Crash course on natural necessity

Ted Sider Spring 2018

1. Natural necessity

"Natural necessity" is a name I'm giving to a very general topic of metaphysics that concerns the nature of laws, causation, dispositions, counterfactuals, etc. I'm calling it "natural necessity" since it involves a kind of necessity that is supplied by "nature" rather than… whatever grounds so-called logical or metaphysical necessity. Bachelors must be unmarried; dropped stones must fall; but the mustness in the second case seems different, a matter of nature rather than concepts or logic or ….

In this area there are a number of connected issues. The purpose of this document is to quickly introduce some of those issues and some of their connections.

2. Concepts of natural necessity

The two most central concepts in this vicinity are: cause and law. The main difference between these two is that cause is particular and law is general. An example of causation is: *the event of Suzy's throwing the ball at time t caused the event of the window's breaking at time t'*. An example of a law (or anyway, a statement that would be a law if it were true) is this: *it is a law that any object will accelerate in the direction of the net force acting on it, with a magnitude proportional to the ratio of the magnitude of that force divided by the object's mass*. (*Not*, notice, "…any object will *be caused to* accelerate…". Laws, according to most people anyway, don't talk about causation.)

Other concepts of natural necessity include counterfactuals ("if I had struck this match, it would have lit"), dispositions ("this match is disposed to light if struck"; "this match is flammable"), and perhaps chance.

(In addition to these metaphysical concepts, there are epistemic concepts that connect as well, like explanation and prediction.)

3. Which concept of natural necessity is most fundamental?

One question about concepts of natural necessity, such as laws and causation, is how they relate to each other. Which is most basic? And how are the others grounded in that most basic one?

I guess the most common view is that laws are the most fundamental sort of natural necessity, and that causation, dispositions and the rest are to be explained in terms of laws. This isn't to say that laws are absolutely fundamental, just that they're the most fundamental concept in the vicinity of natural necessity.

(Why is this view popular? Why do its proponents accept it? Speaking for myself, it's two main things. First, the most fundamental science, namely physics, talks about causation little if at all. Second, causation seems more complex, quirky, and projective of our conceptual scheme. I'm thinking of things like i) the question of how relevant a thing needs to be to count as a cause (and relatedly, the difference between "a cause" and "the cause"), ii) the question of causation by absence, iii) the connection between causation and normativity (McGrath, 2004), iv) the messiness of the issue of preemption.)

If laws are the most fundamental, then how is causation to be understood? The simplest view that grounds causation in laws is the "covering law" theory of causation: one event causes another iff there is a law that implies that every event like the first is followed by some event like the second. (See the very beginning of Lewis (1973*a*) for a description of this kind of view.) Other accounts don't define causation directly in terms of law, but do it indirectly—e.g. Lewis's (1973*a*; 1979) counterfactual account, which defines causation in terms of counterfactuals—roughly: *if the cause hadn't occurred, the effect wouldn't have either*—but then defines the counterfactual similarity metric in terms of laws.

A very different approach holds that causation comes first and law second. And for that matter, there is the view that some other notion of natural necessity—dispositions for instance—is prior to both causation and laws.

4. Quidditism vs nomic/causal/dispositional essentialism

The view that causation (or perhaps dispositions) are prior to laws is tied up with another big question, that of the relationship between properties and various concepts of natural necessity. Are properties "independent" of the facts about laws, or causation, or dispositions, in which they figure? Can we understand what a property like mass is, independently of what laws govern mass, or of how having mass causes or disposes a thing to behave? Or are the laws or causal or dispositional facts somehow bound up in the nature of the property, or even prior to it? There are two main views here:

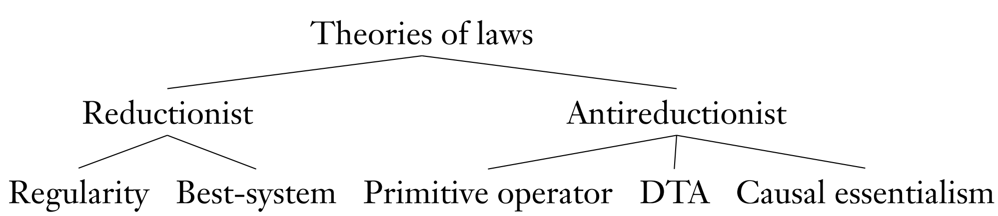
Quidditism Properties are independent of laws/causation/dispositions

Nomic/causal/dispositional essentialism Properties are bound up with laws/causation/dispositions

This is of course a very vague description of the dispute, and to make progress one needs to get clearer about what it really amounts to. But what's important for now is this: the issue of the relative priority of cause, dispositions, and laws of nature affects how the quidditism/anti-quidditism opposition should be understood. If one thinks of laws as being prior to causation—as I do—then it's natural to think of the issue as concerning the relation between properties and laws. If one thinks of causation as prior to laws, then the issue becomes that of the relation between properties and causation. And if dispositionality is the most fundamental sort of natural necessity, the issue is that of the relationship between properties and dispositions.

5. Laws

What is it to be a law of nature? Here is a diagram of some of the main views:



Let's start with reductionist theories.

5.1 Regularity theory

This is the simplest view.

Regularity theory A law is a true regularity. A regularity is a sentence of the form "All Fs are Gs", where F and G are suitable predicates.

The game then is how to understand "suitable". You have to restrict somehow; otherwise 'All people identical to Ted live in Princeton" and "All people who are in this room at this time are thinking about philosophy" count as laws of nature, whereas they clearly are not. So usually one bans names of particular objects, times, or places, in suitable predicates. But names could be hidden—'socratizes', 'Canadian' (= 'citizen of Canada'), etc. So probably it won't be possible to have a purely "syntactic" definition of 'suitable'. As a start, let's assume that suitable predicates must be "qualitative", where this is understood as a metaphysical notion: a qualitative predicate is one whose holding is insensitive to the identities of particular objects, and depends only on the global array of qualities. (Yes, this is circular—I'm not trying to give a reductive definition of 'qualitative'.) For example, the properties of being identical to Ted or Socratizing or being an American are all nonqualitative (since they "involve" the particular objects Ted, Socrates, and the USA, respectively); the properties of being round, or within three feet of something with unit negative charge, are qualitative. (Note that qualitative properties don't have to be intrinsic. They can involve relations to things, just not to *particular things*. Being within three feet of something with unit negative charge is a qualitative property; being within three feet of Eliza the electron is nonqualitative.)

Even spotting ourselves the notion of a qualitative property, there still are big problems with the regularity theory. Armstrong (1983) goes over a number of these; I'll just mention them quickly:

- *Qualitative descriptions of single-cases:* Let F be a qualitative predicate that just happens to apply to all and only those people in the room right now. Then "All Fs are thinking about philosophy" will be a true regularity, but not a law.

- *Gold/uranium example:* "Every solid lump of gold is less than 1 million pounds" isn't a law, but "Every solid lump of Uranium 235 is less than 1 million pounds" is (let's suppose). It's hard to think of a definition of 'suitable' that would exclude one but not the other. And in fact, if any law contains the predicate 'gold', then there *can't* be a definition of 'suitable' that would allow the second to be a law but exclude the first: if the second is allowed then 'solid lump', 'Uranium 235', and 'is less than 1 million pounds' are suitable; if any law contains 'gold' then 'gold' is suitable; so every predicate in the first sentence is suitable; so it must be a law if it is true.

- *Explanation, etc.:* The first two problems are "extensional", in that the regularity theory seems not to be extensionally adequate: it doesn't correctly identify which regularities are in fact laws. Armstrong and others have argued that even if an extensionally adequate regularity theory could be constructed—that is, one that was free of counterexamples, one that correctly identified all the laws as being laws, and didn't misidentify any nonlaws as being laws—it still would have the following problem. Surely if it is a *law* that all Fs are Gs, then this fact can *explain* why it is that, in fact, all Fs are indeed Gs. Laws can explain regularities. But if the law *just is* the regularity, then the law couldn't explain the regularity, because nothing can explain itself.

  Similarly, it has been argued that laws being mere regularities is incompatible with the fact that we can come to know (or reasonably believe) that future Fs will be Gs on the basis of observing past Fs that are Gs. If laws are different from regularities, it's claimed, then this is unproblematic: we (defeasibly) infer the law from our past observations of instances of the regularity, and then infer the future instances from the law. But if laws just are regularities, then this would be unjustified, since we would just be inferring the later part of the regularity from its earlier part.

5.2 Best-system theory

The currently most influential reductionist theory of laws of nature is David Lewis's best-system theory:[1]

> I adopt as a working hypothesis a theory of lawhood held by F. P. Ramsey in 1928: that laws are "consequences of those propositions which we should take as axioms if we knew everything and organized it as simply as possible in a deductive system". We need not state Ramsey's theory as a counterfactual about omniscience. Whatever we may or may not ever come to know, there exist (as abstract objects) innumerable true deductive systems: deductively closed, axiomatizable sets of true sentences. Of these true deductive systems, some can be axiomatized more *simply* than others. Also, some of them have more *strength*, or *information content*, than others. The virtues of simplicity and strength tend to conflict. Simplicity without strength can be had from pure logic, strength without simplicity from

[1]See Lewis (1973*b*, pp. 73–4; 1983, pp. 366–8; 1986, pp. 121–4; 1994). See also Beebee (2000); Hall (2015); Loewer (1996).

> (the deductive closure of) an almanac… a contingent generalization is a *law of nature* if and only if it appears as a theorem (or axiom) in each of the true deductive systems that achieves a best combination of simplicity and strength. (Lewis, *Counterfactuals*, p. 73.)

The idea is that the rules determining what the best system is, are basically the rules that guide scientists in their search for laws. They're apt to count something as a law if it's a very simple and powerful rule. Take Newton's second law, $F = ma$, and the law of gravitation $F_g = G\frac{m_1 m_2}{r^2}$. Two very simple rules, but with them Newton could explain why the apple hit him on the head, why balls of unequal masses fall at the same rate, and why the planets move around the sun in elliptical orbits. Adding something as a law is *not* legit if it is too complex. (E.g., a single sentence describing everything that ever happens.) And it's not legit if the statement is too weak. (Just saying "there exists something" is simple, but doesn't imply much.)

Note: this theory doesn't go anywhere without the distinction between natural and unnatural properties. (In my view, anyway, and in Lewis's; but Barry Loewer disagrees!) If you could use any old language to construct the deductive systems, then (as Lewis (1983) later pointed out) you can trivially construct a maximally simple theory according to which all truths count as laws: the theory with just one axiom, $\forall x F x$, where F is a predicate that's true of all and only objects in the actual world. The solution: require all predicates in the theory's language to express natural properties.

The best-system theory avoids the first two problems for the regularity theory because, as Lewis says, the account of laws of nature is collective. It doesn't say "every true statement of such-and form" is a law. Whether something counts as a law depends on what it contributes to the overall set of laws.

Does it avoid the problem of explanation? Some people will say: Lewis-laws are just glorified regularities, and thus can't explain anything.

5.3 The primitive operator theory

If you don't like either the regularity theory or the best-system theory, you might go in the opposite direction, and accept a completly anti-reductionist theory of laws: to say that laws are utterly brute. The simplest theory of this sort adopts as part of its fundamental ideology an operator 'it is a law of nature that'. Presumably this operator must be factive (i.e., it obeys the rule of inference: "if it is a law that ϕ; therefore, ϕ") but beyond that there's little to say about its inferential role. (It isn't extensional, for example: if it's a law that Fs are Gs, and if it's in fact true that all and only Fs are Hs, it doesn't follow that it's a law that all Hs are Gs.)

5.4 The Armstrong/Dretske/Tooley theory: laws as relations between universals

Some people want to be anti-reductionist, but say a *bit* more about laws. In particular, they want to say that laws in some way are due to something about the properties involved. Armstrong, Dretske, and Tooley all defend views of this sort. Armstrong puts the view this way:

> Suppose it to be a law that Fs are Gs. F-ness and G-ness are taken to be universals. A certain relation, a relation of non-logical or contingent necessitation, holds between F-ness and G-ness. This state of affairs may be symbolized as 'N(F,G)' (Armstrong (1983, p. 85)).

The "DTA" view assumes realism about universals, that there exist such things as universals F, G, etc., at least in the case of scientific kinds. (Armstrong himself *only* accepts the existence of universals for scientific kinds.) The relation of necessitation itself is a further universal, a "higher-order" universal because it relates first-order universals like F and G. As with the primitive operator theory, the holding of this relation of necessitation is not further analyzed—we don't just define $N(F,G)$ as meaning that the regularity "All Fs are Gs holds, for that would turn the view into a regularity theory.[2] But of course the law $N(F,G)$ can't just be completely *disconnected* from the regularity; if it's a law that Fs are Gs then it has to be *true* that all Fs are indeed Gs. Laws have implications for what happens "on the ground". So what DTA say is that even though necessitation is a primitive relation, it nevertheless obeys this rule: *if* $N(F,G)$, *then* All Fs are Gs. That is, the law implies the regularity. (The converse implication doesn't hold; there can be regularities that don't correspond to laws; these are accidental regularities.)

[2] There's actually a use-mention confusion here. If 'F' and 'G' are names of universals—which is how I was using them earlier in the paragraph—I can't just start using them as predicates. So I should instead describe the regularity this way: "everything that *instantiates* F also instantiates G". Alternatively, I could have used 'F' and 'G' as predicates, and continued to describe the regularity as "All Fs are Gs", if earlier, instead of writing "$N(F,G)$" (which treats 'F' and 'G' as names rather than predicates) I instead wrote "$N(F\text{-ness}, G\text{-ness})$".

A side point: one concern about this view is that not all laws have the form "all Fs are Gs". Think of exclusion laws, which say that nothing is both F and G. Or, more realistically, think of real laws of physics, which are quantitative in form. What the "true metaphysical logical form" of those laws is (if one believes in such a thing) is an open question, but it doesn't seem likely to be "all Fs are Gs" in which F and G stand for universals. The significance of this fact, it seems to me, is that it favors the primitive operator theory over the DTA theory. The appeal of the DTA theory was that it said something more specific about what makes there be a law that ϕ (where ϕ is a sentence) beyond just saying "it is a law that ϕ". The more specific thing was that there is a certain relation, N, that holds between the universals involved in the law. But as we saw, laws have implications for what is happening on the ground; there needs to be some rule connecting necessitation's holding amongst some universals and some first-order fact about what particulars instantiate those universals. So if there isn't a fixed sort of first-order fact that always holds whenever some universals are related by law, it would seem that there can't be any one fixed relation of necessitation, since any relation would have to obey some particular rule connecting it to facts on the ground. DTA might try embracing a bunch of different necessitation relations, each implying different sorts of first-order facts. Perhaps $N_1(F,G)$ implies "all Fs are Gs", $N_2(F,G)$ implies "*no* Fs are Gs", etc. But is there any guarantee that there will be a short list of the possible logical forms of laws? The more types of necessitation we need, the more attractive it becomes to replace all of them with a single operator "it is a law that", which obeys this one rule: if it a law that ϕ, then ϕ.

But anyway, back to the DTA theory. (Most of what I say in this next bit also applies to the primitive operator theory.) The "extensional" objections to the regularity theory are all answered because the DTA theory gives no reductive analysis of necessitation. (Likewise for the primitive operator theory.) Whenever we have an accidentally true generalization, such as "Every solid lump of gold is less than 1 million pounds", the DTA theorist can just say that the universal being a solid lump of gold simply doesn't necessitate the universal being less than 1 million pounds.

These objections were also allegedly answered by Lewis's best system theory. But DTA claim an advantage over the best systems theory regarding explanation and induction. They say that since laws are over and above regularities, they can explain regularities. Similarly, they say, we can have have reason to believe that unobserved Fs will be Gs by observing Fs that are Gs and becoming increasingly confident that $N(F,G)$.

In my view, they don't really have an advantage over the regularity theory here. [This next bit is not strictly part of the crash course.] Here's why Chris Swoyer thinks they do have an advantage:

> It is unclear what could justify accepting a mere generalisation (even one with pragmatic or epistemological trappings) short of checking all of its instances, for if laws merely record regularities, why should the fact that two properties have been found to be coinstantiated or to be instantiated in succession be thought to tell us anything about unobserved cases? Yet if a sentence telling us that all Gs are Fs is regarded as 'lawlike', we often feel justified in accepting it after observing just a few positive instances. This practice would seem to be warranted only if there is something about a thing's being G that at least makes it probable that it is also F. And the [DTA] theory nicely accounts for this, for if g bears the [necessitation] relation to f, the second property will accompany the first in all cases, allowing us to make predictions about unexamined instances as well as to confirm a generalisation about all of them. Swoyer (1982, pp. 208–9)

However, suppose we observe a bunch of Gs that are Fs, and no Gs that aren't Fs. Here's why this ultimately justifies our belief that future Gs will be Fs, according to DTA: the observation gives us reason to believe $N(G,F)$, which implies that all Gs are Fs, which gives us reason to believe that any unobserved Gs will be Fs. Now, focus on the first of these three steps. Why does observing Gs that are Fs (and not observing any that aren't) give us reason to believe that $N(G,F)$? After all, the fact that observed Gs have been Fs doesn't entail $N(G,F)$. We are near to the traditional problem of induction. Perhaps DTA will say "it's built into the concept of justification that we're justified in believing in laws given many positive instances"; perhaps they will say "postulating the laws explains the observed Gs that are Fs, and we're justified in believing what explains our observations"; or perhaps they'll say something else. But can't the regularity theorist or the best-system theorist say parallel things, given what they take laws to be? (Swoyer slides over this issue by shifting, near the end of the quotation, between talking of what we're justified in believing to be true and talking about what is in fact true. Yes, if it's *true* that $N(G,F)$ then it must be *true* that Gs must be Fs; but how can our observations justify our *believing* that $N(G,F)$?)

Lewis has an objection to the DTA theory. (His objection is closely connected to van Fraassen's "inference problem", from his book *Laws and Symmetry*.) It picks on the fact that DTA take $N(F,G)$ to metaphysically entail "All Fs are Gs":

> Whatever N may be, I cannot see how it could be absolutely impossible to have $N(F,G)$ and Fa without Ga. (Unless N just is constant conjunction, or constant conjunction plus something else, in which case Armstrong's theory turns into a form of the regularity theory he rejects.) The mystery is somewhat hidden by Armstrong's terminology. He uses 'necessitates' as a name for the lawmaking universal N; and who would be surprised to hear that if F 'necessitates' G and a has F, then a must have G? But I say that N deserves the name of 'necessitation' only if, somehow, it really can enter into the requisite necessary connections. It can't enter into them just by bearing a name, any more than one can have mighty biceps just by being called 'Armstrong' (Lewis (1983, p. 366)).

Here Lewis is relying on what he sometimes calls "the principle of recombination", and which other people sometimes call a "combinatorial" principle governing modality. Such principles say: "things of such-and-such type can be arbitrarily rearranged with respect to one another". For example, if it's possible for there to exist a golden mountain, and it's possible for there to exist a silver asteroid, then it should be possible for there to exist *both* a golden mountain and a silver asteroid. Most everyone believes that *some* combinatorial principle for modality must be correct, but there is a lot of dispute over exactly which such principles are correct. Whether Lewis's objection can be sustained depends on the details of this issue.

I myself don't find this objection to the DTA theory convincing. (Again, this next bit isn't really part of the crash course.) The combinatorial argument is based on the idea that there is something wrong with "necessary connections". But *everyone* believes in *some* necessary connections. For instance, we all believe that the proposition that it is snowing and grass is green necessitates the proposition that it is snowing. The combinatorial argument must be based on the thought that *that* kind of necessary connection is unproblematic, whereas there is something problematic about the kinds of necessary connections embraced by DTA. But I doubt that there is any principled line to draw here. I think there is a kind of illusion that there is, because we tend to think: the former necessary connection is unproblematic because it's just a "trivial logical connection". But given that we reject logical conventionalism (as I think we should), I don't see how the picture of logical necessity as being "trivial" can be sustained. (I say more about this line of thought in Sider (2011, 275–6).)

It seems to me that the deepest complaint reductionists have, about both the DTA theory and the primitive operator theory, is that the extra facts (facts about necessitation or "it is a law that") are unexplanatory posits. They're posited simply to make laws be something over and above the regularities, thereby according with our picture of laws "guiding" the world or "giving rise to" the world; but since no mechanisms are supplied for this alleged guidance, positing these extras don't improve our overall understanding of the world.

6. Quidditism and laws

The views about laws we've discussed so far—the regularity theory, the best system theory, and the DTA theory—more or less presuppose quidditism. (This point can't be made rigorously yet, since we haven't precisely defined what quidditism is.) The reductionist views define laws in terms of patterns, and thus presuppose that the patterns are there in order for the definition to make sense. The DTA theory begins with universals, and then defines laws as relations between them; their picture, certainly, is that the universals are given first. (And they say that the relation N is a contingent one, though one could alter this part of the view.)

7. Objections to quidditism

In this next bit I'll look at the usual objections to quidditism.

7.1 "Distinctions without differences"

One is that it draws "distinctions without differences":

> The quidditist is… committed to distinctions which my intuitions tell me are distinctions without differences… Let us start by considering the world isomorphic with ours, but where a quark colour has swapped places with a quark flavour. To the inhabitants of such a world, their world looks just like ours, but in reality it is supposed to be quite different. Can that really be? My intuition is that to play the nomological role of some colour or flavour is to be that colour or flavour, and that the idea of two qualities swapping nomological roles is thus unintelligible.
>
> This is not a verificationist argument. It is not like the case of a world which is just like ours except for having come into existence five minutes ago complete with fossils and (pseudo-) memories. In such a case there is something distinguishing that world from ours which its inhabitants are prevented from knowing, giving them the illusion that their world is like

> ours. But in the case of colour/flavour exchange, the inhabitants could happily know all the truths about their world, and the narrow content of their knowledge would be identical with ours (or with what ours would be if we knew everything), and still their world is supposed to be different from ours, and their knowledge to differ from ours in its broad content. More apt than the comparison with a world without a past would perhaps be the following: someone living in a Newtonian world with absolute space might be tempted to think that things could all have been ten centimetres to the left of where they are. (Black, 2000, p. 94)

It's really hard to tell what the argument is here, yet I do think this is a pretty common thought. What is the alleged source of the claim that there is a distinction without a difference? Is it that we wouldn't know the difference? Black seems to insist that this *isn't* the argument he's making. But then, what *is* the argument? One worries that it trades on a perceptual conception of a distinction without a difference: that the worlds wouldn't *look* different. But who would accept that perception is the measure of legitimate metaphysical difference?

8. Categorical properties unknowable?

Another common argument against quidditism is epistemological: it implies distinctions that we couldn't know anything about. Before we get into details, let's review a general point about epistemic arguments in metaphysics. This is put nicely by John Hawthorne:

> We are all familiar with arguments with the following structure: If metaphysics M is right, then there are unlucky worlds where our judgments are way off with respect to subject matter S. Further, there is a natural sense in which, if M is right, we can't tell whether we are in an unlucky world. But we are very knowledgeable about subject matter S. If we can t tell whether we are in an unlucky world, we are not knowledgeable about subject matter S. So metaphysics M is all wrong. (Hawthorne, 2001, pp. 365–6)

The problem with such arguments is that they threaten to prove too much. As Hawthorne points out, one such argument would look like this:

> If metaphysical realism about physical objects is true, then there are unlucky worlds where we are brains in vats. Supposing realism is true, we

> can't tell whether we are in a brain in a vat world. But we know a whole lot about tables. So we should not be metaphysical realists about physical objects. (Hawthorne, 2001, p. 366)

Hawthorne continues to point out that there isn't any consensus about how to reply to such arguments; but there does seem to be a consensus that *something* is wrong with them. (Otherwise we'd need to be very skeptical indeed.)

OK, on to the epistemic arguments. One of them, it seems to me, is weaker than the other. The weak argument is that we don't "know" the alleged categorical properties, since all we know from observation and science is dispositions.

> When we think of categorical grounds, we are apt to think of a spatial configuration of things—hard, massy, shaped things resisting penetration and displacement by others of their kind. But the categorical credentials of any item in this list are poor. Resistance is *par excellence* dispositional; extension is only of use, as Leibniz insisted, if there is some other property whose instancing defines the boundaries; hardness goes with resistance, and mass is knowable only by its dynamical effects. Turn up the magnification and we find things like an electrical charge at a point, or rather varying over a region, but the magnitude of a field at a region is known only through its effect on other things in spatial relations to that region. A region with charge is very different from a region without: perhaps different enough to explain all we could ever know about nature. It differs precisely in its dispositions or powers. But science finds only dispositional properties, all the way down. Blackburn (1990, pp. 62–3)

He concludes:[3]

[3]The first passage of Blackburn's might suggest a slightly different argument: that the properties science tells us about are dispositional, and it would be speculative to postulate anything further. Compare also (Ellis and Lierse, 1994, p. 32)

> There is one argument against categorical realism, however, which appears to be decisive. This is the argument from Science. With few exceptions, the most fundamental properties that we know about are all dispositional. They are of the nature of powers, capacities and propensities. Therefore, we must either suppose that these basic properties are not truly fundamental, and that they will all eventually be shown to be dependent on categorical properties, or else we must concede that categorical realism is false.

But I don't think it's so clear that "science finds only dispositional properties", as Blackburn puts it. What science tells us *about* charge (say), is, to be sure, its causal or dispositional or nomic profile; but why couldn't the property we are thus told about—the property of charge—nevertheless be a quiddity, a property in which its causal or dispositional or nomic profile is not "inherent"?

> G [the purported categorical ground of a disposition] will remain, therefore, entirely beyond our ken, a something- we-know-not-what identified only by the powers and dispositions it supports. (Blackburn, 1990, p. 64)
>
> … our best physical understanding of the world gives us no conception of what they [the categorical properties] might be. (Blackburn, 1990, p. 65)

My question here is: what is the conclusion of this argument supposed to be? It's something like "we don't know what the categorical properties are". But what does that mean? In once sense I obviously do "know what the categorical properties are": they are charge, mass, spatiotemporal relations, and so on (i.e., the properties that physics tells me they are). I know that it's mass, rather than charge, that causes dropped objects to fall, since 'mass' is the name I give to the property playing this role. Why doesn't our best physical understanding of the world tell us "what they are"?

The idea seems to be that physics just tells us their role. But what is alleged to be missing? The developers of classical mechanics claimed to explain a lot by positing a few fundamental properties: charge, mass, and spatiotemporal relations, plus a set of principles saying how those properties interact. The way we learn about "charge" is that we learn that a certain theory, a theory that posits that a certain property plays "the charge role", does a great job of explaining the data; we conclude that the theory is true; and we name the posited property "charge". So we know plenty of things about charge: it is involved in such-and-such laws; it is instantiated here but not there; etc. What more do you want, Blackburn?

One epistemic argument that is reasonably clear is the one Lewis gives in his paper "Ramseyan Humility". He argues that there are possible worlds in which different categorical properties swap roles. If that's true, then there's a sense in which there's something we couldn't know. Let @ and w be such swap worlds: charge and mass play roles R_c and R_m in @; the roles are reversed in w. It seems that we couldn't know whether we're in w or @.

Reply: if we're in w, we could say "let's introduce the meanings of 'charge' and 'mass' thus: "the properties that *actually* play roles R_1, R_2, and so on. So now don't we know that we're in @? After all, we know that charge plays role R_c, and that's true only in @. Lewis's response seems to be that we don't know that charge plays role R_c. Similarly, I assume he'd say that we don't know that the meter bar is one meter long, simply by announcing that 'meter' is to rigidly designate the actual length of the meter bar.

Lewis doesn't take this as any kind of objection at all (why think we know everything?, he says). I'm not sure I agree with Lewis's description of the sort of ignorance that results; but anyway, it's hard to see why there is a problem here.

Schaffer (2005) makes a lot of nice points about this argument. One is: isn't the *epistemic* possibility of a swap enough to undermine knowledge? (Why should it matter that the possibility isn't metaphysical?) The second is like Hawthorne's: aren't these swapping scenarios just skeptical hypotheses? Why isn't the argument here—that we don't know that mass plays R_m because it could have failed to in the swap world—any better than: we don't know there is an external world because there isn't one in the deceiving-demon world?

The analogy with skeptical examples isn't perfect. In those examples, we imagine people in similar situations to us, but whose sentences are false, given what they mean by those sentences. But the people in w speak truly when they say 'charge plays R_c', since in w, 'charge' means mass. (This is the "two-dimensional" aspect of the example (Davies and Humberstone, 1980).) There are hard questions about what to say in such cases: do we know that the meter bar B is one meter long? But even without answering such questions, we can say the following. Insofar as I lack knowledge that mass plays R_m, I also lack knowledge of singular propositions, such as the proposition that you are all in front of me—even though I can see you all, you all are causing me to have these beliefs, and so on. For consider a world w' in which individuals have permuted roles. The argument that we don't know whether we're in @ or w' seems as good as the argument that we don't know whether we're in @ or w.

9. Shoemaker's epistemic argument

I like this argument *slightly* better:[4]

> The supposition that these possibilities are genuine implies, not merely (what might seem harmless) that various things might be the case without its being in any way possible for us to know that they are, but also that it is impossible for us to know various things which we take ourselves to know. If there can be properties that have no potential for contributing to the causal powers of the things that have them, then nothing could be good evidence that the overall resemblance between two things is greater

[4] Question: in Hawthorne's (2001) terms, doesn't this challenge even our ability to know the Ramsey sentence of a world, and not just our ability to know which properties occupy which roles in that Ramsey sentence?

> than the overall resemblance between two other things; for even if *A* and *B* have closely resembling effects on our senses and our instruments while *C* and *D* do not, it might be (for all we know) that *C* and *D* share vastly more properties of the causally impotent kind than do *A* and *B*. Worse, if two properties can have exactly the same potential for contributing to causal powers, then it is impossible for us even to know (or have any reason for believing) that two things resemble one another by sharing a single property. Moreover, if the properties and causal potentialities of a thing can vary independently of one another, then it is impossible for us to know (or have any good reason for believing) that something has retained a property over time, or that something has undergone a change with respect to the properties that underlie its causal powers. (Shoemaker, 1980, p. 237)

Shoemaker next replies to the objection that rejecting the skeptical hypotheses is *simpler*:

> Whatever may be true in general of appeals to theoretical simplicity, this one seems to me extremely questionable. For here we are not really dealing with an explanatory hypothesis at all. If the identity of properties is made independent of their causal potentialities, then in what sense do we explain sameness or difference of causal potentialities by positing sameness or difference of properties? There are of course cases in which we explain a constancy in something by positing certain underlying constancies in its properties. It is genuinely explanatory to say that something retained the same causal power over time because certain of its properties remained the same. And this provides, ceteris paribus, a simpler, or at any rate more plausible, explanation of the constancy than one that says that the thing first had one set of underlying properties and then a different set, and that both sets were sufficient to give it that particular power. For example, if the water supply was poisonous all day long, it is more plausible to suppose that this was due to the presence in it of one poisonous substance all day rather than due to its containing cyanide from morning till noon and strychnine from noon till night. But in such cases we presuppose that the underlying property constancies carry with them constancies in causal potentialities, and it is only on this presupposition that positing the underlying constancies provides the simplest explanation of the constancy to be explained. Plainly this presupposition cannot be operative if what the 'inference to the best explanation' purports to explain is, precisely, that sameness of property goes with sameness of causal potentialities. (Shoemaker, 1980, pp. 237–8)

I'm not totally sure I get this; but let me make one reply. Against the last sentence, I don't think the appeal to simplicity is meant to explain that "sameness of property goes with sameness of causal potentialities". What's meant, rather, is the following. Suppose we may *assume* for the sake of argument the metaphysics in question: quidditism. Now suppose that you've got two descriptions available: just one property throughout or two (or many…). The simplest hypothesis is the first one. So we may say: given that we're assuming quidditism, we are entitled to believe that the first quidditist description is the correct one.

To be sure, we might also ask what to say if we drop the assumption of quidditism, and throw the simplicity question wide open: which is the best account of the situation: just one quiddistic property, two quiddistic properties, just one essentialist property, two essentialist properties… Maybe then simplicity doesn't favor the first as opposed to, say, the third. And maybe this is what Shoemaker is getting at, since he continues a sentence later:

> This disassociation of property identity from identity of causal potentiality is really an invitation to eliminate reference to properties from our explanatory hypotheses altogether; if it were correct then we could, to use Wittgenstein's metaphor, 'divide through' by the properties and leave the explanatory power of what we say about things untouched. (Shoemaker, 1980, p. 238)

But this is a very different argument from the one Shoemaker originally advertised. The argument isn't that quidditism would lead to a sort of empirical skepticism. It's rather just an argument that quidditism isn't *true*, or rather that we have no reason to believe it: we have no reason to believe it because postulating quiddities is not explanatory. This is just a philosophical argument—and a nonepistemic one—directly in favor of his own view against quidditism.

Is it correct? Well, we would need to look more closely at exactly what causal (or nomic) essentialism says.

References

Armstrong, D. M. (1983). *What is a Law of Nature?* Cambridge: Cambridge University Press.

Beebee, Helen (2000). "The Non-Governing Conception of Laws of Nature." *Philosophy and Phenomenological Research* 61: 571–94.

Black, Robert (2000). "Against Quidditism." *Australasian Journal of Philosophy* 78: 87–104.

Blackburn, Simon (1990). "Filling In Space." *Analysis* 50: 62–5.

Davies, Martin and Lloyd Humberstone (1980). "Two Notions of Necessity." *Philosophical Studies* 38: 1–30.

Dretske, Fred (1977). "Laws of Nature." *Philosophy of Science* 44: 248–68.

Ellis, Brian and Caroline Lierse (1994). "Dispositional Essentialism." *Australasian Journal of Philosophy* 72: 27–45.

Hall, Ned (2015). "Humean Reductionism About Laws of Nature." Manuscript. Available at `https://philpapers.org/archive/HALHRA.pdf`.

Hawthorne, John (2001). "Causal Structuralism." *Philosophical Perspectives* 15: 361–78. Reprinted in Hawthorne 2006: 211–28.

— (2006). *Metaphysical Essays*. Oxford: Oxford University Press.

Jackson, Frank and Graham Priest (eds.) (2004). *Lewisian Themes*. Oxford: Oxford University Press.

Lewis, David (1973*a*). "Causation." *Journal of Philosophy* 70: 556–67. Reprinted in Lewis 1986: 159–71.

— (1973*b*). *Counterfactuals*. Oxford: Blackwell.

— (1979). "Counterfactual Dependence and Time's Arrow." *Noûs* 13: 455–76. Reprinted in Lewis 1986: 32–66.

— (1983). "New Work for a Theory of Universals." *Australasian Journal of Philosophy* 61: 343–77. Reprinted in Lewis 1999: 8–55.

— (1986). *Philosophical Papers, Volume 2*. Oxford: Oxford University Press.

— (1994). "Humean Supervenience Debugged." *Mind* 103: 473–90. Reprinted in Lewis 1999: 224–47.

— (1999). *Papers in Metaphysics and Epistemology*. Cambridge: Cambridge University Press.

— (2009). "Ramseyan Humility." In David Braddon-Mitchell and Robert Nola (eds.), *Conceptual Analysis and Philosophical Naturalism*, 203–22. Cambridge, MA: MIT Press.

Loewer, Barry (1996). "Humean Supervenience." *Philosophical Topics* 24: 101–27. Reprinted in J. Carroll (Ed.) (2004), *Readings on Laws of Nature* (Pittsburgh: University of Pittsburgh Press), pp. 176–206.

McGrath, Sarah (2004). "Causation By Omission: A Dilemma." *Philosophical Studies* 123(1-2): 125–48.

Mellor, D. H. and Alex Oliver (eds.) (1997). *Properties*. Oxford: Oxford University Press.

Schaffer, Jonathan (2005). "Quiddistic Knowledge." *Philosophical Studies* 123: 1–32. Reprinted in Jackson and Priest 2004: 210–30.

Shoemaker, Sydney (1980). "Causality and Properties." In Peter van Inwagen (ed.), *Time and Cause*, 228–54. Dordrecht: D. Reidel. Reprinted in Mellor and Oliver 1997: 228–54.

Sider, Theodore (2011). *Writing the Book of the World*. Oxford: Clarendon Press.

Swoyer, Chris (1982). "The Nature of Natural Laws." *Australasian Journal of Philosophy* 60: 203–23.

Tooley, Michael (1977). "The Nature of Laws." *Canadian Journal of Philosophy* 7(4): 667–98.

— (1987). *Causation: A Realist Approach*. Oxford: Clarendon Press.