12

Imaginative Blocks and Impossibility: An Essay in Modal Psychology

Shaun Nichols

1. THREE QUESTIONS

The big philosophical questions about modality are metaphysical and epistemic: What are the truth-makers for our modal judgments? What justifies our modal judgments? These two questions are notoriously problematic.[1] What fact could make it true that *blue swans are possible*? And, assuming there is such a fact, what justifies our belief in that fact? Few philosophers think that there are easy answers here (see e.g. Gendler and Hawthorne 2002). Indeed, one might regard modal realism—the view that there exist infinitely many possible worlds (Lewis 1986)—as revealing the depth of philosophical desperation over modality.

Here I want to pursue the issue from a different direction. In addition to metaphysical and epistemic questions about modality, there is another question, which is sometimes treated as a shameful relative of the others: What is involved, psychologically, in making modal judgments? That is, in addition to modal metaphysics and modal epistemology, one might study modal *psychology.* This seems a promising avenue. For if we can characterize the psychology underlying modal judgment, then we will have a fixed point from which to explore the harder questions concerning modality. Furthermore, determining the psychological source of modal intuitions might help us determine to what extent we should trust the intuitions (see e.g. Hill 1997).[2] Here, then, is the guiding question of this essay: What is the best account of the cognitive underpinnings of modal judgment?

[1] It's even problematic to state them as I have. For it might turn out that our modal judgments are uniformly false and unjustified.

[2] Some philosophers take their modal intuitions to be very strong evidence indeed of the modal facts. Kripke writes: 'If someone thinks that the notion of a necessary or contingent property. . . is a philosopher's notion with no intuitive content, he is wrong. Of course, some philosophers think that something's having intuitive content is very inconclusive evidence in favor of it. I think it is very

The approach taken here will be unapologetically naturalistic. The project of naturalistic modal psychology is nicely set by Blackburn, who maintains that the naturalist's charge is 'to explain the way in which we make modal judgments—the ease with which we noncollusively agree upon them' (1993: 62).[3] I will draw on modal judgment in children and on recent work on the imagination to sketch an account of modal psychology. I won't try to give a complete account of our modal psychology; rather, the primary focus will be on the relation between imagination and modal judgment. Unlike other treatments of modal judgment, however, the project here will not take as a primary constraint the modal intuitions of philosophers (cf. Yablo 1993). For the goal is to get an account of normal modal judgment that emerges in the absence of the potentially indoctrinating effects of philosophical training. Since the naturalistic investigation of modal judgment is almost entirely unexplored, at many junctures, I'll just be making my best guess. But we can start on fairly common ground by looking to philosophical remarks on the role of imagination in modal judgment.

2. MODAL PSYCHOLOGY AND IMAGINATION

Contemporary work on modality boasts an impressive diversity of proposals. According to Lewisian realism, there exists a set of possible worlds that grounds the truth of (true) modal claims. 'It is impossible that *p*' is true iff *p* is true at none of these possible worlds (Lewis 1986). Modal fictionalism can be viewed as parasitic on this: 'It is impossible that *p*' is true iff, according to the fiction of possible worlds, *p* is true at no possible world (Rosen 1990). Modal primitivism maintains that modal truths reflect fundamental irreducible features of the world. For instance, on one version of this view, the intuition that kangaroos might have had no tails reflects an irreducible modal property of kangaroos (Shalkowski 1996). And expressivists (e.g. Blackburn 1993) maintain that to say that it is impossible that *p* is true is to express a certain attitude that arises from the fact that when we try to imagine that *p*, we fail.

Despite this diversity in views, there is wide agreement about one aspect of modal psychology—that modal judgment depends crucially on the imagination.[4] We find this view expressed by modal primitivists (Shalkowski

---

heavy evidence in favor of anything, myself. I really don't know, in a way, what more conclusive evidence one can have about anything, ultimately speaking' (Kripke 1980: 42).

[3] Ultimately, Blackburn doubts that we can meet the naturalistic charge he sets. I think his pessimism unfounded for reasons set out in sect. 6.

[4] The term 'conceive' is often used instead of 'imagine' here. But in the recent literature, some philosophers try to explicate 'conceivability' in a way that will maximize the likelihood that conceivability will be a good guide to possibility (e.g. Chalmers 2002; Yablo 1993). I do not want to prejudge issues about the epistemic propriety of forming modal beliefs from imaginative activities, so I will avoid using the term 'conceive'. But in any case, on standard accounts (e.g. Yablo 1993), propositional imagining is at the core of conceiving.

1996: 382), modal realists (e.g. Lewis 1986: 113–14), modal fictionalists (e.g. Rosen 1990: 340), and modal expressivists (Blackburn 1993; Craig 1985). Thus Scott Shalkowski writes: 'Certainly, conceivability, broadly construed, plays an important role in forming modal judgements. It is hard to see how we could get started on the modal enterprise without it' (Shalkowski 1996: 282). And Gideon Rosen notes that the modal realist is committed to the following:

(i) the modal truths are truths about a domain of universes; (ii) the principles which guide our imagination are true of that domain; so (iii) by and large, when we imagine in accordance with these principles the states of affairs we imagine are realized somewhere among the universes. (Rosen 1990: 340)

Like the modal realist, the fictionalist also adverts to imaginative tendencies. It is not our business here to judge between expressivism, primitivism, Lewisian realism, and fictionalism. What matters is that all of these accounts agree that imagination is essential to the psychology of modal judgment.

Although imagination is crucial for modal judgment, few philosophers would maintain that we can reduce modal concepts to imaginative tendencies. It's implausible, for instance, that 'impossible' should be identified with 'unimaginable'. We can recognize past cases in which people could not imagine that p despite the fact that p was true. Quantum mechanics provides a vivid example. Some people still maintain that they can't imagine how quantum mechanics could be true, but few of these would claim that this means that it's impossible that quantum mechanics is true. Similarly, we sometimes imagine propositions that we regard as impossible—I can imagine that arithmetic is complete, though I don't believe it's possible.[5] Thus, despite the widespread agreement that imagination plays a vital role in generating modal judgments, there is also fairly widespread agreement that modal judgments aren't equivalent to imaginative tendencies. I embrace this orthodoxy as well, and the proposal I'll ultimately promote maintains that modal judgments are delivered by imaginative activities, but not that they *reduce* to imaginative activities.

There is a further, familiar worry about the connection between imagination and modal judgment: why should we trust the move from imagination to modal judgment *at all*? What is the justification for moving from imaginative disposi-tions to modal beliefs? Since we are aiming for a naturalistic modal psychology

---

[5] Among contemporary philosophers, modal expressivists come the closest to identifying modal judgments with imaginative tendencies (e.g. Blackburn 1993; Craig 1985). But even expressivists recognize cases in which imaginative tendencies do not (and should not) track modal commitments (Blackburn 1993: 69; Craig 1985: 106). A typical expressivist treatment of this difficulty posits two separable steps in modal judgment: (i) the imaginative tendency (e.g. the inability to imagine that p) and (ii) the subsequent modal projection (e.g. holding that it's impossible that p) (e.g. Craig 1985: 106–7). A variety of factors might interrupt the transition from imaginative tendency to modal projection. For instance, we might come to see our inability to imagine that p as a product of our ignorance. In that case, we might be reluctant to project an impossibility onto the world.

Shaun Nichols
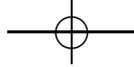
here, we will pursue a less intimidating question: regardless of whether it's rationally appropriate, why are we inclined to move from imaginative dispositions to modal beliefs? To explore this, the best strategy is to consider modal judgment in a more ecologically plausible setting than philosophy departments.

3. MODAL JUDGMENT IN THE WILD

The previous section provides philosophical credentials for the view that imagination plays a vital role in generating modal judgments. In order to discuss the role of the imagination in modal judgment, it will be important to have some picture of the nature of modal concepts. As a preliminary, I should stress that I am not going to suggest anything like definitions for modal concepts. Rather, the goal is to consider the function of incipient modal concepts. This might then help us understand why there is a connection between imagination and modal judgment.

Why do we have modal concepts? Although this is an interesting and perfectly sensible naturalistic question, there is surprisingly little discussion of it in either philosophy or psychology. People obviously do have modal concepts, even if they are not quite the modal concepts that philosophers deploy. Indeed, as we will see shortly, even 3-year-old children apparently have modal concepts. Why would we have such things? What function could they possibly serve? I will maintain that they function to enhance our abilities to make good decisions. The trick is to say how modal concepts enhance decision making. For it's not obvious (to say the least) that *might* and *must* correspond to properties of the world that affect us directly. So how do such concepts help decision making?

To get a purchase on this, I want to turn to the early uses of modals by children. There is some extant research on modal judgment in older children. Daniel Osherson (1976) finds that high school students evaluate modal arguments in ways that conform with a portion of standard modal logic. This result is significant insofar as it shows that at least part of modal logic is not merely an invention of philosophers.[6] But for present purposes, a more ethologically sensitive approach is preferable. To get a handle on the function of modal concepts, it's best to look at how they're actually deployed in the wild. All the examples I use here are genuine examples of spontaneous language use by children or parents drawn from the CHILDES (Children's Language Data Exchange System) database for child language research (MacWhinney and Snow 1990).[7]

---

[6] The portion of modal logic Osherson investigates includes the modal negation rules, the modal distribution rules, and the existence rules (if p is necessary, it is so; if p is so, it is possible). Osherson did not include the strict implication rules; nor were any of the iteration rules tested. For what it's worth, my guess is that people untrained in modal logic (or possible worlds semantics) will not make judgments that conform to the S5 rules 'From $\Diamond\Box\alpha$ derive $\Box\alpha$' or 'From $\Diamond\alpha$ derive $\Box\Diamond\alpha$'.

[7] The CHILDES database is a collection of transcripts from everyday verbal behavior of several children and their families. The database was initially established to study children's language,

Imaginative Blocks and Impossibility   241

This will come as no surprise, but in the CHILDES database children and parents rarely express judgments of absolute possibility and impossibility.[8] Rather, the modal talk of children and parents tends to focus on *risks* and *opportunities.* Here are some examples in which modals are used to represent *risk*.

Ross (2;7): Marky [a younger sibling] might fall. (MacWhinney and Snow 1990)

Adam (3): Do you want me stand up slippery bathtub?
Mother: No.
Adam: Why not.
Mother: Because you might fall and hurt yourself. (Brown 1973)

Father: I want to look at your new hat.
Abe (3;8): It's made out of paper; it could rip easily. (Kuczaj and Maratsos 1975)

Father: . . . I guess you can't play football then.
Abe (3;9): I can too I can too I can too.
Father: Would it help you if we got a helmet?
Abe: Yeah.
Father: How would it help?
Abe: It would hit the helmet instead of me.
Father: And what would happen then?
Abe: I'd not be hurt except it could still land on my nose. (Kuczaj and Maratsos 1975)

Father: You could fall and get hurt Ross.
Ross (4;2): No. Not if I hold on to here and here I won't.
Father: You could . . . .. It's dangerous. (MacWhinney and Snow 1990)

Adam (4;2): Paul [a younger sibling], you might cut yourself on this. (Brown 1973)

Here are some examples of children deploying modals to represent *opportunities*:

Alison (2;4): We could march around or we could run around. (Bloom 1973)

Ross (3;3): Hi Titus [a cat]. I got her tail.
Father: You did.
Ross: She's under there. I could get her.
Father: Okay but don't be too mean to her okay? (MacWhinney and Snow 1990)

---

but it has been an invaluable resource for studying a number of features of child psychology (see e.g. Bartsch and Wellman 1995).

[8] It's not that children are incapable of making judgments about absolute possibility and impossibility. If asked, children will say that it's not possible for something to be red but not take up any space. My 7-year-old daughter explained to me that only *things* can be red, and things have to take up space.

> Father: I can't make that one work.
> Abe (3;7): You could glue it. (Kuczaj and Maratsos 1975)
>
> Adam (4;1): We could put the animals in here. (Brown 1973)

Children use modals in other ways too, of course. Here are a couple:

> Mother: We'll have to teach you some card games.
> Nathan (3;9): We have cards?
> Mother: Mmhm.
> Nathan: Where?
> Mother: I don't know.
> Nathan: [They] could've got lost. (Sachs 1983)
>
> Father: Was I bossy to [mommy] today?
> Ross (3;8): You couldn't be 'cause you were at work. (MacWhinney and Snow 1990)

It's noteworthy that the children's modal claims probably can't typically be given a deflationary kind of epistemic interpretation. For instance, it's unlikely that when 2-year-old Ross says 'Marky might fall', what he really means is '*for all I know* Marky will fall'.[9] When we turn to the use of modals for opportunities and past events, it's even less plausible to interpret children as only deploying deflationary epistemic modal notions. Children often point out that some future opportunity is available (e.g. 'You could glue it'), and they say that something that didn't happen *could have happened* (e.g. 'We could have broken the lamp'). It seems clearly unworkable to reduce these judgments to judgments of epistemic possibility.

Thus, well before they begin kindergarten, children are deploying non-epistemic modal notions. Given the typical use of modals in children and parents to represent risk and opportunity, I make the bold conjecture that a primary function of modal concepts is to enable the representation of risk and opportunity. Obviously, accurately assessing risks and opportunities would be a big help to decision making.[10] So this gives us some purchase on the function of incipient modal judgment. Perhaps there are no modal properties in the world. But modal concepts enable the representation of risks and opportunities, and obviously if those representations turn out to be good predictors of risk and opportunity, that would come in rather handy.

---

[9] In addition, it's implausible that fictionalism accurately describes the psychological character of such early modal judgment. Surely Ross is not thinking, 'According to the fiction of possible worlds, there is a world in which Marky falls.'

[10] For ease of exposition, I advert to risks and opportunities as non-epistemic possibilities that can be accurately or inaccurately represented. However, this can be reframed in a less metaphysically controversial fashion simply by casting it in terms of accurate representations of *epistemic* possibilities. Accurately assessing epistemic possibilities would still be a boon for decision making, even if one (mistakenly) thinks of them as something other than epistemic possibilities.
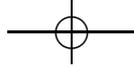
4. IMAGINATION AND EARLY MODAL JUDGMENT

If this is the right story about the function of early modal concepts, does this give us any way to address issues about the relationship between imagination and modality? Does the imagination play a role in generating early modal judgments about risk and opportunity? Presumably. To begin with, it's plausible that one of the primary functions of the imagination is to carry out hypothetical reasoning (Nichols and Stich 2003). We know independently that young children are competent with simple hypothetical and even counterfactual reasoning (German *et al.* 1996; Harris and Nichols 2003). We use this facility to best determine which outcomes follow from which antecedents: if the branch breaks, I will fall. In addition, it's likely that, at least sometimes, it is because the child can't imagine that *p* (given her standing beliefs) that she comes to think that there is no risk that *p*. The child can use this imaginative capacity to determine which outcomes are consistent and which inconsistent with her standing beliefs. If she is utterly unable to imagine some outcome, given her standing beliefs, then she comes to think that that outcome is impossible. One reason to think that such a process occurs is that if you ask a child whether something is possible—say, whether a hornet can get into the car—he will often proceed to imagine several different ways this might happen. The child imagines a hornet getting in through an open door or an open window or a broken windshield or an open vent. As these options are closed off by stipulation ('the doors, windows, and vents are all closed and unbroken'), the child will often come to think that, with those stipulations in place, it is impossible for the hornet to get into the car. That is, when all the ways of the hornet getting in that the child can imagine are foreclosed, the child can't imagine the hornet getting in and, as a result, judges that the hornet can't get in.

So, although it's been underexplored, it seems plausible that children form modal judgments from their imaginative activities. I've kept quiet about one important element here, though. In typical cases of imagination-driven modal judgment, among our important standing beliefs are standing *modal* beliefs. It's independently clear that not all of an individual's modal beliefs come from his own imaginative exercises. Some will come simply from testimony. We tell our children that fish can't breathe when they're out of water. Most children acquire this belief through testimony without seeking confirmation by pulling a guppy out of the aquarium to watch it suffocate. Some modal beliefs might also have an innate basis. For instance, one interpretation of recent infancy work is that infants have tacit knowledge that an object *can't* pop in and out of existence, vanish, or move through another solid object (e.g. Spelke *et al.* 1995). These standing modal beliefs often figure in the imaginative exercises that lead to further modal beliefs. In particular, the standing nomological modal beliefs constrain what we can imagine. Given the things that I already believe—e.g. that fish

Shaun Nichols

can't breathe out of water—I can't imagine the shark getting to me on the beach. From this, I form the belief that it's impossible for the shark to bite me up here on the beach. By contrast, given the things I already believe, I can easily imagine the hornet stinging me on the beach. From this, I form the belief that it's possible that the hornet sting me. This might cast some light on why modal judgments get delivered by the imagination. We use the imagination to determine which outcomes are consistent and which inconsistent with our other beliefs (including our standing modal beliefs).

How does this transition from imaginative activities to modal judgment work? One possibility is that people consciously exploit an explicit rule of the form 'if I can't imagine that *p*, then *p* is impossible'. But this seems excessively intellectualized. A more plausible alternative is that there's a basic causal connection between certain kinds of imaginative failures (or successes) and modal judgment. Our minds are wired such that certain sorts of imaginative failures issue in judgments of impossibility. That is, the link between imagination and modal judgment is an implicit feature of the system, perhaps installed by evolutionary processes or perhaps acquired through some very early learning process.[11]

As we saw earlier, modal philosophers reject the identification of imaginative tendencies and modal judgment. The modal psychologist should follow suit. I've suggested that we are naturally inclined to move from imaginative activities to modal judgment, but the imagination does not force us into unrevisable modal beliefs. For example, even if Joe can't imagine a mosquito bite causing serious illness, he might believe that it's possible because a reliable source has assured him that it is.

Now, has this procedure of using the imagination to gauge risk and opportunity been successful? Although it's hard to find experimental evidence on the issue, it's plausible that the procedure has conferred significant benefits on decision making. Typically, when a person finds it easy to imagine that he will be hit by a car if he stays where he is, it has served the person well to believe that he is at risk. And typically, when the person cannot imagine that he will be hit by a car in his present location, it has served him well not to worry about being hit by a car.[12]

---

[11] One important feature of the above account is that the postulated connection is causal, not constitutive. That is, I don't want to claim that modal judgments are constituted by imaginative activities, only that they are (sometimes) caused by imaginative activities. But there are numerous open questions about which kinds of imaginative failures generate modal judgments and about the nature of the connection between imaginative failures and modal belief. One possibility is that whenever an agent can't imagine that *p*, he immediately forms a belief that it is impossible that *p*; this belief can then be overthrown in light of further consideration. Another possibility is that when an agent can't imagine that *p*, this activates a higher credence level for the proposition that it is impossible that *p*, but countervailing activations might prevent the agent from actually forming the belief that it is impossible that *p*.

[12] Interestingly, when adults imagine how some bad outcome might have turned out differently, they typically focus on some feature of the situation over which *they* had control. For instance, when people injured in accidents imagine ways in which the accident might not have happened, they

Although the evidence is again thin, there is some reason to think that a systematic use of the imagination to assess risk has been a boon in industry. It is now common in industry to use a sequenced form of risk analysis (Failure Modes and Effects Analysis (FMEA)) that attempts first to determine the potential failures of the product and the potential effects of the failure. This involves imagining various scenarios given standing beliefs about the product and the regularities. A number of companies, most prominently General Electric, maintain that adopting FMEA (as part of an overall process known as Six Sigma) dramatically increased their bottom line (see e.g. Slater 1998). The apparent success of FMEA speaks to the effectiveness of using the imagination to assess risks.[13]

Thus, we have one viable explanation for why it would benefit us to be inclined to move from imaginative activities to modal beliefs. When we couldn't imagine that *p* (given our standing beliefs), typically *p* didn't happen, and so *p* wasn't worth worrying about. However, when we could easily imagine that *p*, then *p* often did happen, and it was worth worrying about it. Presumably the success of this way of assessing risks depends on having standing beliefs that roughly reflect the regularities of the world. If the future stops resembling the past, our imagination will be rather less helpful at assessing risks.[14]

5. IMAGINATIVE BLOCKS

In the wild, our modal judgments are typically nomological. And the imagination plausibly plays an important role in delivering these nomological modal judgments. When we are engaged in such imaginative exercises, we take standing nomological beliefs as a starting point. Philosophers of modality are typically concerned with judgments about *absolute*, or unqualified, modalities. Here, of course, the situation is very different. For when we use the imagination to reach absolute modal judgments, we set aside our standing nomological beliefs. But even with these beliefs set aside, we still find ourselves forming modal beliefs from imaginative activities.

In the previous section, I suggested that there is an implicit psychological connection between certain imaginative activities and modal judgment. It's most implausible that this connection exists primarily in order to enable transitions

show a pronounced tendency to imagine scenarios in which they acted differently. One plausible explanation of this is that counterfactual thinking enhances the ability to prevent bad outcomes in the future, and people sensibly focus on features that are under their control (see Byrne 2005: ch. 5).

[13] One salient feature of this kind of risk analysis is that the people conducting these imaginative exercises are very well informed about the domain. Their imaginative exercises are not merely flights of unconstrained speculation. Something similar is likely true when people engage in risk assessment of ecologically familiar domains.

[14] The same consideration applies to hypothetical reasoning, of course—hypothetical reasoning will be less successful if the future stops resembling the past. And hypothetical reasoning is plausibly one of the primary functions of the imagination (Nichols and Stich 2003).

from imaginative activities to *absolute* modal judgments. Rather, the connection between imagination and modal judgment presumably earned its keep by facilitating *nomological* modal judgments. Nonetheless, it is plausible that we exercise this same connection when we form judgments about absolute modality from imaginative activities.[15] When we use the imagination to reach judgments about nomological impossibility, our standing nomological beliefs put constraints on what we can imagine. But when we set aside these nomological beliefs, we still find limitations on what we can imagine. And those more basic limitations can still give rise to modal judgments.

Absolute modal judgments are generated by imaginative limitations that persist even when we set aside our standing nomological beliefs. But we're not interested in any such case of an imaginative failure. Sometimes I can't imagine some scenario because I'm too tired or too distracted. We are interested in something more fundamental. Sometimes our inability to imagine something reflects a basic imaginative limitation. The canonical example is our inability to imagine a counter-arithmetical claim like $1 + 1 = 3$● (e.g. Craig 1975, 1985; Blackburn 1993). Since we're taking a cognitive approach here, we can rely on the competence/performance distinction to characterize this. When a person cannot imagine a scenario because he is fatigued or distracted, this counts as a performance error for our purposes. There are deeper limitations, though, that reflect our imaginative competency. For example, even when we are alert, attentive, fully informed, etc., the claim that $1 + 1 = 3$ taxes our very imaginative competency. Those are the limitations that we will focus on. Following Blackburn, let's call these 'imaginative blocks'.[16]

● Q1

The imaginative blocks lead to judgments of absolute impossibility. Just as the fact that I can't imagine a shark getting to me on the beach leads me to think that it's impossible for a shark to get me there, analogously the fact that I can't imagine that $1 + 1 = 3$ leads me to think that it's impossible that $1 + 1 = 3$. Further, as with nomological judgments, the connection between imaginative activities and absolute modal judgment is defeasible; for instance, testimony from a trusted source can lead me to believe that something is possible despite my inability to imagine it. However, there is a crucial difference between nomological and absolute modal judgments. In the case of nomological modal judgment, the judgment typically depends on standing beliefs about the laws and the world. For judgments of absolute impossibility, we deliberately set aside those beliefs, yet

---

[15] Presumably it's important to our capacity to form nomological judgments from imaginative activities that the capacity be sufficiently flexible that diverse nomological beliefs can guide our imaginative activities. Thus, it makes sense that the connection between imagination and modal judgment would not be tied to a particular set of nomological beliefs.

[16] In her work on imaginative resistance, Gendler makes a compelling case that sometimes we resist imagining certain things (e.g. that the members of some minority group are naturally lazy and stupid) because we don't *want* to imagine those things (2000 and ch. 9 above). On the taxonomy urged above, this too would be a performance limitation.

we still arrive at modal judgments. What we don't find is that if we suspend all beliefs about laws and the world, our imagination is completely unconstrained and our modal intuitions disappear. On the contrary, our imagination is still regimented, and modal intuitions still flow from the regimentation. This presents the modal psychologist with an obvious task—to explain why we have the imaginative blocks we do. I think there is a perfectly good naturalistic explanation that emerges from recent work on the cognitive architecture of the imagination. But before giving the explanation, I want to address one source of pessimism about the naturalistic project.

6. ANTI-NATURALISM

To give a naturalistic account of modal psychology, we need to explain why we have the imaginative blocks that we do. Ultimately, Blackburn doubts that we can meet the naturalistic charge. And it is precisely in explaining how our imagination is constrained that Blackburn thinks we will fall short. He thinks we will never be able to explain the imaginative blocks we have (Blackburn 1993: 71–4). On Blackburn's view, the attempt to explain our imaginative blocks will reach a dead-end because if we see our inclination to rule out p as the 'outcome of a contingent limitation', then 'we are already making something of the thought that p might be true' (p. 71). What is it to 'make something of a thought'? Blackburn says that to make something of a thought includes 'being able to explain how such a way of thought might arise, knowing how it might be rectified, understanding the practices of those whose thought it is, and so on' (p. 66). Thus, Blackburn seems to think that if we were to explain how the imaginative block against the proposition $1 + 1 = 3$ arises, we would accordingly be 'making something of' the thought that $1 + 1 = 3$ might be true; but if we make something of the thought that $1 + 1 = 3$ might be true, then we can't regard it as impossible.

Blackburn surrenders too quickly here. *Pace* Blackburn, a naturalist might be able to explain why we have an imaginative block against the proposition $1 + 1 = 3$ without being able to make anything out of thought that $1 + 1 = 3$ might be true. To see this, consider cognitive boundedness in other species. Chimpanzees can't make anything out of the proposition that the set of real numbers is finite. But obviously a cognitive ethologist can perfectly well make this observation about chimpanzee cognition without having to 'make something of the thought' that the set of reals might be finite. Now our situation is, granted, rather different, because the psychological facts are interestingly different. The chimp lacks the cognitive equipment to make out whether there are finitely or infinitely many reals; in our case, we can't make anything out of $1 + 1 = 3$ because of an imaginative block. But there's a crucial methodological similarity. When we study the chimp, we just note the way his psychology works. We
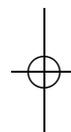
don't have to worry about other ways that it might have worked to track other things (we know not what). Well, when we do the parallel naturalistic project on humans, we're the apes under investigation, and we should try, as far as possible, to achieve a similar distance. In particular, in pursuing a naturalistic explanation of the imaginative blocks, we are not obligated to 'make sense' of propositions that are excluded by our imaginative blocks. We are merely obligated to explain how the blocks arise.

7. ARCHITECTURAL EXPLANATION OF IMAGINATIVE BLOCKS

Why do we have the imaginative blocks we do? To answer this question in a naturalistic way requires consulting naturalistic approaches to the imagination. In this section I'll argue that naturalistic accounts of the imagination do indeed explain why we have the imaginative blocks adverted to by Blackburn.

The core feature of the theory of the imagination that can be used to explain imaginative blocks, I'll maintain, is the 'single code hypothesis', according to which representations in imagination will be processed by inferential mechanisms in the same way as isomorphic beliefs. To explain the single code hypothesis, it's important to get clear about some background assumptions concerning the cognitive architecture of the imagination. First, I will adopt the representationalist approach that is common in this area and say that propositional imagining involves 'pretense representations'. To imagine that Hamlet is a prince is to have a pretense representation with the content *Hamlet is a prince*. Second, I will assume that a pretense representation can have exactly the same content as a belief. Indeed, on contemporary accounts of the imagination, one can simultaneously have a belief with the content p and a pretense representation with the content p. This is nicely illustrated in an experiment of Alan Leslie's. Leslie had young children watch as he pretended to pour tea into two (empty) cups. Then he picked up one of the cups, turned it over and shook it, turned it back right side up and placed it next to the other cup. The children were then asked to point at the 'full cup' and at the 'empty cup'. Both cups were really empty throughout the entire procedure, but 2-year-olds reliably indicated that the 'empty cup' was the one that had been turned upside down and the 'full cup' was the other one (Leslie 1994). On the most natural interpretation of this, the child is *imagining that the cup is empty*. But the child also, of course, *believes that the cup is empty*. This suggests that the crucial difference between pretense representations and beliefs is not given by the *content* of the representation. Rather, contemporary accounts of the imagination maintain that pretense representations differ from belief representations by their *function*. Just as desires are distinguished from beliefs by their characteristic functional roles, so too pretenses are distinguished from beliefs (see also Currie 1995). In our account of pretense and imagination, Stephen Stich

and I exploit the familiar illustrative device of using boxes to represent functional groupings, and we propose that there is, in addition to a belief box and a desire box, a 'pretense box' (Nichols and Stich 2000). The final important background assumption is that pretense representations interact with some of the same psychological mechanisms that belief representations interact with. Consider again Leslie's experiment. Virtually all of the children in Leslie's experiment responded the same way when asked to point to the 'empty cup'. How are these orderly patterns to be explained? The prevailing cognitivist view is that the pretense representations are processed by the same inference mechanisms that operate over real beliefs.[17]

With the functional architecture in place, we can now articulate the core feature of cognitivist accounts that I want to exploit. Stich and I suggest that the representations in the pretense box and the representations in the belief box are in the 'same code', to adopt a computational locution from Leslie (1987: 417). Of course, no one knows what the code is for representations in the belief box, so it's not possible to be specific about the details or the nature of the putatively shared code. But the critical point can be made without giving further detail about what the code is. The key point is just that, if pretense representations and beliefs are in the same code, then mechanisms that take input from the pretense box and from the belief box will treat parallel representations much the same way.[18] For instance, if a mechanism takes pretense representations as input, the single code hypothesis maintains that if that mechanism is activated by the occurrent belief that p, it will also be activated by the occurrent pretense representation that p. More generally, for any mechanism that takes input from both the pretense box and the belief box, the pretense representation p will be processed in much the same way as the belief representation p. I will count any theory that makes this claim as a 'single code' theory. As a result, while off-line simulation theorists don't frame the issue quite this way, they are plausibly viewed as single code theorists. For they maintain that various mental mechanisms process 'pretend

---

[17] Of course, there are probably also mental mechanisms that take input from the belief box but not from the pretense box. For instance, at least on the story that Stich and I tell, the practical reasoning mechanism takes beliefs and desires as inputs, but it does not take pretense representations as input (Nichols and Stich 2003).

[18] This doesn't, of course, mean that the mental processing of pretense representations will be *exactly* parallel to the processing of isomorphic belief representations. After all, the pretense representations do not feed into all of the same mechanisms as beliefs. Another obvious difference is that when the inference mechanisms (for instance) receive input from the pretense box, the outputs are typically sent back to the pretense box rather than to the belief box. Introspection presents yet another kind of case. For when I introspect my pretense representations, the output is a belief about what I'm pretending, and when I introspect my beliefs, the output is a belief about what I believe. So, if a single introspection mechanism processes both pretense representations and beliefs, then this mechanism treats pretense representations and beliefs in importantly different ways. These qualifications do not, I think, compromise the single code hypothesis, insofar as the qualifications seem independently plausible and well motivated.

Shaun Nichols
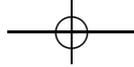
beliefs' much like real beliefs (e.g. Currie 1995; Goldman 1989; Gordon 1986; Harris 1992).[19]

Part of the reason why people have converged on the single code hypothesis comes from our impressive facility at predicting how other people will draw inferences. Why is it that we are so successful at predicting inferences? Do we have a superb theory of inference that beautifully tracks how people actually make inferences? From the earliest days of the debate between simulation theory and theory theory, this option has seemed massively profligate, and the simulation-based explanation has seemed overwhelmingly preferable (see Harris 1992; Stich and Nichols 1995). We excel at inference prediction because when we predict another's inferences, we exploit the very same inference mechanisms that we use when we draw inferences from our own beliefs, and those inference mechanisms treat the pretense inputs much as they would treat belief inputs (for discussion see Nichols and Stich 2003; for some options on how this is implemented, see Carruthers, forthcoming).

One consequence of the single code hypothesis is that if the candidate belief that p would be immediately rejected by the inference mechanisms, then the candidate pretense representation that p will also be immediately rejected by the inference mechanisms. While it's possible to believe disguised contradictions, most philosophers (and psychologists for that matter) would agree that at least in the typical case, we cannot believe obvious contradictions like $p \& -p$. The natural psychological explanation for this is that the inference mechanisms rebel at glaring contradictions—they won't tolerate patently contradictory representations in the belief box.[20] As noted earlier, the inference mechanisms also receive pretense representations as input, and on the single code hypothesis, since our inference mechanisms would reject the candidate belief representation $p \& -p$, so too would the mechanisms reject the candidate pretense representation $p \& -p$. This now gives us the basis for an explanation of the imaginative blocks that underwrite modal judgment. If we try to imagine that $p \& -p$, we encounter an imaginative block. On the single code hypothesis, this block is explained by the fact that the pretense representation that $p \& -p$ would engage our normal inferential systems. And just as our inferential systems would expel the belief representation $p \& -p$, so too do they expel the pretense representation that $p \& -p$.[21]

---

[19] Off-line simulation theorists often have additional commitments of course. For instance, many prominent versions of off-line simulation theory explicitly invoke pretend desires in addition to pretend beliefs, and also maintain that the practical reasoning system takes as input pretend beliefs and pretend desires (e.g. Currie and Ravenscroft 2002; Gordon 1986). Those additional stipulations are consistent with, but not required by, the single code hypothesis (cf. Nichols and Stich 2000; Nichols 2004).

[20] There's a salient issue about what counts as a patently contradictory representation, of course. I'm not sure where or how to draw the line, but I rely on uncontroversial instances of patently contradictory representations.

[21] This account of imagining contradictions is of a piece with some recent treatments of imaginative resistance (Nichols 2004 and forthcoming; Weinberg and Meskin, Ch. 10 above).

Imaginative Blocks and Impossibility   251

In summary, then, here's the reason we can't imagine that p&-p:

i. Our imagination system is hooked up to our sober inferential system.

ii. Our sober inferential system rejects representations like p&-p.

I've gone to some length to argue for (i), and I take it that (ii) is independently plausible. So, we have these imaginative blocks because of the structure of the imagination in our cognitive architecture. If the imagination were entirely detached from our logic circuits and was an unconstrained fantasy generator, then we would certainly not have the imaginative blocks that we do. The architecture of the imagination ensures that there are directions in which the imagination won't stray.[22]

There's a further question, of course, about why we're built in such a way that these two conditions hold. For (ii), the answer is comparatively easy. You don't need to be much of an evolutionary psychologist to agree that it would be adaptive for animals to stop believing p when they come to believe $-p$. For (i), there are a number of possible explanations, one of which is simply that hooking the imagination up to the inferential system was an easy way to facilitate effective hypothetical reasoning (e.g. Nichols and Stich 2003).

8. IMPLICATIONS

We now have in place a naturalistic sketch of a portion of our modal psychology. Humans apparently have an early emerging (and perhaps innate) psychological tendency to form modal judgments from imaginative activities, and this serves, I've suggested, to facilitate reasoning about risks and opportunities. This connection between imagination and modal judgment is exploited when imaginative blocks lead us to form judgments concerning absolute modalities. And we have a naturalistic explanation for why we have these blocks. Now I want to turn briefly to some implications. It's not at all clear what lay people mean by their modal assertions, and I have avoided trying to give a semantics for modal terms. As a result, even if everything I've said above is right, we still can't resolve big questions like whether lay modal judgments are typically true or justified. But I would like to use the modal psychology I've sketched to make a couple of limited observations.

Although I maintain that there is a block against imagining patent contradictions, we can apparently engage with contradictions in reasoning. I can, for instance, use first-order logic to prove for any arbitrary proposition that it follows from a contradiction. However, it's plausible that we need to distinguish these learned logical skills from the blocks that naturally emerge from the architecture of the imagination. See Weinberg and Meskin (Ch. 10 above) for useful discussion of the psychological processes by which we can imagine contradictions.

[22] For simplicity, I've focused on how the single code hypothesis explains why we have a block against imagining contradictions. But the single code hypothesis can also be used to explain imaginative blocks for other 'impossibilities' (see Weinberg and Meskin, Ch. 10 above).

When we try to answer the big questions about the metaphysical ground of modality and our epistemic access to it, there are numerous factors to consider. The typical constraints on theory building—simplicity, explanatory power, productivity—will all come into play. My concern here has been restricted to another factor—the genesis of modal intuitions that flow from the imagination, and in particular the genesis of imagination-driven intuitions about absolute modalities. Most modal philosophers want to provide theories that render those modal intuitions true and justified.[23] The intuitions are, of course, taken as defeasible—we can make modal mistakes. Nonetheless, the typical assumption is that, barring performance errors, our imagination-driven modal intuitions are largely true and justified. The modal psychology described here lends no support to prominent accounts of the metaphysics of modality. At least prima facie, the account of modal psychology I've sketched invokes no fancy metaphysics. There is no appeal to causal relations or psychological associations to modal primitives or possible worlds. Indeed, there is no appeal to causal relations or psychological associations with fictionalist renderings of possible worlds or primitive modalities. Rather, imagination-driven modal judgment has been explained in virtue of processes that are metaphysically humdrum. Naturalistic considerations explain why imaginative exercises generate modal judgments; and cognitive-architectural constraints explain why we have the imaginative blocks that issue judgments of absolute modality. So if the modal psychology offered here is right, these intuitions about absolute modalities are causally adrift from the metaphysical and semantic machinery invoked by prominent modal philosophers. Thus, whatever explanatory virtues modal realism, modal primitivism, or modal fictionalism might have, they do not extend to explaining the intuitiveness of many common judgments of absolute modalities. I've only tried to offer a naturalistic account of a part of our moral psychology. If on the full account of modal psychology, the genesis of our absolute modal intuitions makes no contact with possible worlds, modal primitives, or associated fictions, this raises difficult questions about the propriety of using such metaphysical and semantic machinery to establish that our common modal beliefs are true and justified.[24]

---

[23] Shalkowski (1996) begins his article thus: 'Modal locutions are common enough to give modality an air of legitimacy. Frequently, we talk of things being necessary, possible, inevitable, or avoidable' (p. 375). On the first page of Lewis's *On the Plurality of Worlds* (1986), we find him asserting that 'things might have been different, in ever so many ways. This book of mine might have been finished on schedule. Or, had I not been such a commonsensical chap, I might be defending not only a plurality of possible worlds, but also a plurality of impossible worlds . . . or I might not have existed at all . . . or there might never have been any people. Or the physical constants might have had somewhat different values, incompatible with the emergence of life.' And in *Counterfactuals,* Lewis begins his defense of modal realism by saying, 'It is uncontroversially true that things might be otherwise than they are. I believe, and so do you, that things could have been different in countless ways' (Lewis 1973: 84).

[24] For related arguments, see Benacerraf 1973 and Margolis and Laurence 2003.

The modal psychology offered here thus might underscore difficulties for theories like modal realism and modal primitivism. At the same time, the modal psychology also undercuts attempts to treat modal judgments as merely conventional. For the imaginative blocks that generate judgments of absolute modality cannot be reduced to linguistic conventions. Our imaginative blocks derive from the character of our inference mechanisms. And the inference mechanisms are presumably shaped partly by natural selection, not just by linguistic conventions.

Finally, if the modal psychology sketched here is right, it might contribute to a skeptical view about the epistemic status of imagination-driven intuitions of absolute modality. Given certain widely shared assumptions, like the assumption that the future will resemble the past, it's plausible that the imagination provides a good guide to risk and opportunity. That's in part what it's designed to do. However, when this imaginative capacity is appropriated in the service of judgments of *absolute* possibility and necessity, it's less clear that we can trust the verdicts. For here the psychological systems are being used outside their natural domain. Hence, there's less reason to think that they will be successful guides in this foreign terrain of absolute modality. But obviously such a skeptical position would require a lengthy defense before it would worry the enthusiastic advocate of absolute modalities.

Thus, while the modal psychology scarcely settles the big questions in modal metaphysics and modal epistemology, it does hold promise for partly constraining the theoretical space. And it provides a relatively firm ground from which to explore broader questions about the nature of modality and our access to it.

REFERENCES

Bartsch, K., and Wellman, H. (1995) *Children Talk about the Mind* (Oxford: Oxford University Press).

Benacerraf, P. (1973) 'Mathematical Truth', *Journal of Philosophy*, 70, 661–80.

Blackburn, S. (1993) 'Morals and Modals', in *Essays in Quasi-Realism* (Oxford: Oxford University Press), 52–74.

Bloom, L. (1973) *One Word at a Time: The Use of Single Word Utterances before Syntax* (The Hague: Mouton).

Brown, R. (1973) *A First Language: The Early Stages* (Cambridge, Mass.: Harvard University Press).

Byrne, R. (2005) *The Rational Imagination* (Cambridge, Mass.: MIT Press).

Carruthers, P. (forthcoming) *The Architecture of the Mind* (Oxford: Oxford University Press).

Chalmers, D. (2002) 'Does Conceivability Entail Possibility?', in Gendler and Hawthorne (2002), 145–200.

Craig, E. (1975) 'The Problem of Necessary Truth', in S. Blackburn (ed.), *Meaning, Reference and Necessity* (Cambridge: Cambridge University Press), 1–31.

254   *Shaun Nichols*

CURRIE, G. (1985) 'Arithmetic and Fact', in I. Hacking (ed.), *Exercises in Analysis* (Cambridge: Cambridge University Press), 89–112.

—— (1995) 'Imagination and Simulation: Aesthetics Meets Cognitive Science', In A. Stone and M. Davies (eds.), *Mental Simulation: Evaluations and Applications* (Oxford: Basil Blackwell), 151–69.

CURRIE, G. and RAVENSCROFT, I. (2002) *Recreative Imagination* (Oxford: Oxford University Press).

GENDLER, T. (2000) 'The Puzzle of Imaginative Resistance', *Journal of Philosophy*, 97, 55–81.

—— and HAWTHORNE, J. (eds.) (2002) *Conceivability and Possibility* (Oxford: Oxford University Press).

GERMAN, T., and NICHOLS, S. (2003) 'Children's Counterfactual Inferences about Long and Short Causal Chains', *Developmental Science*, 6, 514–23.

GOLDMAN, A. (1989) 'Interpretation Psychologized', *Mind & Language*, 4, 161–85.

GORDON, R. (1986) 'Folk Psychology as Simulation', *Mind & Language*, 1, 158–70.

HARRIS, P. (1992) 'From Simulation to Folk Psychology: The Case for Development', *Mind & Language*, 7, 120–44.

—— (2000) *The Work of the Imagination* (Oxford: Blackwell Publishers).

—— GERMAN, T. P., and MILLS, P. E. (1996) 'Children's Use of Counterfactual Thinking in Causal Reasoning', *Cognition*, 61, 233–59.

HILL, C. (1997) 'Imaginability, Conceivability, Possibility, and the Mind–Body Problem', *Philosophical Studies*, 84, 61–85.

KRIPKE, S. (1980) *Naming and Necessity* (Cambridge, Mass.: Harvard University Press).

KUCZAJ, S., and MARATSOS, M. (1975) 'What Children *Can* Say Before They *Will*', *Merrill-Palmer Quarterly*, 21, 87–111.

LESLIE, A. (1987) 'Pretense and Representation: The Origins of "Theory of Mind" ', *Psychological Review*, 94, 412–26.

—— (1994) 'Pretending and Believing: Issues in the Theory of ToMM', *Cognition*, 50, 211–38.

LEWIS, D. (1973) *Counterfactuals* (Cambridge, Mass.: Harvard University Press).

—— (1986) *On the Plurality of Worlds* (Oxford: Blackwell Publishers).

MACWHINNEY, B., and SNOW, C. (1990) 'The Child Language Data Exchange System: An Update', *Journal of Child Language*, 17, 457–72.

MARGOLIS, E., and LAURENCE, S. (2003) 'Should We Trust Our Intuitions? Deflationary Accounts of the Analytic Data', *Proceedings of the Aristotelian Society*, 103, 299–323.

NICHOLS, S. (2004) 'Imagining and Believing: The Promise of a Single Code', *Journal of Aesthetics and Art Criticism*, 62, 129–39.

—— (forthcoming) 'Just the Imagination: Why Imagining Doesn't Behave Like Believing', *Mind & Language*.

—— and STICH, S. (2000) 'A Cognitive Theory of Pretense', *Cognition*, 74, 115–47.

—— (2003) *Mindreading* (Oxford: Oxford University Press).

OSHERSON, D. (1976) *Logical Abilities in Children* (Potomac, Md.: L. Erlbaum Associates).

ROSEN, G. (1990) 'Modal Fictionalism', *Mind*, 99, 327–54.

SACHS, J. (1983) 'Talking about There and Then: The Emergence of Displaced Reference in Parent–Child Discourse', in K. Nelson (ed.), *Children's Language*, iv (Hillsdale, NJ: Erlbaum), pp. 1–18.

SHALKOWSKI, S. A. (1996) 'Conventions, Cognitivism and Necessity', *American Philosophical Quarterly*, 33, 375–92.

SLATER, R. (1998) *Jack Welch and the GE Way* (New York: McGraw-Hill).

SPELKE, E., PHILLIPS, A., and WOODWARD, A. (1995) 'Infants' Knowledge about Object Motion and Human Action', in D. Sperber, D. Premack, and A. Premack (eds.), *Causal Cognition: A Multidisciplinary Debate* (Oxford: Clarendon Press), pp 44–78.

STICH, S., and NICHOLS, S. (1995) 'Second Thoughts on Simulation', in M. Davies and T. Stone (eds.), *Mental Simulation* (Oxford: Blackwell Publishers), 87–108.

YABLO, S. (1993) 'Is Conceivability a Guide to Possibility?', *Philosophy and Phenomenological Research*, 53, 1–42.