Reasoning with Imagination

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Abstract

This chapter argues that epistemic uses of the imagination are a *sui generis* form of reasoning.
The argument proceeds in two steps. First, there are imaginings which instantiate the epistemic
structure of reasoning. Second, reasoning with imagination is not reducible to reasoning with
doxastic states. Thus, the epistemic role of the imagination is that it is a distinctive way of
reasoning out what follows from our prior evidence. This view has a number of important
implications for the epistemology of the imagination. For one thing, it clarifies the epistemic role
of widely invoked "constraints" on the imagination. For another, it highlights important and
underappreciated disanalogies between how perceptual experiences and imaginings justify
beliefs. Ultimately, the view that we can reason with imagination offers an illuminating and
theoretically fruitful framework through which to understand the epistemic structure of the
imagination.

1. Introduction

The imagination is epistemically useful. When used in the right way, it can justify beliefs

about what the world is like. But how should we understand the epistemic role and structure of

the imagination? In this paper I will motivate and defend the thesis that epistemic uses of the

imagination are a kind of theoretical reasoning. This thesis has important implications for the

epistemology of the imagination. On one hand, it is often claimed that imagination justifies

beliefs in a way similar to perception. However, if epistemic uses of the imagination are best

understood as a kind of reasoning, then this analogy between perception and imagination is

misleading: while perception allows us to take in new evidence about the world, imagination

allows us to reason out what follows from evidence that we already have. On the other hand,

although some philosophers refer to certain imaginative episodes as a kind of reasoning, little has

been done to precisify this idea beyond a mere figure of speech.[i] In this paper, I intend to do just that by articulating the epistemic structure of imaginative reasoning.

I will proceed as follows. I begin in §2 by giving important background on epistemic uses of the imagination. In §3 I argue that instances of theoretical reasoning instantiate a certain epistemic structure. Most centrally, in §4 I argue that epistemic uses of the imagination instantiate that same epistemic structure and thus are a kind of reasoning. In §5 I argue that reasoning with imagination is not reducible to reasoning with beliefs. I conclude that understanding epistemic uses of the imagination as a *sui generis* kind of reasoning provides us with a promising framework through which to understand the epistemology of the imagination.

2.   Epistemic Uses of the Imagination

People put their imagination to many uses. Some of those uses are purely recreational, as when I daydream. Some of those uses are aesthetic, as when I imaginatively engage with fiction. Some of those uses are practical, as when I use my imagination to decide between two courses of action. Importantly, some uses of the imagination are epistemic. We can and often do use our imagination to learn new things. Consider the following example:

> *Jenga:* Jessica is playing a game of Jenga, the classic party game in which players take turns trying to remove blocks from a tower without causing it to topple over. Jessica is unsure whether removing a particular block will cause the tower to fall. In order to find out, she imagines reaching out her hand towards the tower and gently removing the block in question. As she imagines herself pulling the block away from the tower, she imagines that the tower does not fall over. On the basis of this imagining, she forms the belief if she removes the block, the tower will not fall.

This example has five important features. First, Jessica's imagining is an instance of sensory imagination. Sensory imagination involves mental imagery, which represents perceptible properties in a perceptual format. It is plausibly a kind of offline perceptual representation in the

absence of any sensory stimulation. In what follows, I will set aside what is sometimes called propositional imagination, which does not involve mental imagery, and will restrict my focus to sensory imagination.

Second, Jessica's belief is intuitively justified on the basis of her imagining. The thesis that imaginings can justify beliefs has found many adherents in recent years (Balcerak Jackson & Balcerak Jackson 2013, Balcerak Jackson 2018, Dorsch 2016, Kind 2016, 2018, Kind & Kung 2016, Langland-Hassan 2016, Williamson 2016).[ii] I am not assuming that imaginative justification is indefeasible or even particularly strong. I only claim that the imagination is capable of conferring some amount of defeasible justification.

Third, in *Jenga* the content of the belief Jessica goes on to form is a contingent proposition about the external world. Her belief concerns the actual Jenga tower that is in front of her. Even as she imagines the nonactual scenario in which she reaches out her hand to remove the block, she continues to imagine the tower behaving as it would in the actual world. Thus, the epistemic uses of the imagination that I will focus on are importantly different from the widely discussed role imagination plays in justifying beliefs about metaphysical possibilities (see Chalmers 2002, Kung 2010).

Fourth, *Jenga* involves an imaginative episode which is constituted by a sequence of imaginative states. Jessica's initial imaginative state represents the tower in its current state and, as her imagining develops over time, each successive state represents her hand moving towards the tower and gradually pulling away one of the blocks. I will refer to both imaginative episodes and states as imaginings, but my primary focus will be on imaginative episodes.

Finally, the content of Jessica's imagining is at least partially determined by her beliefs, memories, and perceptions about the tower of blocks that is in front of her. For example, the state

that she imagines the tower to be in is informed by her current perceptual experience of the tower. If she is already deep into the game and the tower has become a highly irregular shape from having many blocks removed already, she reconstructs that shape in her imagination on the basis of her perception of the tower. Similarly, when she imagines removing one of the blocks from the tower, the content of this imagining is influenced by her beliefs about the size, weight, and material of the block. Finally, the content of her imagining may be influenced by her memories of previous Jenga games.

Jenga is an example of *constrained imagining* (see Kind 2016, 2018 and Kind and Kung 2016). An imagining is constrained when its content is (partially) determined by the content of other mental states which act as *constrainers*.[iii] There are many potential constrainers on imaginings in addition to perceptions, beliefs, and memories. For example, Jessica's intention to imagine a Jenga tower constrains her imagining insofar as it partially determines its content. It is also plausible that modular perceptual information constrains how Jessica's imagining unfolds. Her perceptual system may encode regularities in her environment, such as how towers tend to fall, which influences how she imagines the Jenga tower falling.

Different types of constrainers will be useful for different tasks. For example, imaginatively engaging with fiction typically involves different constrainers than imaginatively daydreaming, which in turn typically involves different constrainers than imagining how I take the actual world to be. It is worth noting that, as I am conceiving of it, the constraining relation can be either personal or subpersonal. Sometimes I consciously and deliberately impose a constraint on my imagination, as when I form a conscious intention to imagine a Jenga tower. Other times my imagination is constrained subpersonally, as when my sensory imaginings are constrained by modular perceptual information that I am not consciously aware of.

Constraints are often invoked as a way of explaining the epistemic power of the imagination (Balcerak Jackson 2018, Kind 2016, 2018, Kind & Kung 2016, Langland-Hassan 2016, Williamson 2016). The rough idea is that by properly constraining our imagination, we can make it more sensitive to the way that things are, and thus (if all goes well) learn about the way things are. I think this proposal is correct, but incomplete. Given the many different ways that the imagination can be constrained, more needs to be said about the conditions on *properly* constraining the imagination such that it has the power to justify beliefs. I will try to fill in some of these important details in what follows.

3. The Epistemic Structure of Reasoning

I am going to argue that we can reason with imagination. In order to do that, I had better say something about what it means to reason *with* some state. At its core, theoretical reasoning involves transitioning from some previously held attitudes to a new doxastic state. One obvious sense of "reasoning with" a certain mental state is for that mental state to be one of the previously held attitudes that enters into the reasoning process. I will call these the *input states* of reasoning. Analogously, I will call the attitude that one forms at the end of the reasoning process the *output state* of reasoning.[iv] Thus, one way of precisifying the question of which states we can reason with is to ask what kind of states the inputs or outputs of reasoning can be. Since I am focusing on theoretical reasoning, which by definition results in a doxastic state as its output, the interesting question is which states can be the inputs of reasoning.

Do input and output states exhaust the states involved in reasoning? Following Staffel (2019) and others, we can distinguish between input states and mediating states. Input states are initial states which enter into the reasoning process. Mediating states are states which help to generate the output state on the basis of the input states. They mediate between the input and the

output. In a sense, this is where the reasoning actually *happens*; the mediating states are constitutive of the reasoning itself. In reasoning, one does not merely have some initial states and then form a doxastic state out of the blue. One reasons one's way to this doxastic state from the input states via some mediating states, and the mediating states are what constitute that process of reasoning. One illustrative, although controversial, example of a mediating state is a taking state. According to some views of reasoning, one must *take* the output state to be supported by the input states (Boghossian 2014, 2019). This taking state cannot be an additional premise that is an input to the reasoning, due to the regress worries raised by Carroll (1895). One can think of it as a background condition that allows the output to be properly based on the input. Other putative mediating states may be quite different in their epistemic structure. Thus, the question of which states one can reason with is the question of which states can act as input or mediating states to reasoning.

One methodological issue that faces us when we ask about which states we can reason with is that the nature of reasoning is a matter of widespread dispute. Arguing for a particular theory of reasoning is beyond the scope of this paper and simply assuming a particular theory of reasoning would significantly diminish the dialectical force and philosophical interest of my argument. I'm going to circumvent this methodological worry by identifying some commonly accepted platitudes about reasoning and using them to explicate some markers that are good evidence for reasoning regardless of the theory of reasoning one accepts. These platitudes pick out an epistemic structure that is distinctive of reasoning. In the next section, I'll go on to argue that epistemic uses of the imagination instantiate this epistemic structure.

Here is one platitude about reasoning: reasoning involves operations on content. Note that in reasoning the output states are different in content from the input states (Boghossian 2003). If they were the same in content, then you would not need to do any reasoning. You could simply transfer the content from input to output without any intervening deliberation or inference. The way reasoning bridges that gap in content between the inputs and outputs is by operating on the contents of the inputs (Broome 2013). In paradigmatic cases of reasoning these operations involve rules of inference. More generally, it is plausible that these operations are facilitated by states that mediate between the inputs and outputs of reasoning. This first platitude is closely related to the commonplace idea that reasoning allows us to infer new information (the output state) from information that we already possess (the input states). If the new information were simply identical to the information that we already possess, then we would not need to do any reasoning.

Here is a second platitude about reasoning: garbage in, garbage out. More perspicuously, for an output of reasoning to be justified, the inputs to reasoning need to have justificatory force. By justificatory force, I mean the property of being able to justify beliefs. Reasoning involves arriving at a belief on the basis of some evidence. If you start with bad evidence, then the output belief will not be justified no matter how well you reason from it. Only epistemically good inputs can generate epistemically good outputs.

A third platitude: in order for the output belief to be justified, you need to reason well. In other words, it is not enough to simply have epistemically good inputs. You also need to reason in a way that is epistemically good. This has to do with how one operates on the content of the input states. For example, reasoning your way to some conclusion via

an invalid inference rule results in an unjustified output, no matter how epistemically justified the input beliefs are.

The first, second, and third platitudes are complementary. Together, they say that in reasoning, the epistemic status of the output belief depends on the epistemic status of the input states and the epistemic status of how one operates on their content.

One final platitude: you can be held epistemically responsible for how you reason. Reasoning poorly can incur personal-level epistemic praise and criticism. This is not merely an epistemic evaluation of the belief that one forms on the basis of reasoning, but of the agent who performed that reasoning. If an agent reasons with some logical fallacy then not only is the belief that is formed on the basis of that reasoning unjustified, but it is also the case that the agent reasoned poorly and that they ought to have reasoned differently.

To summarize, (1) reasoning involves operations on contents, (2) justification by reasoning depends on the justificatory force of the inputs, (3) justification by reasoning depends on how well one reasons, and (4) reasoning implicates epistemic responsibility. Each of these is a marker of reasoning. Taken together, these markers delineate an epistemic structure that is distinctive of reasoning.

In order to further motivate this picture of reasoning beyond mere platitudes, consider how a paradigmatic case of reasoning such as deduction exhibits each of these markers. First, in deduction, the content of the conclusion is different from the content of the premises. One bridges this gap by operating on the content of the premises according to certain rules of inference in order to derive the conclusion. Second, justification by deduction depends on the justificatory force of the input beliefs. This is motivated by the

intuitive idea that the conclusion of some deductive inference will only be justified if the input beliefs are justified as well. I cannot form a justified belief that *q* on the basis of unjustified beliefs that *p* and that *if p then q*. Third, justification by deduction depends on how well one reasons. In the case of deduction, this involves reasoning according to certain logically valid rules of inference. If one reasons according to a rule that exemplifies some logical fallacy, then the output of that inference will be unjustified. Finally, one can be held epistemically responsible for one's deductive reasoning. This is a level of normative appraisal over and above evaluating whether the output belief of the reasoning is justified, or whether the input states really entail the output state. If someone reasons poorly according to invalid rules of inference, but by coincidence happens to arrive at a conclusion that is actually entailed by their premises, there is still a sense in which they reasoned poorly and are epistemically blameworthy as a result.

We can further motivate these markers as distinctive of reasoning by considering perception as a foil to reasoning. It is generally uncontroversial that the process of forming beliefs solely on the basis of perception is not a form of reasoning (although see Siegel 2017). The markers I have identified substantiate this claim.

First, perception does not involve operations on contents. On a popular and plausible view of perceptual justification, perception (prima facie) justifies a belief that *p* only if your perceptual experience represents that *p* (Pryor 2000, Tucker 2010). There is no gap in content between these two states, and thus no operations on the content are needed to transition from the perception to the belief. Perception provides one with *new* information and does not involve operating on the content of information that one already has.

Second, perceptual justification does not depend in any substantive sense on the justificatory force of the inputs. Perceptual states are immediate justifiers. That is, they confer prima facie justification to beliefs in a way that does not depend on the justificatory status of one's other beliefs. So, the justificatory force of perception does not depend on the epistemic status of one's previously held attitudes. As a result, there is no substantive possibility of having "garbage in and garbage out" in perception as there is in reasoning.

Third, perceptual justification does not depend on how well you perceive. Recall that how well one reasons is related to how one operates on the content of the input states. Insofar as perception does not involve operating on content, then it trivially fails to meet this platitude. Nevertheless, perhaps there is some loose sense in which one can perceive well or poorly. For example, perhaps being the subject of a visual hallucination or illusion is an example of perceiving "poorly." But, even if one grants this, it is not plausible that visual hallucinations or illusions defeat one's perceptual justification. One still possesses prima facie perceptual justification when one is hallucinating. If someone hallucinates an apple in front of them (without knowing that they are hallucinating), this justifies them in believing that there is an apple in front of them. Possessing other evidence that there is not an apple in front of them, or evidence that they are hallucinating defeats this perceptual justification, but the mere *fact* that one is hallucinating does not.

Finally, and relatedly, you generally cannot be held epistemically responsible for how you perceive in the way that you can be held responsible for how you reason. Faulty perception is not epistemically evaluable in the way that faulty reasoning is. This can be partly motivated by the fact that perception is passive. Agents cannot be held responsible for how they perceive because they cannot choose how they perceive. This can also be

motivated by the aforementioned fact that perceiving poorly does not undermine perceptual justification. If upon viewing the Müller-Lyer illusion you form the belief that the two lines are unequal in size, you are not epistemically blameworthy for doing so (unless, of course, you were aware of the illusion and thus have evidence which acts as a defeater).

The fact that these four features cleanly distinguish the epistemic structure of reasoning from the epistemic structure of perception is some evidence that these four features carve epistemic nature at its joints and demarcate an important epistemic kind. This is further supported by the fact that debates over whether perceptual states can enter into or be the product of a reasoning process often hinge on these very features (see Siegel 2017). Ultimately, whether the epistemic kind picked out by these features is particularly interesting or important will be decided by how theoretically fruitful its applications are. In what follows, I show how it has theoretically fruitful applications for thinking about the epistemology of imagination and thus provide some evidence for its importance.

4. Imaginative Reasoning

Sensory imagination is often called "perception-like" with respect to its functional roles, phenomenology, and representational properties (for an influential example, see Currie & Ravenscroft 2002). But is imagination also perception-like in its epistemic structure? Analogies between perception and imagination are widespread throughout the literature on the epistemology of the imagination. For example, Hyde states that "the imagination can be put to good epistemic use, justifying certain beliefs based on its content in a way comparable with perceptual experience" (2019, p. 32). Similarly, Balcerak Jackson suggests that by focusing on "the similarities, rather than the differences, between imaginings and perceptual states…we can explain why imaginings have epistemic value,

and what that value is" (2018, p. 209). Finally, Kind argues that "perceiving a state of affairs S justifies (or contributes to the justification of) the belief that *P* [and] in at least some cases, imagining a state of affairs *S* can have the same justificatory power." (2018 p. 228). Other theorists draw similar analogies between the epistemic roles of imagination and perception (see, for example, Dorsch 2016).

In the preceding quotations, the perceptual analogy is invoked in order to claim that imagination and perception have similar epistemic structures; that they justify beliefs in broadly the same way. There are a number of reasons one might find this model of imaginative justification to be plausible. First, perception and imagination are phenomenally and representationally similar; both states involve similar kinds of experiences and represent similar kinds of properties. One might take these similarities to suggest epistemic similarities as well. Second, perception and imagination can justify similar beliefs. For example, one can form a justified belief that one's sofa will fit through a doorway either by *seeing* the sofa fit through that doorway or by *imagining* the sofa fit through that doorway.

Nevertheless, in this section I will argue that epistemic uses of the imagination (or, at least, an important class of them exemplified by *Jenga*) are best understood as a kind of reasoning. This, in turn, suggests that the perceptual analogy is misleading. Although sensory imaginings may be perception-like in various respects, they do not justify beliefs in a perception-like way. Instead, imaginative justification is best understood as a species of justification by reasoning.

Recall that in epistemic uses of the imagination, one bases a belief on an imagining which is constrained in various ways by one's other mental states. I will be arguing that

the constrainers act as the input states to imaginative reasoning, the imaginings which they constrain act as the mediating states of imaginative reasoning, and the belief formed on the basis of the imagining is the output state of imaginative reasoning.[v] As we will see, this framework is useful for understanding the different epistemic roles that constrainers and imaginings play.

Let us now consider whether epistemic uses of the imagination exhibit the markers of reasoning identified in the previous section. Epistemic uses of the imagination meet the first platitude about reasoning: they involve operations on content.[vi] Consider *Jenga*. At the outset of *Jenga*, Jessica has no beliefs about whether or not the tower will fall. Neither does she have any imaginative states that represent the state of the tower after she has removed the block at the outset of the imaginative episode. Thus, there is a gap in content between the output belief and any of the input states. In order to bridge this gap, Jessica allows her imaginative episode to unfold, thereby performing various operations on the content of her initial imaginative state, before arriving at an imaginative state which represents the tower after she has removed the block. As her imaginative episode unfolds, it takes the content of the constrainers regarding the physical structure of the tower and the motor control of her hand and develops that content in various ways by representing her hand as moving towards the tower and then removing a block so as to modify the structure of the tower. Only by operating on the content in this way can Jessica arrive at an imaginative state which explicitly represents the tower after the block has been removed and thus arrive at a justified belief about whether the tower will fall. If Jessica simply began by imagining the tower falling over, then intuitively her belief would not be justified

because her imagining would not mediate between her prior attitudes and the resulting belief in an epistemically appropriate way.

Epistemic uses of the imagination also meet the second platitude about reasoning: imaginative justification depends on the justificatory force of the constrainers. This is clear from considering two variations on *Jenga.* The first is as follows:

> *Unjustified Jenga:* Jessica uses her imagination to learn whether removing a Jenga piece from the tower will result in the tower collapsing. This imagining is partially constrained by her beliefs about the mass and material of the blocks and her memories of previous Jenga games. However, her memories are hazy and her beliefs are based on poor evidence. On the basis of this imaginative episode, Jessica forms the belief the tower will not fall if she removes a certain block.

Intuitively, the output belief is unjustified. Indeed, it seems like it is unjustified *because* it was based on an imagining which was constrained by states which themselves lack justificatory force. Because the inputs to the imagining are epistemically bad, so too is the belief that is based on it. This hypothesis is further borne out when we consider a contrasting case:

> *Justified Jenga:* Jessica uses her imagination to learn whether removing a Jenga piece from the tower will result in the tower collapsing. This imagining is partially constrained by her beliefs about the mass and material of the blocks and her memories of previous Jenga games. Her memories are vivid and precise, and her beliefs are based on excellent evidence. On the basis of this imaginative episode, Jessica forms the belief the tower will not fall if she removes a certain block.

In this case, the output belief is intuitively justified. The only difference between *Unjustified Jenga* and *Justified Jenga* is the justificatory force of the constrainers. We can even stipulate that the imaginative content and phenomenology is held constant between the two cases. Thus, imaginative justification depends on the justificatory force of the

constrainers. No matter how careful Jessica is in letting her imagination unfold, it will not result in a justified belief if she starts with constrainers that are not capable of justifying beliefs.[vii]

As in paradigmatic cases of reasoning, merely having epistemically good inputs is not enough. The third platitude about reasoning also applies: imaginative justification depends on how well one imagines. In order to generate a justified output, you not only need good constrainers, but you also need to properly operate on those constrainers in your imagination. One way of imagining poorly might be failing to construct a stable imaginative representation. It is difficult to construct a stable imaginative representation of sufficiently complex scenes, regardless of whether one's constrainers have a positive epistemic status or not. For example, in *Jenga*, Jessica might fail to hold the structure of the tower constant in her imagination. Another way of imagining poorly may be failing to imagine what is entailed by its constrainers. For example, Jessica might correctly imagine the structure of the tower after removing the block but fail to imagine the fact that the tower will fall as a direct consequence of removing the block, perhaps because she fails to recognize the extent to which the tower's structure is unstable. Another way of imagining poorly may be failing to constrain one's imagining with a reason that one ought to be sensitive to. For example, Jessica might fail to imaginatively simulate the effects of friction on the dynamics of the tower. While it remains an open question exactly what demarcates epistemically appropriate imagining from epistemically inappropriate imagining, it does at least seem that there is such a distinction to be drawn. Holding the epistemic status of the constrainers constant, there are ways of imagining that confer justification onto the output

belief and ways of imagining that do not. Thus, how one develops the content of their imagining is epistemically relevant.

Finally, epistemic uses of the imagination meet the final platitude about reasoning: epistemic uses of the imagination implicate epistemic responsibility. Consider the following variation on *Jenga* (adapted from a similar case in Balcerak Jackson & Balcerak Jackson 2013):

> *Wishful Thinking Jenga:* Jessica really wants to win the game of Jenga. Her desire to win, coupled with her irrational optimism about how good she is at Jenga, cause her to imagine cleanly removing a piece from the tower without it falling, and thereby form the belief that if she removes the piece the tower will not fall.

It would be quite natural to hold Jessica epistemically responsible for her imagining. Intuitively, she is blameworthy for imagining in the way that she did. One might rightly criticize her for letting irrational factors influence the content of her imagination. It is intuitive to say that she *ought* to have constrained their imagination in light of her evidence about the Jenga tower and *ought not* to have constrained it in light of her irrational optimism. These criticisms are natural to make even if her imagination was veridical and the Jenga tower really will remain standing. Although the belief she forms is intuitively unjustified, these are appraisals of *Jessica*, the agent who did the imagining, and not merely of the belief she formed. This suggests that agents can be held epistemically responsible for the imaginative projects they engage in.

Where does this leave us? I began this section by noting that theorists often invoke an analogy with perception when discussing the epistemic role of the imagination. Understood loosely, this analogy is harmless. After all, it is true that both perception and imagination have the capacity to justify beliefs. However, when understood more strictly as a claim

about the epistemic structure of the imagination, the analogy fails. Imagination and perception do not play the same epistemic roles. Rather than acquainting one with new evidence about what the world is like, epistemic uses of the imagination allow one to appropriately form new beliefs on the basis of evidence which one already possesses. More precisely, epistemic uses of the imagination involve operations on contents, implicate epistemic responsibility, and only justify beliefs when they both have epistemically good inputs and when one properly operates on the content of one's imagining. Thus, epistemic uses of the imagination are best understood as a kind of reasoning.

5. Reasoning with Imagination is Not Reducible to Reasoning with Beliefs

So far, I have argued that some epistemic uses of the imagination instantiate an epistemic structure that is distinctive of reasoning. One might concede that epistemic uses of the imagination such as *Jenga* are in fact cases of reasoning, but object that they are reducible to paradigmatic cases of reasoning with beliefs. On this view, epistemic uses of the imagination involve reasoning, but do not involve reasoning with imaginings. Instead, they involve reasoning with one's beliefs. The imaginative episode that accompanies the reasoning is epistemically epiphenomenal; it does not play any essential epistemic role. The imagination may contribute to the causal story of how the subject arrives at a particular belief, but it does not contribute to the epistemic story of whether and how that belief is justified. This analysis has the advantage of explaining why epistemic uses of the imagination exhibit each of the markers of reasoning without introducing a *sui generis* and heretofore mostly unrecognized type of reasoning. It might therefore be thought of as a more parsimonious way of understanding epistemic uses of the imagination.

There is a flat-footed response to this way of formulating the objection. Namely, it is implausible in a case like *Jenga* that beliefs alone could account for the subject's justification. *Jenga* is an extremely complicated case in which Jessica must track many physical properties of the tower while also regulating motor imagery of her hand removing the block. If beliefs alone were doing the epistemic work here, this would require her to believe a theory of physics. Empirical work on mentally simulating the stability of towers of blocks has suggested that a model which obeys roughly Newtonian mechanics best matches human performance (Battaglia et al. 2013, Hamrick et al. 2016). But it is very implausible that humans all believe Newtonian mechanics. It is more likely that roughly Newtonian mechanical laws are implicitly built into the functioning of the system involved in imaginatively simulating physical systems, or, at the very least, are represented sub-doxastically. This best accounts for the fact that conceptually unsophisticated animals and young children can perform physical reasoning tasks using their imagination.

The more general point is that our imaginative capacities cannot be fully explained by our beliefs. Sensory imagination constitutively involves offline perceptual processing, and thus our imaginative capacities are tightly linked to our perceptual capacities. Imagination is sensitive to regularities in our environment that have been registered by perception. One particularly striking demonstration of this is the fact that perceptual learning, the process by which one becomes more perceptually sensitive to certain features by being repeatedly exposed to them, can occur within the imagination. That is, merely imagining some feature repeatedly causes one to be able to better perceptually discriminate that feature (Tartaglia et al. 2009, 2012). Similarly, we can get better at imagining in a way that does not seem to depend on gaining any new beliefs. Studies suggest that people can

increase their skill at easily generating vivid mental imagery simply through practice (Rodgers et al. 1991, Calmels et al. 2004). Finally, it is plausible that we can constrain our imaginings with non-doxastic states such as memories or occurrent perceptions. All of this points to the fact that what we imagine cannot be reduced merely to what we believe. In epistemic uses of the imagination, beliefs may partly influence what is imagined, but they do not exhaust what is imagined. Thus, it is likely that imaginings contribute something epistemically over and above beliefs. Reasoning with imagination cannot be reduced to reasoning with beliefs.

In response, one might concede that imaginings have *content* that cannot be reduced to the content of one's beliefs. But this does not yet show that imaginings play an epistemic role over and above one's other cognitive capacities.[viii] Let the constrainers be any kind of state you would like, belief or otherwise, the point is that the imagining does not play a role in epistemically mediating between those constrainers and the output belief. The constrainers on the imagining are what justify the output belief, not the imagining. At best, the imagining plays a kind of heuristic role in generating the output belief, but not an epistemic role in justifying it. As Shannon Spaulding puts it, "Imagination generates ideas, but other cognitive capacities must be employed to evaluate these ideas in order for them to count as knowledge" (2016 p. 207). Once we expand the potential constrainers from only beliefs to non-doxastic states as well, this objection seems more plausible.

Nevertheless, there are at least two distinctive and epistemically relevant roles that the imagination plays: imaginings *integrate* and *develop* the content of their constrainers in a distinctive way. What do I mean to say that imagination integrates the content of constrainers? I mean that imagination is a central workspace that takes inputs from many

different modules and subsystems such as beliefs, memories, and perceptions and not only translates them into a single format but can also integrate them into a single imaginative episode. For example, in *Jenga* Jessica's imagining integrates her beliefs, memories, and perceptions about the Jenga tower into a single continuous imaginative episode. Indeed, we have seen that the imagination, in virtue of being housed in the perceptual system, plausibly has access to modular information that other systems cannot *as a matter of principle* access. The epistemic upshot is that imagination often has more information available to it than other cognitive capacities on their own. Intuitively, Jessica's imaginative episode in *Jenga* is much more informationally rich than her beliefs about Jenga towers on their own, or her perceptual experience of the Jenga tower on its own. Thus, imagination is often in the position to justify more beliefs than other cognitive capacities on their own in virtue of being a central workspace that integrates representations from these other capacities.

Once imagination has integrated the information encoded by the constrainers, it goes onto develop that information in various ways. What does it mean to say that imagination develops the content of the constrainers? I just mean the fact, explored in the previous section, that imagination operates on the content of the constrainers to arrive at a final imaginative state that is different in content from the initial imaginative state. For example, in *Jenga* Jessica's initial imaginative state represents the Jenga tower as it currently is, and her final imaginative state represents the Jenga tower after a piece has been removed. The intermediate imaginative states represent her hand reaching towards the tower and removing one of the blocks in a particular way. Together, these states constitute a single imaginative episode.

The fact that imaginative episodes develop their content is epistemically relevant. The process of operating on the content of the imagination can make certain inferential transitions epistemically appropriate that otherwise would not be. In general, merely having some evidence that supports some belief is not sufficient for that belief to be doxastically justified. Some gaps between evidence and belief are too large to cross in an epistemically appropriate manner, even when the evidence actually does support the belief. For example, consider some extremely complicated mathematical theorem that follows from some basic axioms. Even though the axioms really do support the theorem, intuitively if I form a belief that the theorem is true on the basis of the axioms, I will have done something epistemically wrong. Simply basing my belief that the theorem is true on the axioms without any intervening inferential steps would result in an unjustified belief. Instead, I need to go through a number of smaller inferential steps which constitute a proof of the theorem from the axioms in order for it to be epistemically appropriate to base my belief that the theorem is true on the axioms. Intuitively, these smaller steps help me to recognize exactly why the theorem follows from the axioms. Thus, developing content in certain ways is an epistemically relevant feature of belief-forming processes.

An analogous process occurs in epistemic uses of the imagination. It is plausible that imagination can play the role of developing the content of input states such that one can derive the conclusion in an epistemically appropriate manner. That is what the imagination is doing in *Jenga.* Jessica starts with a collection of beliefs and memories and perceptions about the Jenga tower. These are the input states to her reasoning. However, it would be too great a leap for her to immediately infer that the tower will fall on the basis of these input states. She needs to do some reasoning to bridge the gap in content between

these inputs and the output belief that the tower will fall. Intuitively, engaging in an imaginative episode that takes in these input states and traces out their entailments is one way to bridge this gap in an epistemically appropriate manner. Indeed, this is exactly the epistemic role that mediating states play in paradigmatic cases of reasoning. In some cases, there may be multiple ways to bridge the gap between input and output in an epistemically appropriate manner. Perhaps there are cases where one could either reason with imagination *or* reason with beliefs to reach the relevant conclusion. But this is no threat to the epistemic relevance of the imagination, as long as imagination is *one* way to bridge the gap in an epistemically appropriate manner.

Nevertheless, there are many cases where imaginative reasoning is the only epistemically appropriate way to develop the content in order to reach the conclusion. To see this, consider how Jessica might reason her way to the conclusion that the tower will not fall in *Jenga* without using her imagination. It would have to involve some extremely complex chain of mathematical reasoning about physics that would simply be too complicated for anyone to carry out with their beliefs.

This demonstrates the fact that while reasoning with beliefs is well-suited for developing content in certain ways, reasoning with imagination is well-suited for developing content in other ways. For example, deductive reasoning with beliefs is well-suited for tracing out the logical entailments of the input states. On the other hand, reasoning with imagination is well-suited for tracing out the spatial, or physical, or causal entailments of the input states. Since imaginings develop, at least in part, according to stored perceptual information, and since that information is particularly relevant to how spatially extended physical objects interact with each other, then imagination will be

particularly well-suited to figuring out how certain physical systems will change over time, among other things. The imagistic format of imagination plausibly also allows for certain distinctive transitions between imaginative states. These features go some way towards explaining the distinctive epistemic value that imagination has in a case like *Jenga*.

Of course, reasoning with imagination is not limited to physical reasoning. For example, many theorists have argued for the importance of the imagination in reasoning about other people's mental states (Currie & Ravenscroft 2002, Goldman 2006). In this case, one can tell a similar story about how imagination is particularly well-suited to simulating mental states such that it can integrate and develop your information about the mental states of another person, and so on for other kinds of epistemic uses of the imagination. Thus, not only are imaginings epistemically relevant, but they are sometimes distinctively epistemically relevant; not only is the imagination a way of forming justified beliefs, but it is sometimes the best or only way to form justified beliefs.

6. Conclusion

In this paper I have argued that we can reason with imagination. In particular, I have argued for a framework for understanding epistemic uses of the imagination in which constrainers on an imagining act as input states to imaginative reasoning, the imagining itself is a mediating state which operates on the content of those input states and thereby allows one to form a justified belief as the output state of the imaginative reasoning. I argued for this structure by way of arguing that epistemic uses of the imagination involve operations on contents, implicate epistemic responsibility, and only justify beliefs when they both have epistemically good inputs and when one develops their imagining appropriately. I also argued that reasoning with imagination is not reducible to other, more

familiar kinds of reasoning with doxastic states. Thus, epistemic uses of the imagination are a *sui generis* form of reasoning.

This thesis has wide-ranging implications for theorizing about reasoning and the imagination. First, there is a tendency within the literature on reasoning to exclusively focus on reasoning with beliefs (e.g. Broome 2013, Boghossian 2003, Staffel 2019). If the arguments of this paper are on the right track, then theories of reasoning should also accommodate reasoning with imagination. Second, although it is widely accepted that constraints on the imagination are epistemically important, the thesis that we can reason with imagination clarifies the particular epistemic role they play as inputs to imaginative reasoning. Third, although it is often claimed that perception and imagination are epistemically similar, the arguments of this paper suggest that they play fundamentally different epistemic roles. While perception takes in new evidence about the world, imagination allows us to reason out what follows from evidence that we already have. Finally, although I have focused on theoretical reasoning, the framework developed in this paper has the potential to shed light on imagination's role in practical reasoning as well. Understanding epistemic uses of the imagination as a form of reasoning offers a fruitful way forward for theorizing about the epistemology of the imagination.[ix]

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[i] Although see Balcerak Jackson & Balcerak Jackson 2013 who explicitly discuss and argue for the idea that one can reason with their imagination. See also Williamson 2016, who argues that epistemic uses of the imagination are a kind of conditional reasoning.

[ii] There are also notable dissenters (e.g. Egeland 2019, O'Shaugnessy 2000, Spaulding 2016). I will address some of their objections in §5. For now, let me address an initial skeptical worry about the justificatory force of the imagination: perhaps imagination is simply not very reliable. While there are no doubt many domains about which imagination is unreliable, empirical evidence suggests that subjects are reliable at using imagination to make physical inferences of the kind exemplified by *Jenga.* One study found that not only are subjects who use their imagination reliable at predicting whether a tower of blocks will fall or not, but they are also reliable at determining which *direction* the tower will fall in, and that this reliability is maintained even when the tower consists of blocks of different masses (Battaglia et al. 2013). Other studies that demonstrate the reliability of the imagination in physical inferences include the classic mental rotation paradigm (Shepard & Metzler 1971), as well as studies implicating imagination in making predictions on the basis of mechanical diagrams (Hegarty 1992).

[iii] Plausibly, there are also constraints which result from the architecture of the imagination, rather than from other contentful mental states. I set these aside in what follows.

[iv] Input states are often referred to as premise attitudes and output states are often referred to as conclusion attitudes in the literature on reasoning.

[v] Plausibly, imaginings can also act as input states to reasoning. For example, Jessica's initial imaginative state represents her hand reaching towards the Jenga tower despite the fact that she does not believe this to be the case. This suggests that Jessica's imagining is a kind of conditional reasoning, in which she reasons with a merely imagined premise as an input. Nevertheless, not all epistemic uses of the imagination are best understood as conditional reasoning which takes imaginings as inputs. Consider a subject in a psychological experiment who is asked to perform a mental rotation in order to figure out whether two objects are identical (Shepard & Metzler 1971). The subject's initial imaginative state does not represent a scenario which is contrary to what they believe (it simply represents the objects as they appear to the subject), and they do not go on to form a belief in a conditional (they simply form the belief

that the two objects are identical). Thus, I will understand imaginative reasoning as distinguished by its imaginative mediating states, rather than imaginative inputs.

[vi] I am indebted to the discussion of this point in Balcerak Jackson & Balcerak Jackson (2013).

[vii] This feature explains why non-epistemic uses of the imagination cannot justify beliefs about the actual world. Imaginatively engaging with a fantasy novel, for example, cannot justify beliefs about the actual world precisely because fantasy novels are not typically good sources of evidence about what the actual world is like and thus lack justificatory force with respect to those beliefs.

[viii] This more general form of the objection is argued for forcefully by Spaulding (2016) and Egeland (2019).

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