

Naturalised Modal Epistemology

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Work on possibility, necessity and possible worlds has flourished since the 1970s, and much of the work on the metaphysics of modality has been pursued in a "metaphysics first" manner—many of those working on the metaphysics of modality have concentrated on first-order questions about modality or possible worlds, and left the epistemologists and methodologists to catch up. This reflects a more general trend in metaphysics of the last few decades: after decades of logical positivists, Wittgensteinians and who-knows-else telling us metaphysics was meaningless or impossible or not respectable, a generation of metaphysicians reacted by setting such sceptical doubts aside and getting on with the job. After all, the theoretical reaches of sciences like physics seem to engage with metaphysical questions, and if an epistemology or philosophy of language tells you that physics is meaningless or unsuccessful, doubt the philosopher rather than give up physics.

While I heartily approve of philosophers not waiting for epistemological permission to get on with philosophy, I also think it is welcome that attention is to some extent returning to epistemological questions about modality. These questions are interesting, and hopefully better methods of investigating modality will yield better theories of modality, even if it would be wrong to hold up first-order business until we sort out the epistemology. (If you wait for the question of the method of philosophy to be resolved before you do philosophy, you will be waiting a long time.)

There has been some tendency among the metaphysicians who have turned their attention to the epistemology of modality to think that some special method is required for resolving modal questions (and perhaps other metaphysical questions). (See e.g. Bealer

1998, 2002 and Lowe 2001, especially chapter 1). This, in turn, tends to raise empiricist and positivist scruples that are never far from the surface in other philosophers. If there is a subject matter that would require such powers of discovery in us, perhaps we should suspect that our apparent knowledge of modal matters is a mirage?

This suspicion by itself would justify an exploration of methodologically naturalistic accounts of modal epistemology. "Naturalistic" philosophical approaches are standardly divided into two, often intertwined, strands. Both involve treating philosophical questions in ways analogous to the treatment of scientific questions in the natural and social sciences (or at least treating philosophical questions in the ways authors *think* natural and social scientific questions are addressed). One strand of naturalism, *metaphysical* naturalism, involves treating the metaphysical commitments of philosophical theories as being of the same order as scientific commitments. Metaphysical naturalism often goes along with *physicalism*, which is the doctrine that everything is physical (or some nearby weakening of that thought). Though those who think that e.g. the natural sciences do not respect physicalism may well be naturalists without being physicalists. Metaphysical naturalists may or may not reject the existence of abstract entities, that question often turning on their view of whether the natural and social sciences require the existence of abstract entities for their correctness. And there are other dimensions of variation as well. I mention metaphysical naturalism mainly to set it aside for current purposes.

The second strand of naturalism, *methodological* naturalism, is the approach that requires that philosophical *methods* be those of the natural and social sciences, or at least that those methods be of the same general kind and be generally harmonious with the methods of the sciences, particularly the natural sciences. Methodological naturalism comes in many varieties—for a taxonomy of some of them, see Jenkins 2013. The form of methodological naturalism I will be concerned with has an important negative component and an important positive component. The negative component is that we should not use methods that are too radically different from those in fact used in the natural and social

sciences. The positive component is that we should take the deliverances of scientific and near-enough-to-scientific methods seriously—we should be reluctant to reject the deliverances at least of mature sciences, and be happy to incorporate those in our philosophical inquiries insofar as they are relevant, and we should trust philosophical results derived through appropriately naturalistic methods. None of this is meant to imply credulity—physicists disagree with each other, so we should be at least as happy to disagree with the theories of any given physicist as other physicists are. And we should expect different philosophers applying even good methods to often disagree, so naturalism is not meant to be a device for stifling disagreement among naturalistic philosophers.

So far this specification of methodological naturalism is still rather unspecific. Some of that is unavoidable if I am not to be too idiosyncratic, given disagreements among methodological naturalists. Since it is difficult to discuss methodological naturalism without some more specificity, in the remainder of this section I will put some more flesh on the bones of the particular variety of methodological naturalism that will be my focus.

One decision point for a methodological naturalist is what to say about "folk" methods of inquiry. When I am trying to find out where I put my housekeys, I am afraid I do not put on a labcoat or fire up a statistics program. Nevertheless, I think I employ reasonably good methods to work out where my keys are. Much of our inquiry about our surroundings and each other is not very scientific: I can know when a bus leaves, or which celebrity is marrying which, or what form of government France has, without doing much in the way of science. I think a sensible methodological naturalist will allow that many of the everyday methods we use to determine things do deliver knowledge, and the kind of naturalism I will be exploring here will not be so narrow in what methods count as broadly scientific so as to exclude these. (However, the reader should be aware that some use "naturalistic methods" in a more restricted way so that only scientific methods are naturalistic methods, and so e.g. my house-key finding would not be methodologically naturalistic. Readers who prefer that use of "naturalistic" should

reinterpret the discussion to come as covering both methods that are "naturalistic" in their sense, and also penumbra of methods of the sort that a strict naturalist will likely still find some place for in her understanding of good human inquiry.)

Methodological naturalism should also have something to say about which methods are scientific methods, and to address the question of whether there is one unified method of the sciences, or a wide variety—and if there is a wide variety, which of those methods are the ones the naturalist suggests we endorse. Traditionally methodological naturalists have often taken the natural sciences as their paradigm, but more accommodating naturalists will also want to take advantage of successful methods in the life sciences, in historical sciences such as geology and palaeontology and to some extent cosmology, and in my view ought to take seriously the accomplishments of human and social sciences such as economics or psychology.

This is not the place to attempt an overall theory of scientific method, nor to settle the question of what methodological commonalities there are in successful scientific inquiries. Fortunately, some rules of thumb can help us classify methodological proposals as naturalistic or not. I will take it to be a sufficient condition for a piece of methodology to be naturalistically respectable if it is closely analogous to methods self-consciously employed in the sciences. (A method can of course be *naturalistically* respectable but not respectable tout court—no doubt there are pockets of bad methods in science, and a philosopher who follows those methods risks also doing bad work.) And I will take it to be a close-to-sufficient condition for a methodological proposal to *not* be naturalistically respectable if it largely relies on a method which by scientific standards appears worthless for acquiring true beliefs, or it relies on methods that, while scientific standards may be silent about them, do not hold out the prospect of being vindicated by scientific standards. No doubt these rules of thumb are not perfect even across their domain, and they leave unanswered the further question of what the standards of the sciences are, but they should be enough to be getting on with.

A vexed question is the place of the "deductive sciences" in a methodologically naturalist program. Can a naturalist in good conscience take the methods of mathematics and logic much as she finds them, perhaps on the grounds that they form part of successful scientific inquiries, or is she obliged to give a non-obvious account of their methods to assimilate them to the paradigm non-deductive sciences? This issue is an important one in the current context, since a lot of investigation of modality can resemble research in logic and mathematics, e.g. in work on modal logic and the model theory of modal logic, respectively. We would have a shortcut to naturalism about modal inquiry if it turned out to be similar enough to logic or mathematics, which in turn was automatically naturalistically respectable.¹ However, I will not try to travel this road in this paper, but instead will focus on methods that can be assimilated to the methods of the non-deductive sciences. (Though as we will see on p XX, if mathematical method itself can be assimilated to the methods of the non-deductive sciences, that may provide a model for assimilating modal inquiry to the non-deductive sciences.)

The final topic to be addressed, given the topic of my paper, is the connection between methodology and epistemology. Pursuing methods of various sorts provides answers to questions and claims about the target of inquiry: but what should the methodological naturalist say about whether the answers are *warranted* or *epistemically justified* or are *true* or are *known*? This is another point on which different naturalists will disagree, depending mainly on what they think we can expect from science, epistemically speaking. It is possible to be a naturalist and have an instrumentalist view of theories across the board, including the theories of natural science, for example. Those naturalists are not likely to think there is much knowledge or even truth about the subject matters of our theories to be had. However, I will have a more optimistic naturalism in mind: the kind of naturalism that takes scientific methods to be good ways to gain both truth and knowledge, and which aims to garner truth and knowledge in modal matters. The question of the epistemic credentials of science is rather too large to go into here, but my

¹ This would be an obvious strategy to try if one sought a naturalistic vindication of the work done in Williamson 2013, for example.

hope here is to explore a plausible *epistemology* of modality, and not just a method of inquiry that will yield conclusions with no claim to be items of knowledge.

With that much said about methodological naturalism in general, let turn to the question of what, specifically, a naturalised epistemology of modality might be. It would be unhelpful to insist on too great a similarity between modal inquiry and inquiry in particular sciences: we will not look for the modaltron in a particle accelerator or cultivate necessity in an agar dish. Modality has the feature that we implicitly seem to know a lot about what is necessary and what is possible, but it is puzzling how we could know very much about those matters, or how we could resolve disputes and paradoxes that naturally arise when we expand our modal theorising beyond the commonplace. In this way, modality is similar to a number of other philosophical topics! I advocate, in cases like this, an investigation of what we are already doing when we think we are modalising well, to see if we can articulate what is good about successful modal inquiry. Then we should do more of that, together with any improvements in methods we come upon along the way.

To do that naturalistically, we should use scientific techniques, and techniques analogous to scientific techniques, to investigate what we are doing already, and look to the sciences, and the history of scientific methods, for suggestions about how to systematise and improve our methods. And we should be prepared to consider abandoning methodological naturalism about modality if we discover that our currently successful methods in modal inquiry are too different in kind from methods successful in the sciences. I would not want to suggest this is the *only* way to be methodologically naturalistic about modality: only that it seems to me one promising way to proceed.

Our modal opinions carry across a wide area: not just explicit judgements of metaphysical possibility and impossibility, but judgements about the truth of counterfactual and other conditional claims, judgements of feasibility and ability, judgements about dispositions, powers and chances, and as Kment 2014 has pointed out, judgements about what "nearly" happened or "almost" happened. Many uses of "can"

"must", "has to" and the rest concern quite restricted modalities: what can happen, given many features of the world which themselves seem contingent when we take a more generous view of what is possible. Working out the situations in which these restricted claims are true, or at least are judged to be true by apparently competent judges, seems to me more empirically tractable than directly trying to determine anything about e.g. what is metaphysically necessary. However, a systematic and explanatory theory of these restricted modalities will, in my view, bring with it an account of "metaphysical" possibility and necessity, as well as other kinds of possibility of more traditional interest to philosophers. Likewise, empirically informed work on conditional matters, dispositional matters, ability claims, and so on will yield generalisations to be further explained by a systematic theory: and that systematic theory, testable at least indirectly through its connection to more directly tractable matters, will be the way we will come to know answers to more recondite modal questions.

Indeed, when seen through a naturalistic lens, this seems to me what is already happening to some extent in our modal theorising: the system of our modal views is sensitive, however imperfectly, to ordinary modal opinions in common sense and science, even though the typical arguments of a philosopher of modality are somewhat removed from this data, just as much of the work of theoretical physicists is somewhat removed from instrument readings or even lab reports.

Why naturalise?

Naturalism is sometimes proclaimed rather than argued for, but I think a brief defence of methodological naturalism about modality is in order, especially since a number of metaphysicians of modality seem to be suspicious of naturalistic method for this topic. Bealer 2002 and Lowe 2001 are prime examples, and even David Lewis's brief remarks on modal epistemology, particularly Lewis 1986 pp 111-113, look rather unlike the

methods he would advocate for much of natural science.² Naturalism about modal epistemology seems to me to be attractive for at least three reasons, though I do not think this list exhausts its appeal. The first reason is that the techniques of the sciences, particularly the natural sciences, have been very successful in a range of inquiries, so if we can find a way to usefully apply them to modal questions we have some reason to hope that we might have the same kind of success.

The second reason to expect that naturalism will be applicable here is that it is suggested, or even forced on us, by the appeal of *holism* about inquiry. What we decide about one topic of inquiry has knock-on effects for what we should say about others, and discoveries in one area often lead us to change our mind about quite different topics. Refinements of our ability to engineer measuring instruments can yield changes in our opinions about the atmosphere of other planets, or the early universe, or sub-atomic particles, for example. Very few if any of our inquiries are methodological islands: and this suggests that discoveries made through scientific methods should bear on questions outside the traditional domains of particular sciences. Likewise, if the answers given by our different inquiries are intertwined, it would be surprising if non-scientific methods resolved some of our questions without bearing on scientific inquiry. If holism about inquiry is correct, our modal investigations will bear on traditional scientific questions and vice versa: so methods appropriate for resolving scientific questions would have to be relevant for modal inquiry, at least indirectly.

A third motivation for naturalism about modal methodology stems from *metaphysical* naturalism. If, for example, modal facts are nothing over and above physical facts, plausibly the physical sciences would be a way to get epistemic access to these facts. This is perhaps the weakest of the three motivations for methodological naturalism about

² I wish to head off one potential muddying of the waters: Lewis does use the expression “naturalistic epistemology” on Lewis 1986 p 113 – but there he is using it to mean the descriptive question of “how do we come to have the modal opinions we hold”... “[n]ever mind what makes our modal opinions count as knowledge”. I am referring to his sketch of what might make our modal opinions *knowledge*, and why e.g. reliance on observation is inappropriate.

modal questions. As stated, it appears to rely on the assumption that the physical sciences are well suited to access *any* physical facts: and even though I am a physicalist e.g. about taxation rates, I would not recommend doing physics to calculate your tax bill. I will argue later in the paper that looking at the methods of the sciences, including the physical sciences, can help us answer modal questions, but in not such a flat-footed way. Perhaps the best case from metaphysical naturalism runs something like this: the basic thesis of metaphysical naturalism, *plus* some theses about which natural facts appear as modal facts, or as closely connected to modal facts, together will tell us the study of those natural facts will shed light on modal facts: and if our investigation of those other naturalistic facts is through scientific means, then those scientific means will shed light on modal questions. The final step of that reasoning is itself a substantial step that could be queried, once we notice that there is no guarantee that the best way to investigate natural facts is to do science: but it may be plausible given some particular conjectures about what natural facts modal facts are connected to.

None of these three considerations mandate methodological naturalism about modality, but they at least justify an investigation of what a naturalistic approach might yield. The ultimate justification of a naturalistic approach to modal questions would be to show how it yields more knowledge, or at least plausible opinions, than we could have expected otherwise, or as an alternative that it provides an independently appealing theoretical framework for integrating and explaining why some methods of modal inquiry are good and some are not. In the remainder of this paper I will take a less abstract look at what a naturalistic approach to modal method might look like: first considering the extent to which we would need to abandon traditional methods of modal inquiry (short answer: much less than you might have thought), and second considering whether thinking about modal method naturalistically might produce some methodological benefits for the study of modality (short answer: it probably does).

How Revisionary Does Naturalistic Modal Epistemology need to be?

One might have thought that taking a naturalistic approach to modal epistemology would require significant revisions to how philosophers trying to answer modal questions should go about their business. After all, according to the standard conception of the metaphysics of modality, among our primary methods for learning modal truths are reliance on intuition and testing the limits of what we can conceive, reliance upon a priori knowledge, including knowledge gained from conceptual analysis, and considering fit between our explicitly modal claims and the claims elsewhere in metaphysics and other areas of philosophy. None of these, on the face of it, seem much like method in the sciences.

On closer examination, however, naturalism can make room for all three methods. Whether we should be the kind of naturalists that accommodate them is another question, one that is too big to address here: my purpose here is merely to point out some ways one can be a naturalist without condemning a lot of work that is already being done on modality.

The use of imagination and "conceiving" in answering modal questions has received a lot of attention in writing on modal epistemology (see for example the papers in Gendler and Hawthorne 2002), with some writers going so far as to say it is a central method of determining the answer to modal questions.³ Closely connected to this activity is the activity of considering philosophical thought-experiments to come up with modal verdicts: in particular, one way to suggest that something is possible is to describe the right sort of imaginary scenario in which it happens. (See for example Black 1952 on the possibility of indiscernible but distinct objects, or Gettier 1963 on the possibility of justified true belief without knowledge.) Often this is described as reporting our "intuitions" about possible cases: and while "intuition" seems to be used in many ways by philosophers, I will include intuitions about imaginary cases in the general category of

³ Yablo 1993 does not say this in as many words, but he does agree that "[n]o independent evidence exists that conceivability is a guide to possibility – no evidence obtainable without reliance on the faculty under review". (p 3) Presumably if there is no evidence about modality obtainable without the faculty of conceiving, conceiving had better be a pretty central method.

relying on conceiving, imagining and employing thought experiments. Note I intend “conceiving” to go beyond mere sensory imagination here: when we conceive of someone in a Gettier case, we do not “see” the true justified belief without the knowledge.

On first blush resolving questions about the world by sitting around and imagining things is not a scientifically respectable method of proceeding. (A partial exception might be made for the science of imagination itself.) One way to understand this activity more scientifically respectable as a source of data is to notice that, in one important way, this conceiving and imagining is not the start of the epistemological process at all. After all, when we make plausibility judgements on the basis of imagination or thought experiment, our imagining and thought experimentation is informed by a lot of what we know about the world. When I try to work out whether I would notice an adult rhinoceros in a carpark in front of me, I use not only particular information I have about the carpark, my relation to it, and my senses, but also general information about the size and noticeability of rhinos. Likewise for many other ordinary modal judgements made on the basis of imagining: the Eiffel tower could be painted pink, the Pacific Ocean could not fit in my coffee mug, and so on. Just as these acts of imagination utilise a lot of non-modal information I already possess, presumably they also utilise a lot of modal information I already possess: about what can go in cups, how unobtrusive adult rhinos can be, what paint can do when put on steel, and so on.

While it is hard to deny that we use imagination and thought experimentation when considering particular modal questions that may not have occurred to us before, I do not think that there is much pressure to think of the process of imagination as one that does not rest on any pre-existing modal assumptions we might have. And provided that the source of those modal opinions is naturalistically respectable, manipulating them using imagination to draw out consequences need be no more mysterious than discovering whether one chair is taller than another by imagining them next to each other. At least for naturalists who are happy with informal “folk” methods of inquiry, using imagination and

“conceiving” to answer some modal questions can be seen as just a particular application of a general-purpose method we have for utilising implicit opinions we already have.

I would be uncomfortable with an inquiry that had as the entirety of its data the results of attempts to conceive of things, or imagine things, and reports of the verdicts of thought experiments. So if modal enquiry was nothing more than cataloguing these, that would not seem very worthwhile, any more than determining lengths of objects only by imagining them side-by-side would be. But as a way of drawing out our initial modal opinions, that can then be systematised, compared with other modal judgments we are inclined to make, and the modal claims our accepted theories make, imagining and conceiving can play a role in modal theorising without dominating it. Compare: a theory of motion based entirely on imagining moving bodies would be suspicious and only dubiously scientific, but a theory that takes seriously Galileo’s thought experiment about falling bodies tied with thin string in narrowing the acceptable theoretical options for falling bodies seems entirely respectable.

One thing that may make imagining and conceiving especially useful in some cases is if it is a way of bringing to consciousness information encoded in inaccessible or even sub-personal systems. Maybe there is no other introspective method of knowing that an event has a particular emotional resonance for us without imagining it, or knowing what associations we have for a scent we have not experienced for a long time without imagining that scent. If some of our internal representations of modal information are not very introspectively accessible to us, imagining and conceiving may be of special use in bringing out that information for conscious scrutiny. It would be speculation to say modal information is often like this, or even sometimes like this, but I think that is plausible about some topics at least. I sometimes try to work out what putting different foods together would taste like using my sensory imagination, and I can do this not just to make predictions about future combinations, but to form opinions about merely possible combinations I do not plan to put together – but I do not see how I could, in practice,

form some of these judgements about merely possible combinations without my sensory imagination or the imagination of others.

This reliance on a pre-existing sense of the answers to modal questions, if it is the full story about our access to modal truths through conceiving and imagination, does cast doubt on how central these methods are, or should be, to our modal investigations. But this account of these methods should be enough to accommodate some of the famous uses of cases in arguments about modality. It is possible that there be a bronze statue created at the same time as the piece of bronze that makes it up, and which is destroyed at the same time as that piece of bronze, but which nevertheless has the property of possibly being destroyed without destroying the piece of bronze, for example. That possibility tells us something interesting about temporal and modal identity conditions, but we discover it through a thought experiment. Furthermore, relying on conceiving and imagination seems to be entirely fine for many ordinary modal judgements: whether this round peg can fit in that square hole, whether I could hit that window with this rock, whether I can pour the rest of the juice from that bottle into this glass. Being able to make many modal judgements reliably using this mechanism is good news for modal inquiry, even if we sometimes have to be suspicious of it when it is turned on topics of more philosophical interest.

Let me now turn from discussing using conceivability to the use of a priori judgements in modal epistemology. Relying on a priori judgements and conceptual analysis is an anathema for some naturalists (see for example Devitt 1996). But there is no obvious tension here. Take, first of all, analytic *a priori* truths. It is not particularly an anti-naturalist thought to hold that words have meanings, and those meanings put some constraints on the truth-conditions of the sentences in which those words appear. (You might even think those meanings determine the truth-conditions!) And if they do, there may well be constructions that are guaranteed to be true, given the meanings of those words, and others guaranteed to be false. “Jones is not a married bachelor” may not need much scientific inquiry to settle. Furthermore, there is nothing particularly non-

naturalistic in thinking that competent speakers have a certain amount of awareness of at least some of the facts about the meanings of their expressions. Indeed, most standard accounts of how we decide what to say give a role to our awareness of what the different options we could produce may mean. (How would we find that out? With the same sort of information we use in learning to speak a language. A lot of it will come from observing the speech and actions of already competent language users.) Put those thoughts together, and it does not seem too odd to think that we could tell some claims are true and some are false just in virtue of our semantic competence: which matches some accounts of what it is for something to be knowable *a priori*.

Rey 1998 is one naturalist who has developed an account of a priori knowledge of analytic truths, though one can of course be a naturalist with faith in folk linguistic knowledge of the right sort without accepting the details of Rey's theory. Indeed, those who think that empirical semantics is a respectable department of linguistics are likely to think that semanticists are (or are potentially) scientists establishing which sentences are true and which are false just due to their meaning, and which have a further component to their truth or falsehood settled by matters of fact: and if empirical semanticists can know these things qua scientists, what's contra-naturalistic about the rest of us finding out roughly the same thing? (I will say something more to defend the naturalistic credentials of linguistics below.)

Likewise, there is nothing particularly anti-naturalistic in thinking that we have concepts, the deployment of which can give us true beliefs about the world. Again, Rey 1998 sketches a model of concepts that would let agents come to true beliefs through deploying them, and more than that: those true beliefs would be warranted and cases of knowledge. Rey works with a relatively reliabilist picture of what makes true belief knowledge, but more complex epistemological stories are also available. Jenkins 2010, for example, has an account on which the acquisition and/or retention of our concepts through experience leads some of those concepts to be *grounded*, which is a matter of "non-accidental relevant accuracy" (p 264): notions she in turn unpacks in other work. Once in

possession of grounded concepts, they must be deployed appropriately in conceptual analysis: but when they are, the resulting beliefs are knowledgeable (to use Crispin Wright's expression). That information about the outside world could be encoded, by experience, in mental states ('concepts'), and that information could then produce beliefs through person-level processes of examination of those concepts, is not a particularly mysterious or anti-naturalistic picture about how reflection on our concepts could tell us about the external world.

To give a naturalistically respectable account of knowledge of conceptual truths is not yet to show that relying on one's concepts for information about the world is methodologically naturalistic. After all, relying on concepts might be a legitimate source of knowledge without being a method employed by the sciences. One could try to argue that knowledge from concepts is relied on, at least implicitly, in many scientific endeavours. (Since Jenkins thinks this is the source of much of our mathematical knowledge, she may well be happy to take this route.) Even leaving that aside, however, it is easy enough to see how we could explore the deliverance of our concepts scientifically, as part of psychology or cognitive science. A naturalist is likely to want to situate our reliance on information from concepts within such a scientific understanding of concepts and their use, since we should be on the lookout for ways of improving the deliverances of our concepts and cases when our concepts may lead us astray. At least when a project of exploring knowledge from concepts is allied to a project of the scientific exploration of this process, I think a naturalist will have little to complain about, qua naturalist, in seeing what modal knowledge we can discover here. In any case, we should not be too precious about whether conceptual analysis is or is not naturalistic: the main point I want to make is that there is little reason for the methodological naturalist, qua methodological naturalist, to be opposed to the use of conceptual analysis, even if she opposes some of the anti-naturalistic theories of how conceptual analysis works.

One more thing remains to be established, even for a naturalist sympathetic to analytic *a priori* truths: how much *modal* information we can get from analytic truths. It is often supposed that analytic truths are all necessary: but can that itself be known *a priori*, either in general or in specific cases? Some analytic truths might be useful without a general principle about analytic truths: it is plausibly analytic that “necessarily” is equivalent to “not-possibly-not”, for example, and knowing that gives us a very useful modal axiom. Likewise, it is plausibly analytic that (non doxastic, non deontic) necessity always ensures truth: and without the T axiom many modal logics would be hamstrung. Analytic truths will be a much more fruitful source of modal information, however, if we can justify a principle that analytic truths are in general necessary. (Perhaps there are some exceptions, such as supposedly contingent *a priori* cases.) While I share the general sentiment that most analytic truths are necessary, I confess I am much less sure why this should be the case.

Analytic truths may also be of assistance with the epistemology of some synthetic necessary truths. Many people have thought that Kripkean cases of the “necessary *a posteriori*” have their roots partially in general analytic modal principles: that every material object essentially has the origins it has, or that every natural kind has certain aspects of its internal constitution necessarily. Whether these alleged analytic truths really are analytic (or really are true), there are less controversial cases: given the meaning rules for the “actually” operator of quantified modal logic, $@p$ is guaranteed to be necessary provided p is true: so while “actually there are Australian kangaroos” is not analytic, analytic principles about “actually” plus the truth that there are Australian kangaroos together guarantee it is necessary. I am suspicious of how much of the interesting metaphysical necessities depend on analytic truths even in the extended sense in which the previous examples do, but even without these analytic truths should provide a rich vein of necessities.

What about the final method I mentioned, that of co-ordinating one’s modal commitments with one’s other philosophical commitments? We may alter our modal

judgments because of philosophical problems that pit them against other attractive principles. For example, we may be tempted by each of the views that a given statue is identical to a lump of clay, that the clay has the property of possibly surviving squashing and the statue does not, and Leibniz's Law, according to which identical objects share all their properties. In resolving this paradox, we may well revise our modal views, either about which things have which modal features, or that modal features are somehow sortal relative or otherwise "inconstant" (see e.g. Noonan 1991). Another kind of case where we might change modal judgements in the light of metaphysical considerations can occur when we inquire into the metaphysics of modality itself. For example, David Lewis was led by his concrete modal realism to deny that it is metaphysically possible that there be nothing (Lewis 1986 p 73), since that possibility could not be accommodated given his account of possibility. Or to take another example, D.M. Armstrong's combinatorial theory of possibility led him to reject the possible instantiation of "alien" universals, universals not found in the actual world or made up from those that are (Armstrong 1989 pp 54-6). Whatever one may think of the wisdom of these particular philosophical moves, the general idea that one's modal commitments should be in harmony with one's other metaphysical commitments is surely appealing.

It is easy to see why a methodological naturalist might be suspicious here. If an entire metaphysical enterprise proceeded by little more than reflective equilibrium of a range of otherwise unsupported opinions, the result may be a coherent world-picture, but might be entirely disconnected from how things in fact are. I imagine some of the traditional opponents of metaphysics would have just this suspicion about analytic metaphysics. But whether there is anything to this suspicion rather depends, to a great extent, on whether the other metaphysical commitments, logical commitments, and so on are naturalistically objectionable. The methodological naturalist about modality should, I hope, be sympathetic to methodological naturalism about metaphysical questions in general. And the naturalist should welcome constraints on our modal theorising from other parts of our theory that are supported in methodologically naturalistic ways. As someone who is sympathetic to methodological naturalism across the board in metaphysics, I think it is a

virtue rather than a vice that our modal theorising is informed by our metaphysics in other areas. Again, there is an analogy here with the debate about naturalism and reflective equilibrium in ethics: a naturalist might well be suspicious of a method of “narrow” reflective equilibrium, where all we do is bring our moral opinions into coherence with our other moral opinions, but a naturalist should have much less concern about a method of “wide” reflective equilibrium, in which we bring our moral opinions into coherence with our opinions in general, including our scientific and naturalistic ones.

Naturalism about modal epistemology need not dismiss many of the approaches currently taken to investigating modal questions, even if naturalists should sometimes resist the views of practitioners themselves about why the methods they employ are getting to the modal truth. My own preferences are for relatively ecumenical naturalism that does make a place for all three of the methods discussed to some extent. Of course, one can be a naturalist who *also* rejects one or more of these three methods as sufficiently truth-tracking or worth serious attention: but those naturalists ought not claim that there is anything in them that need conflict with *naturalism*, whatever other problems they might diagnose.

What Could A Naturalised Approach to Modality Add?

A naturalised epistemology of modality would be methodologically disappointing if all it ended up doing was rubber-stamping the methods we are already using when working out answers to modal questions. Even if methodological naturalism has a place for relying on intuitions, for something like old-fashioned conceptual analysis, and bringing our modal opinions into equilibrium with our other philosophical commitments, for it to be particularly methodologically interesting, it should point us in the direction of ways of investigating modality that are not already receiving due attention.

Luckily, I think there are several lines of inquiry that methodological naturalism about modality suggest, and several of these lines of inquiry may strike theorists of modality as

interesting even if they are not themselves methodological naturalists: if so, all the better. The list of suggestions I will offer is not at all meant to be exhaustive.

If our discovery of modal facts is a process not dissimilar to our discovery of other, better understood, ranges of facts, then investigation of ourselves and our capacities to respond to the world might indirectly shed some light on what we are responding to when we get the modal facts correct. The investigation of modality could thus benefit from a more systematic study of the psychology of modal judgements. Merely detecting what prompts modal judgements would not settle epistemological questions, but on the assumption that ordinary users of modality are doing a good job with at least a limited range of modal questions, investigating how they in fact form their judgements should provide us defeasible accounts of what it takes to correctly form those judgements, and what it takes to form them with warrant and in knowledge-producing ways.

Let me briefly mention two areas of modal psychology that it seems to me would repay further study by philosophers concerned with modal epistemology. The first is the study of the development of modal judgements in children, along with related judgements about counterfactuals, truth in fiction, conceivability, and so on. (One of the pioneering works in this field is Piaget 1987, and an example of recent work in this area of interest to philosophers is Buschbaum et al 2012).⁴ The psychology of adult judgements about possibility, especially the more generous senses of possibility of particular interest to philosophers, is also relevant (see Shtulman and Tong 2013 for one interesting recent example). Psychological research exploring the necessity claims and counterfactual claims we are inclined to make is also potentially illuminating: see e.g. Rips 2001 for discussion.⁵ Extracting lessons either about modal truth or the epistemology of modality from psychological experiments is far from straightforward, but no more so than in many other cases of constraining theories by experiment.

⁴ The relevance of this sort of research to modal epistemology is also argued for by Nichols 2006 pp 252-253.

⁵ Thanks to Bob Fischer for discussion here.

The second area of the psychology of modal judgements is one that I am currently less familiar with, but which has attracted the attention of a number of philosophers of mind: the study of perception of *affordances*. It seems to be a relatively fundamental part of the content of many perceptual contents that objects around us present *affordances*: for example, they are graspable, or provide a place to stand, or can be opened, and so on (Gibson 1979). This perception of opportunities and options and possibilities, and non-perceptual beliefs about these features of our surroundings, seem to be a relatively basic part of our epistemic repertoire, and seems to be providing modal information, or at least dispositional information. A good understanding of when we have knowledge of affordances would be a great help in seeing how the project of gaining knowledge of modality might get started: and producing a good theory of affordance perception and affordance judgements seems like a job for the standard techniques of cognitive psychology. Here, incidentally, is one point where we might get empirical traction on one debate between naturalists and non-naturalists about modal method: if the best cognitive psychological model of our knowledge of affordances brings in a faculty of modal intuition, or a mechanism of Kantian transcendental aesthetic, or a non-perceptual source of information about the modal identity conditions of Aristotelian kinds, then methodological naturalism about modality, in its current incarnations, is in trouble. If the psychological mechanisms are more prosaic, on the other hand, as I predict they will be, that should add to our suspicions against the view that some special intellectual faculty is needed for modal knowledge.

The literature on perception of modal matters has important epistemological ramifications in another way. One of the pressures towards a distinctive epistemology of modality is the traditional empiricist thought that the senses can only tell us what is the case, not what must be the case or what is non-actual yet possible. If we perceive mere possibilities, then this thought is mistaken at its root, and we can treat modal information about the world more like information about mass or colour or distance.

Another area of scientific inquiry that has been used more by philosophers of modality is the study in linguistics of the behaviour of modal expressions in natural language. Perhaps because of its close affiliations with philosophical logic and traditional philosophy of language, theories of the behaviour of modal expressions in natural language and philosophical views of modality have cross-fertilised each other: Anjelika Kratzer's work on the semantics of modals and related expressions (e.g. Kratzer 2012), for example, was affected by, and affects, work in both philosophy and linguistics. Again, one might doubt the epistemic relevance of this work to modal questions: why suppose that facts about the way we talk about modality tell us anything about what the truth about modality is? I think work on the linguistics of natural-language modals can help us in our modal theorising in a number of ways. On the assumption that we pre-theoretically have a lot of modal knowledge, you might expect that knowledge to manifest in our competent language use: that we would tend not to assert modal sentences unless their truth-conditions were satisfied. Another way it might help us is by giving us traction on the question of which apparent analytic truths are genuinely guaranteed by the relationships between the meanings of words and which are not; and together with reason to think analytic truths are necessary, this could yield modal knowledge. A third way it might be illuminating is in suggesting modal theories for further evaluation: to take one obvious case which is old news, the analogies between modal expressions and quantificational expressions have suggested to many that talk of necessity and possibility is implicitly a matter of quantification over possibilities: and whether or not this is in the end the way to understand modality, building a theory of modal language using a possible worlds semantics yielded a powerful and unified theory.

Semantics, especially formal semantics, is not a typical poster-child for methodological naturalists. It can be accused of having the same armchair character as a lot of philosophy: a lot of it consists in model-building by investigators who are not fresh back from corpus searches or delivering questionnaires to naive informants. But both directly and indirectly semantics is constrained by empirical research on languages. There is more and more directly empirical work done to develop and test semantic theories (see

Glynn and Fischer 2010 for examples in the case of cognitive semantics). It is also constrained indirectly in a number of ways: semantics is constrained to make contact with syntax, for example, and empirical research that influences theories of syntax feeds through to influence semantic theories trying to match that syntax. Beyond that, it should be obvious that even learning one's home language requires investigation of the world, albeit the sort of investigation often carried out by language-acquiring infants. This is investigation of one's own linguistic community and how they talk. There is a lot to learn about English that an English-speaker must acquire, for example, so even a native English-speaking linguist relying on her own linguistic competence for guidance in constructing a theory of English has a very sophisticated body of naturalistically respectable information to go on, albeit a body of information that it can be tricky to access in the needed ways.

Looking more carefully at the psychological and linguistic role of modal judgements should be particularly important for expressivists about modality, since the empirical core of that view is that modal claims have a function other than expressing beliefs or stating modal facts, and that they express some psychological state other than belief: a state which we should therefore expect to be typically present when competent modalisers make modal claims. But non-expressivists should be interested for a different reason: they might hope that we can learn something about what in the world is being tracked by those judgements, and so what the truth-conditions of those judgements are. Another psychological or psycho-social matter which modal expressivists have been particularly interested in, but which should be interesting to realists as well, is the question of what modal judgements do for us – as Divers 2010 puts it, the question of the *function* of modal judgements. One reason for expressivists to be interested in this question is because it can help us construct a theory of what is being expressed when people make modal judgments. But one reason for naturalist realists to be interested in the same question is because they should hope that identifying how we do better for going in for moral judgements can help us identify what it is about the world we are getting right

when we make successful modal judgements.⁶ There is an analogy here with moral naturalism: when a theorist like Railton sketches a story about how sensitivity to the moral truth could help us with our goals (see e.g. Railton 1986), he can be seen as offering a story about the *function* of moral judgments that buttresses his naturalistic moral realism: though Railton himself does not put what he is doing in quite in this way.

A focus on what produces modal judgments, and what practical benefits we secure when successfully modalising, seem to me interesting questions in their own right, even apart from any light they shed on how we can improve our methods for getting it right about modal matters and avoiding errors. Even those who think we have non-naturalistic methods for discovering modal truths should allow these are not only interesting questions, but ones which may be fruitfully investigated using naturalistic methods.

There are several ways a detailed look at the use of modality in the sciences might assist us epistemologically. One way would be analogous to the arguments associated with Quine and Putnam offered for a naturalised vindication of mathematics. (See e.g. Quine 1981, Putnam 1971 ch 8, Colyvan 2001). According to this style of argument, confirmation of theories is somewhat holistic: if a theoretical package is empirically successful as a whole, then any part of that package "indispensible" to it accrues empirical confirmation. Quine and Putnam suggest that mathematics is indispensable to contemporary physics and other natural sciences, which between them enjoy a lot of empirical confirmation, so the mathematics needed for those scientific theories is confirmed as well.

By analogy, if successful scientific theories contained, as an indispensable part, modal claims or modal commitments, then according to one variety of naturalist, at least, those modal claims would share in the confirmational success of the theories they are

⁶ Investigation of the psychology of modal judgement may also drive some naturalists towards anti-realist accounts of modality of one sort or another: see for example Mizrahi 2014. Thanks to Bob Fischer for this suggestion.

embedded in. There are related ways modal claims could be confirmed by forming part of successful scientific theories. For example, Colyvan defends a view of indispensability arguments where the standard is best seen, not as *indispensability*, but whether (e.g.) physics without mathematics would be *as good a theory* (Colyvan 2001 pp 78-86). If non-mathematical physics was less simple, or less explanatory, or less unified, or otherwise less virtuous, we may rightly prefer mathematical physics *even if* a non-mathematical physics that was empirically equivalent to our current theories could be constructed. I agree with Colyvan, since I also think that simplicity and other theoretical virtues are epistemically important and not merely pragmatic.

So if successful scientific theories were better with modal claims than without, we would potentially have an indispensability/inference to the best explanation argument for the truth of those modal claims. At least, this would be so if the epistemological assumptions behind this line of thought can be vindicated: but there is certainly not anything anti-naturalistic in having confidence in this strategy. I should note explicitly that when looking for successful modal theories, we need not stick to physics or other natural sciences, as Quine might: perhaps the successful theories that vindicate modality might be, or include, inquiries like psychology or linguistics. If the only theories that were "best" with modality were found in the human sciences, that might suggest that modal features of the world were somehow "secondary qualities": and while the question of whether modality is a "secondary quality" is an interesting metaphysical question, naturalised epistemology need not stand nor fall with any particular answer to that question.

Whatever we think of comparing overall theories by the lights of overall virtues as a way of confirming their components, there is another way examining the use of modality in successful sciences can help epistemologically. It's a safe bet that successful inquiries are doing something good, epistemically speaking: or at least a methodological naturalist should think so. When we come modal components of successful sciences, looking at how those components got there and what circumstances cause it to be modified might

well illuminate how to epistemically support modal judgements. It's at least worth a try. Doing this might reveal to us ways that modal judgements get supported that we would not have initially thought of. Consider an analogy: some medieval scholastics were convinced that there could not be living creatures too small to see. Someone initially committed to that conclusion by scholastic arguments might be able to be argued out of that if we could expose her to Louis Pasteur's observations and experiments, even if no scholastic thought to try the kinds of observations and experiments that made Pasteur famous. Likewise, someone might not be able to think of a way science could confirm or disconfirm a modal hypothesis, beyond showing something to be unnecessary because false or possible because true: but she might realise there are ways by looking at the details of a scientist testing a modal theory.

There are not many history of science inquiries into the use of possibility and necessity *per se* by scientists, though this is a topic I where I would welcome more investigation. (Inquiries into the use of scientific laws and counterfactuals are somewhat better developed.) One topic nearby that has received considerably more investigation, however, particularly in the recent philosophy of science literature, is scientific use of *models*. The class of models associated with a theory sometimes seems closely connected to the *possibilities* countenanced by that theory: physical possibilities in the case of a physical theory, chemical possibilities in the case of a chemical theory, evolutionary possibilities in the case of an evolutionary biological theory, and so on.

There is a large and burgeoning literature on the use of models in science, and much of it speaks to connections between parameter values of models and possibilities for systems, counterfactual information conveyed by models, the law-like character of some of the principles governing correct models, and so on. Unfortunately the exact connections between models and what they convey about modal properties of their target systems remains controversial. I will not try to construct and defend a particular account of the modal information conveyed by model use here: my point is just that a naturalist interested in how we come to have model knowledge would be well served to work out

how scientists in model-based sciences construct and test the models that they interpret as providing modal information. When we know how scientists do this well, we will know more about one way we come to modal information naturalistically, using the methods of the sciences.⁷

One objection one might raise to this picture is that there is no obvious need to interpret the “possibilities” left open by a model as being alethic or worldly possibilities. Perhaps they are just epistemic possibilities – for all we know, or for all the model tells us, such-and-such may occur, or alternatively the more the model leaves unspecified, the more ignorance someone relying entirely on the model would have. A full treatment of the connection between modality and models would have to address the charge that the phenomena could all be handled invoking only epistemic possibilities, but I am confident that epistemic possibilities are not enough on their own. On the face of it, scientific theories and models enable us to discover that some outcomes are genuine possibilities for systems, while if the possibilities were just our ignorance they would not seem to be matters for scientific discovery – we often start out being aware we are ignorant of a system to be studied! It is also unclear how mere options left open by our knowledge could play the role in explanation and support of counterfactuals that models seem to play. More would have to be said to convince a philosopher sceptical that sciences can discover modal information, but hopefully enough has been said to suggest that a naturalist should take as her working assumption that much of what sciences appear to tell us about possibilities is likely to be the outcome of a method that can yield genuine modal knowledge, and knowledge of alethic possibility at that.

Not all uses of models in scientific inquiry play this role, however. Sometimes models are deliberately idealised or simplified so that inquirers know the phenomenon under investigation does *not* match the models in various ways: it may even be that scientists using the models take it to be *impossible* that the target of study be just as the models

⁷ Timothy Williamson has a lot of interesting things to say about models and modality in “Modal Science”, a talk presented at the 2014 Epistemology of Modality conference in Aarhus.

seem to represent it as being. Predator-prey models, for example, often make predator numbers and prey numbers real-numbered functions of each other, environmental factors, and time, even though there is no extra predation by 0.1 of a wolf, let alone the difference between 3.14 wolves and π wolves. So there is no automatic inference from a scientific model representing p as being the case and p being possible according to the relevant science. However, this use of models can also provide us fodder for an investigation of possibility, albeit in another way. Even when scientists are sure the truth is other than the model represents, this use of idealisations and convenient fictions is not unconstrained: some models are appropriate and some are not, and some inferences drawn about what is true according to the model are appropriate and some are not. When we look more carefully at what information about target systems these idealised models are supposed to yield, we find that some of the information to take seriously is not just about what the actual system is like, or is like for all we know, but also information about what are the other possibilities for such systems. Perhaps there is no such thing as 3.14 foxes: but even an idealised fox-rabbit predator-prey model can give us some information about what would happen to rabbit numbers if foxes were entirely removed from an ecosystem, even if we will never remove all the foxes by any means that preserves the other features of the system.

One common feature of many of these uses of models is that they seem to primarily be tracking limited forms of possibility: physical possibility, or biological feasibility, and so on. Philosophers primarily interested in the epistemology of “absolute” possibility or “metaphysical” possibility or “logical” possibility might wonder whether investigating the use of models in science will have anything useful to tell us about the epistemology of these more generous modalities. I think studying the epistemology of models has things to tell us about these modalities as well, however, at least indirectly. This is in part because I suspect there will be important commonalities in the epistemology of the different grades of alethic modalities: so a sense of how we discover ecological or chemical possibilities will already put us in a better position with respect to the others.

Another reason is that one very natural model of these more limited modalities is as *restrictions* of some absolute sphere of possibilities, and one model of this restriction is that what is necessary in a “restricted” modality is what is entailed by some set of truths about the subject matter: entailed by the laws of physics perhaps for physical possibility, entailed in addition by a set of facts about life and its organisation for biological possibility, and so on. If, as seems plausible, the *entailment* involved is the strict implication of absolute necessity, or perhaps the strict implication of “logical necessity” if that is any different, then studying how we come to know what is e.g. chemically possible will *en passant* tell us how we determine the truth of various conditionals that obtain with absolute or logical necessity. Of course, this sketch of the connection between restricted modalities and absolute modality is controversial⁸, and even if it was accepted the epistemological upshot I have gestured at would need further support: but this picture of the relationship between different modalities is at least a ground for optimism that the epistemology of restricted modality will assist with the epistemology of absolute alethic modality.

Conclusion

The prospects for a naturalistic story about our modal knowledge are much rosier than many might have initially thought. Naturalistic accounts are available, not just to vindicate much of the thinking about modality pursued by philosophers, logicians and linguists in the last few decades, but to point to new areas of research which we can hope will illuminate modal questions further.

None of this demonstrates that there are no *non-naturalistic* methods for inquiry into the modal. I am personally sympathetic to methodological naturalism, broadly enough construed, but an argument that we can vindicate everything we wish to naturalistically would require detailed discussion of all of our (alleged) results and their sources, a task that goes very far beyond what there is space for here. However, even those who retain non-naturalistic methodological convictions when it comes to modal investigations may

⁸ I discuss it in some more detail in Nolan 2011.

wish to think about what naturalistic methods could add to our modal inquiries. Even if we have special techniques for modalising, an investigation of the psychology of modal judgement, for example, might clarify our thinking about modality or reveal something about what we are responding to with our judgements that are not obvious to the Pure Light of Reason. Or a systematic understanding of the connection between theoretical models and modality might shed some light on modality, and not just on our practice of using models. Naturalists and non-naturalists alike stand to benefit from the further development of naturalistic methods in our modal investigations.⁹

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