execution and observation of the very same behavior. The ST holds that mirror neurons are subpersonal, neural instantiations of the simulation heuristic. Our own cognitive machinery is employed to simulate the target's mental states, and this simulation generates mental state ascriptions that we use to explain and predict the target's behavior.

Consider the following case. Suppose you have just witnessed something that you find horribly disgusting. (I will let readers generate your own disgusting examples.) When you are disgusted your face naturally contorts in a particular way. Your nose wrinkles and your upper lip and cheeks are raised. When I observe your disgusted facial expression, neurons in my insula

selectively activate (at an attenuated level) in the same way as if *I* were disgusted. I may unknowingly mimic your disgusted facial expression and even come to experience a weak feeling of disgust.[13] The suggestion is that the very same mechanism is responsible for experiencing and perceiving disgust. I understand your disgust – more generally, your emotions, feelings, and intentions – because my mirror neurons simulate what it is like to experience what you are experiencing.

According to the ST, mirror neurons realize low-level simulation. This neural simulation is, for the most part, automatic. Although we are not consciously aware of or in control of the simulational process[14] in the way that we are with high-level simulation, the products of the simulation, emotional contagion and the mental state attribution, are consciously accessible.

As I noted above, high-level simulation is one form of deliberate imagination, and low-level simulation is one form of spontaneous imagination. Like deliberate and spontaneous imaginings, high-level and low-level simulations exhibit variation within each category. Simulations can be more or less high-level and more or less low-level (de Vignemont, 2009). High-level and low-level simulation are best understood as two ends of a continuum.

4. The Threat of Collapse

[13] This emotional contagion can be particularly vivid when observing physical or emotional pain. Some readers will recall the basketball game between the Louisville Cardinals and the Duke Blue Devils in the 2013 NCAA Men's Division I Basketball Championship Tournament. In this game, Kevin Ware, a Louisville player, fell awkwardly after attempting to block a 3-point shot. When he fell, his leg fractured and 6 inches of his tibia protruded from his leg. Fans who saw the fall reported feeling nauseous and in pain just in virtue of seeing the fall. Watching this horrific injury was so disturbing for viewers that television programs would not show the video. They would, however, show the pained and tearful expressions of the players, coaches, and fans. Simply watching the facial expressions of those who had seen this injury caused real emotional distress for some observers.

[14] I allow for the possibility of unconscious quasi-sensory imagining. See footnote 5.

Simulation theorists argue that low-level and high-level simulation generate knowledge of other minds. High-level simulation proceeds through retrodictive simulation, and low-level simulation proceeds through the mirror neuron model described above.

As compelling as this account may otherwise be, it faces the following skeptical challenge. It is not clear how imagination alone can give us new knowledge of others' mental states. Imagination itself does not tell us which of the mental states imagined, if any, are likely to be correct. This is what is known as the "threat of collapse" (Davies & Stone, 1995b). It is called the threat of collapse because, upon inspection of imagination-based simulation, it is evident that the ST needs the theoretical knowledge posited by the TT. Thus, it is argued, perhaps a bit hyperbolically, the ST simply collapses into the TT. The threat of collapse looms both for high-level and low-level simulation.

The threat of collapse involves three related problems. First, a particular behavior is compatible with indefinitely many mental states. Recall the example of high-level simulation that I discussed earlier. I observe John teasing Mary and retrodictively simulate the mental states that could have caused this behavior. I considered three sets of mental states: John likes Mary and is trying to get her attention, he dislikes her and is trying to humiliate her, or he is indifferent to her and is simply amusing himself. These are not the only explanations compatible with John's behavior. Perhaps John is trying to distract Mary to steal her wallet. John may be trying to hide his homosexuality by flirting with a woman. Or maybe John is seeing whether Mary would be a good fit for another friend who is looking for love. We can generate in imagination indefinitely many explanations that are compatible with John's behavior, and these explanations have very different implications.

Second, imaginative simulation provides no way to judge the plausibility of the various imagined mental states.[15] The simulation does not tell us whether the simulation that involves the John's teasing is more plausible than the simulation that involves a ploy to steal Mary's wallet. Both simulations are coherent and compatible with what we observe. If we were to try to figure out, with simulation resources only, what our mental states could have been to cause us to behave like John, our retrodictive simulation would have no way to decide between radically different belief-desire combinations that would explain the behavior.

Third, the simulation provides no stopping point. Because there are numerous realistic mental states compatible with the observed behavior, and because the simulation itself provides no way to evaluate the plausibility of each of these imagined mental states, the retrodictive simulation, in principle, could go on forever. The simulation itself provides no way to determine when we have landed on a good-enough explanation of the observed behavior and can stop simulating. Thus, imagination-based simulation cannot, all by itself, provide knowledge of other minds.

The threat of collapse applies to low-level simulational mindreading, as well. Recall that simulation theorists regard mirror neurons as the mechanism of low-level simulation. Suppose that they are right about this. The problem is that an observed behavior or facial expression is compatible with a number of different basic intentions or emotions. A blush may indicate

[15] One way to understand this problem is in terms of likelihood and probability. The likelihood of a hypothesis is the probability of the observation given the hypothesis. The simulation is relevant for comparing the likelihoods of the various imagined mental states. That is, it is relevant for determining whether the observed behavior would follow from the imagined mental states. However, the simulation provides no information about the probability of the various imagined mental states. The probability of a hypothesis is the probability of the hypothesis given the observation. The simulation procedure itself provides no information about which mental states are more probable given the behavior we observe. There is nothing in the simulation that could tell us that. This problem is compounded by the fact that any behavior is compatible with indefinitely many mental state combinations.

embarrassment, happiness, anger, or even just a hot flash. The same applies even more clearly for basic intentions. A given behavioral movement may indicate an intention to eat, give, tease, throw, play with, put away, etc. Pointing out that spontaneous imagination is realistic does not help here. We need more information than the simulation heuristic provides in order to be justified in attributing to a target a particular intention or emotion.

As with high-level simulation, the threat of collapse for low-level simulation involves three related problems. First, the observed behavior is compatible with a number of mental states. Second, the low-level simulation itself provides no way to determine the plausibility of the candidate emotions or intentions. Third, there is no sufficing heuristic or stopping point built into the operation of the low-level simulation. We need other information to discriminate among the intentions that could cause the behavior, or the emotions that could cause the blush. This may be information about the target's recent history, her personality, how certain situations make her feel, folk psychological platitudes about how behaviors relate to mental states, etc.

Such information is not part of either high-level or low-level simulation. This is not accidental. Indeed, the appeal of the ST account is that it does *not* involve this kind of information. One of the selling points of the ST is that, unlike the TT, it does not require access to large bodies of information about folk psychology. Simulation merely requires an ability to imagine oneself in a target's position and decide what one would feel, think, and do in that situation. One simply redeploys one's own cognitive mechanisms for the purpose of mindreading (Goldman, 2006). It is in this sense that the ST is an *information-poor* mindreading process, whereas the TT is an *information-rich* mindreading process.

Although being information-poor is an attractive feature of the ST model of mindreading, the problem is that it is *too* information poor. It appears that imagining other minds, all by itself,

is not sufficient for new knowledge of other minds. Imagination does not tell us which mental states the target is more likely to have. Thus, both for high-level and low-level simulation, the simulation routine is not sufficient for new knowledge of others' mental states.

Most mindreading theorists hold that we *can* get knowledge of other minds through mental simulation, but not *solely* through mental simulation. The typical response to the threat of collapse is to admit that the ST must be supplemented with non-simulational resources. Mindreading theorists widely acknowledge that the ST requires some TT methods. The ST needs TT methods to evaluate the plausibility of different simulated mental states and to signal when we have hit upon a good-enough explanation of the behavior, or, failing that, when to give up. These TT resources are not limited to *post hoc* evaluation of simulated mental states. They can also modulate the selection of possible mental states to run through the simulation. Thus, we need not initiate the simulation with randomly selected imagined mental states.[16]

To evaluate the possible mental states compatible with a target's behavior, imagination-based simulation requires theoretical knowledge about folk psychology, general background knowledge, and the cognitive capacity for inference to the best explanation, all of which are elements of the TT. The process of evaluating the possible mental states is not simulational, and it is not based on imagination. Judging the accuracy of imaginings involves a more general theoretical cognitive capacity to form and evaluate suppositions and to make inferences to the best explanation.

[16] The TT is not subject to the threat of collapse, but it faces its own underdetermination problem. For any particular observed behavior, the data underdetermine the theorized mental states. The most common solution to the threat of collapse is to combine theoretical and simulational resources to yield an epistemically better process of mindreading. Thanks to Neil Van Leeuwen for discussion of this point.

Once we add theoretical knowledge and general cognitive resources described above to the imagination-based simulation, we have a compelling account of how we could get new knowledge of others' mental states. It is an open empirical question whether or how often we in fact get knowledge of others' mental states in this way. Nevertheless, this hybrid account of mindreading is an adequate account that avoids the threat of collapse.

5. The Puzzle of Knowledge through Imagination

The puzzle of knowledge through imagination is that imagination seems to be epistemically useful in some contexts but also limited to the mere creative generation of ideas. The ST's threat of collapse is a specific case of the more general puzzle of knowledge through imagination. It is a useful case study because it has been thoroughly examined, and the lessons learned in the specific case are relevant to the more general case of knowledge through imagination.

Can we get new knowledge about contingent facts through deliberate or spontaneous imagination? On the face of it, it seems that at least *deliberate* imagination can give us such knowledge. Imagining carrying a couch through a doorway can give us knowledge about moving strategies. Imagining a picture hanging on a particular spot on the wall can give us knowledge about decorating a room. Imagining sending a singing telegram to a colleague to inform him that he has been elected new department head can give us knowledge about communicating unwelcome news. In these cases, deliberate imagination seems to generate new knowledge about contingent facts. In fact, it seems that deliberate imagination is designed precisely to give us such knowledge.

However, spontaneous imagination cannot give us new knowledge of contingent facts. Spontaneous imagination is freer than deliberate imagination – we have no control over fully spontaneous imaginings – and this undermines its epistemic value. Spontaneous imagination could incidentally spur an idea, and we could go on to deliberate about the idea, but the spontaneously imagined idea itself does not constitute knowledge. The spontaneously imagined idea must be believed and justified in order to count as knowledge. And though in some cases the idea may be believed simply in virtue of being spontaneously imagined, this is not sufficient for justification. To justify the idea, we have to go through a conceptually and psychologically distinct evaluative process.

One way to think of this intuitive asymmetry is that spontaneous imagination is part of the context of discovery, whereas deliberate imagination is part of the context of justification. Deliberate imagination is a tool for solving practical problems, which qualifies it as part of the context of justification, but spontaneous imaginings merely creatively generate ideas. Spontaneous imagining creatively generates new ideas, and this can lead to new knowledge of contingent facts only indirectly through deliberate imagining, practical reasoning, or some other cognitive intermediary. Hence, *on first appearances*, there is an asymmetry between deliberate and spontaneous imagining with respect to knowledge. It seems that we can get new knowledge directly through deliberate imagining but not directly through spontaneous imagining.

I shall argue that the first appearances are mistaken. Deliberate imagination does not lead to new knowledge more directly than spontaneous imagination. Deliberate and spontaneous imaginings are on a par with respect to new knowledge. Much like high-level and low-level simulation, both capacities must be supplemented somehow in order to bring about new knowledge of contingent facts.

For the reasons described above, spontaneous imagination does not directly yield new knowledge of contingent facts. It may creatively generate ideas, but it does not directly lead to knowledge. Deliberate imagination has a similarly limited epistemic role. We deliberately imagine many ideas. For example, in deliberately imagining carrying a couch through a doorway, we imagine several scenarios. We imagine pushing the couch straight through the doorway. We imagine turning the couch on its side and pushing it through. We imagine angling the couch diagonally through the doorway and turning it as we push it through. As a matter of fact, some of these strategies may work, and some of them may not. The problem is that imagination itself does not tell us which moving strategy, if any, will work. Deliberate imagination may reveal possible strategies, but these may be mixed in with impossible strategies, and imagination cannot tell us which are the strategies that would work in the actual world. Note the parallel with high-level simulational mindreading: the simulation alone cannot tell us which imagined scenario, if any, is likely to be correct. That evaluation requires additional non-simulational resources.

Imagination generates the ideas, but distinct cognitive capacities are responsible for evaluating the plausibility of these ideas. The capacities that evaluate the plausibility of ideas are general cognitive capacities for deductive, inductive, and abductive reasoning, supposition, perception, and long term and working memory. Above I offered an argument that supposition is distinct from imagination. The same considerations apply here, as well. These cognitive capacities are distinct from imagination. They can be employed in the absence of imagination, and imagination can occur without employing these cognitive capacities. Indeed, they have their own distinct functional roles. Thus, the cognitive capacities that evaluate the imagined ideas are

distinct from the capacity that generates the ideas. In distinguishing imagination from other cognitive capacities, I am arguing for a narrow conception of imagination.

Claiming that deliberate imaginings often are realistic does not help here, either. Even if all the scenarios imagined are realistic, this in itself does not tell us which imagined scenario, if any, is likely to be correct. To generate knowledge of contingent facts about the world, imagining moving the couch must be able to bring about a *new*, *true*, *justified belief* about how to get the couch through the doorway. Deliberate imagination alone cannot do this. The evaluation of ideas generated by imagination is independent from the capacity for imagination, just as the theoretical resources used to evaluate simulated ideas are conceptually independent from the simulation.

One could object that this argument works only for cases where we imaginatively generate several ideas and must evaluate each of them in order to generate knowledge. What about a case where we imaginatively generate only one idea? In such cases, there does not seem to be an independent evaluation step. Perhaps, one could argue, in these cases imagination leads directly to knowledge. [17] I think this is a mistake. It is true that in some cases I imagine only one option. In these cases, I *could* imagine other options as well, but I do not. The reasons why I imagine only one option have something to do with my goals, motivation, cognitive load, and other psychological factors. Sometimes we imaginatively generate only one option, and there is an *assumption* of justification. But that does not entail that the one option *is* justified or that it would be selected if we bothered to imaginatively generate other options and evaluate them. The psychological fact that we sometimes do not evaluate our ideas does not imply that we are not epistemically required to evaluate them for them to count as knowledge.

[17] Thanks to Peter Kung for pressing this objection.

One could maintain that our deliberate imaginings usually are accurate, and thus the beliefs they generate reliably are true and hence justified. There is something to this idea, and I shall come back to it in the next section. However, the blanket statement that our deliberate imaginings reliably are accurate is dubious. Of course, our deliberate imaginings are accurate some of the time. In fact, sometimes we seem to *know* that our imaginings are accurate. Other times we coincidentally accurately imagine a scenario. Perhaps in considering the various imagined strategies for moving the couch through the doorway, unbeknownst to us, one of the strategies we imagine is in fact accurate.

However, in many other cases our deliberate imaginings are *not* accurate. Sometimes we deliberately imagine fanciful scenarios. Other times, we attempt to imagine accurate scenarios and we can tell that our imagining is inaccurate, despite the fact that we have no problem constructing the mental representation. While imagining moving the couch, I may have no problem imagining various scenarios while knowing that none of these imagined scenarios will work in the actual world. This further suggests that some other cognitive capacity is responsible for evaluating the accuracy of our imagined ideas. Finally, sometimes we try to imagine scenarios accurately, and it seems to us that we got it right, but we are wrong. The response that imagination directly generates knowledge because imaginings usually are accurate fails because, as it turns out, our imaginings often are inaccurate.

One could push this objection further by arguing that perception is fallible but nevertheless a source of knowledge, so perhaps liability for error is not so problematic for imagination. However, perception is epistemically different from imagination. First, perception is not *free* like imagination is. We cannot perceive anything we want at will. We can perceive only what is there to perceive. We sometimes misperceive, but the ways in which we

misperceive are directly related to the perceptual environment and our perceptual mechanisms. Perceptions cannot freely depart from reality like imagination, which easily and readily departs from reality in dramatic ways.

The second difference between perception and imagination is that the mechanisms that test our perceptions are internal to perception, e.g., eye saccades, trans-saccadic information integration, mechanisms of visual attention. These perceptual mechanisms serve as reality checks, reducing the likelihood of misperceptions and correcting misperceptions that exist. For imagination, the mechanisms that serve as reality checks are independent of imagination. These include general background information, theoretical knowledge pertaining to the particular subject matter, and general cognitive capacities for abductive, inductive, and deductive reasoning, memory, perception, etc. Similarly, mental simulation does not lead directly to knowledge of other minds; justification of these mental simulations is the job of general theoretical resources that are distinct and independent from simulation. Thus, the analogy between perception and imagination fails. Perception can be a direct source of knowledge, but imagination cannot.

Neither deliberate nor spontaneous imagination leads directly to knowledge. Both may creatively generate ideas that we may come to believe, but these ideas must be justified in order to count as knowledge. Cognitive capacities distinct from imagination evaluate spontaneously or deliberately imagined ideas. Thus, spontaneous and deliberate imagination are on par epistemically; neither directly generate knowledge.

6. Lessons for Knowledge Through Imagination

Imagination seems to play an epistemic role in thought experiments, deliberating about practical problems, mindreading, and other contexts. However, the puzzle of knowledge through imagination suggests that imagination is not sufficient for new knowledge of contingent facts about the world. Just as there is nothing in mental simulation itself that could evaluate the plausibility of various mental states that would explain a target's behavior, there is nothing in the capacity of imagination itself that could evaluate the accuracy of the possibilities we imagine. I have argued that the cognitive capacity to imagine scenarios is distinct from the cognitive capacities that underlie our ability to judge the accuracy of our imaginings.

All of these considerations suggest a fairly pessimistic evaluation of the epistemic role of imagination. However, the solution to the threat of collapse suggests a solution to the general puzzle of knowledge through imagination. Just as imagination-based mental simulation must be supplemented with general knowledge, folk psychological information, and general cognitive capacities to evaluate hypotheticals and infer the best explanation, imagination in general also must be supplemented in order to generate knowledge.

My suggestion is that for deliberate and spontaneous imaginings to yield new knowledge of contingent facts, they must be supplemented in the same way. Specifically, they must be supplemented with general background information, theoretical knowledge pertaining to the particular subject matter, and general cognitive capacities for abductive, inductive, and deductive reasoning. Call these capacities and supplementary information *knowledge-plus*. Knowledge-plus is distinct and independent from imagination. These capacities can be employed in the absence of imagination, and no particular aspect of knowledge-plus is necessary for imagination. Moreover, these cognitive capacities have their own functional roles. Thus, there is good reason to think that imagination is conceptually and psychologically distinct from knowledge-plus.

It is plausible that knowledge-plus interacts with imaginings in two ways: it evaluates the imaginings we entertain, thereby allowing us to conclude that what we have imagined is (or is not) an accurate representation of the world, and it modulates our imaginings, thus influencing the sorts of imaginings we entertain in the first place. If this is right, it explains why we sometimes have no problem imagining a scenario but have difficulty knowing whether it is accurate. Our ability to imagine is independent from our ability to judge the accuracy of our imaginings. It also explains why imaginings are not (or at least not always) completely random. For example when we deliberately imagine moving the couch, we do not need to run through all of the logically possible ways to get the couch through doorway. The scenarios we entertain in imagination typically are plausible solutions to the problem because they are modulated by knowledge-plus.

A consequence of my argument is that spontaneous and deliberate imagination are equal with respect to knowledge. In terms of the distinction between the context of discovery and the context of justification mentioned in Section 3, it turns out that both spontaneous and deliberate imagination are associated with the context of discovery. Nevertheless, both kinds of imagination can be supplemented, in the same way, with knowledge-plus, to generate new knowledge of contingent facts. One may spontaneously or deliberately imagine a scenario, employ knowledge-plus to evaluate the accuracy of this scenario, and thereby come to know a new contingent fact. Thus, both spontaneous and deliberate imagination can lead indirectly to knowledge.

It will be instructive to situate my account in relation to a few well-known views about the epistemic role of imagination. Specifically, I will compare my view to three other views on the spectrum that range from highly skeptical to enthusiastically supportive of knowledge through imagination. This discussion is meant to be an illustrative comparison rather than an

argument for or against these accounts. Consider first John Norton's (2004) account of thought experiments, which in my terminology are a kind of deliberate imagination. Norton argues that imagination-based thought experiments can yield knowledge but only because the contemplation of imaginary scenarios consists in the execution of an argument. The role of imagination in thought experiments is merely decorative. The quasi-sensory mental representations simply are picturesque clothing for inductive or deductive arguments.

My account of the epistemic role of imagination is quite different from Norton's account. I do not think that thought experiments always are covert arguments, nor do I think that imagination simply is a decorative addition. My view is that imagination has a distinctive and more important epistemic role than this. Imagination generates ideas that may not be available through perception, memory, or other cognitive capacities. We may go on to consider these ideas, and this may lead to new knowledge of contingent facts. Unlike Norton, I do not regard imagination's role as merely decorative.

Tamar Gendler (2004) argues that the contemplation of imaginary scenarios evokes quasi-sensory intuitions, the contemplation of which reliably yields true beliefs about contingent features of the world. It is not entirely clear whether quasi-sensory intuitions differ from quasi-sensory mental representations that I posit. A further ambiguity is whether the role of imagination simply is to *produce* these intuitions or to *contemplate* them, as well. If quasi-sensory intuitions are the same thing as quasi-sensory mental representations, and if the role of imagination simply is to produce these representations, then Gendler's view is not different from mine. Using Gendler's terminology, my view is that imagination produces quasi-sensory intuitions, but imagination does not contemplate these quasi-sensory intuitions. Other cognitive capacities are responsible for the evaluation of quasi-sensory intuitions.

Finally, in this volume, Timothy Williamson argues that the primary function of imagination is to provide a means for knowledge. Both deliberate and spontaneous imagination (*voluntary* and *involuntary* in his terminology) can yield new knowledge of contingent facts.[18] Williamson offers an evolutionary argument for this claim.[19] He argues that because imagination is selective and reality-oriented, it enables us to prepare for possibilities, avoid dangers, solve practical problems, and take advantage of opportunities. This capacity would confer an evolutionary advantage for humans. Thus, it is plausible that imagination was selected for providing a non-perceptual means for knowledge of contingent facts about the world.

Williamson's view of the imagination differs from mine in two salient respects. First, though his notions of voluntary and involuntary imagination are similar to deliberate and spontaneous imagination, his conception of imagination is much broader than mine. In addition to quasi-sensory mental representations, he includes non-sensory mental representations, supposition, forming and evaluating subjunctive conditionals as part of imagination. Second, Williamson assumes that being selective is part of the function of the faculty of imagination.

In Section 1, I argued that imagination is distinct from cognitive capacities like perception, memory, and reasoning, and in Section 3 I gave three arguments that supposition should be treated as distinct from imagination, as well. These cognitive capacities operate independently of imagination, and have their own functional roles. Thus, I concluded that there are good reasons to think they are conceptually and psychologically distinct from imagination. I argued that the selectivity of imagination is not part of the function of imagination itself. Other sources of knowledge and general cognitive capacities, the collection of which I refer to as

[18] See also Kind (this volume).
[19] Ichikawa (this volume) similarly offers an evolutionary argument for our ability to process quotidian modalities reliably.

knowledge-plus, are responsible for the selectivity of imagination. These cognitive capacities are general and not unique to imagination, thus there are good reasons to think they too are distinct from imagination.

On my view, imagination generates ideas, whereas knowledge-plus modulates imaginings and allows us to know when our imaginings are accurate. My project here is to get very clear on what imagination is and determine the epistemological consequences that follow from this. While my disagreement about the conception of imagination and what properly follows from it may not challenge Williamson's conclusion that imagination evolved to provide a means for knowledge, it may affect the proposed evolutionary story for how imagination came to have this function.

Despite the pessimistic conclusion about whether imagination *directly* yields knowledge, I do think imagination plays an important epistemic role. It can be a non-perceptual means for knowledge, but only through knowledge-plus. Distinguishing the role of imagination from the role of knowledge-plus is important especially in this volume, the goal of which is to determine whether and how we can get knowledge through imagination. On my view, what we imagine is modulated by knowledge-plus, and to the extent that our imaginings are epistemically useful it is in virtue of knowledge-plus. Thus, rather than *knowledge through imagination*, a more appropriate slogan for my project is *imagination through knowledge.*

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