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**COMMENTS ON ELWONGER (AND RETTLER)
(APRIL 2011, REVISED MAY 2011 AND MAY 2012)**

Fabrice Pataut

The comments below (3) result from an exchange based on Luke Elwonger's paper as it was presented at the American Philosophical Association Central Division Meeting in Minneapolis in April 2011 (1) and on Bradley Rettler's response as it was sent to me ahead of the meeting in February 2011 (2). The comments were revised in May of that year and in May of the following year following our discussion during the colloquium and a further exchange of mails over two consecutive years with Elwonger and Rettler.

1. Luke Elwonger: "Physical Constants and Essentialist Arguments for Necessitarianism".
2. Bradley Rettler: "Response to Elwonger".
3. Fabrice Pataut: "Comments on Elwonger (and Rettler)".

**THE AMERICAN PHILOSOPHICAL ASSOCIATION
CENTRAL DIVISION
ONE HUNDRED EIGHTH ANNUAL MEETING**

**MINNEAPOLIS HILTON HOTEL, MINNEAPOLIS, MINNESOTA
MARCH 30-APRIL 2, 2011**

**II-H COLLOQUIUM *NECESSITIES AND ESSENCES*
APRIL 1, 4:20-5:20 PM**

**CHAIR : FABRICE PATAUT (INSTITUT D'HISTOIRE ET DE PHILOSOPHIE DES SCIENCES ET
DES TECHNIQUES, PARIS)**

**SPEAKER : LUKE ELWONGER (UNIVERSITY OF NEBRASKA-LINCOLN) : "PHYSICAL
CONSTANTS AND ESSENTIALIST ARGUMENTS FOR NECESSITARIANISM"**

COMMENTATOR : BRADLEY RETTLER (UNIVERSITY OF NOTRE DAME)

1

LUKE ELWONGER

**PHYSICAL CONSTANTS AND ESSENTIALIST ARGUMENTS FOR
NECESSITARIANISM**

1. Introduction

Many philosophers hold that physical laws have a unique modal status known as nomic necessity which is weaker than metaphysical necessity. This orthodox view has come into question in the past few decades. In particular, the metaphysical view known as essentialism has provided an argument that the laws of nature are necessary in the strongest possible sense. It seems obvious to many that at least some essentialist arguments in favor of the necessity of scientific claims are going to be sound. For example, the view that claims like "water is H₂O" are necessary has itself

become an orthodox view. However, the question of whether *laws*, like the law of conservation of energy, or the law of gravity, are necessary is far more contentious. Philosophers divide roughly into two camps, law necessitarians¹ who hold that the laws are necessary in the strongest sense and contingency theorists who hold that they are at least in some sense contingent.

One argument for the necessitarian position is via an essentialist theory of the transworld identity of properties. In this paper I defend such a theory of the identity of properties and its necessitarian consequences from one major criticism. To focus the paper, I center the discussion on a single critic, E. J. Lowe. In his book, *The Four Category Ontology*, he offers a criticism of the essentialist argument for necessitarianism via an analogy with other forms of transworld identity and intuitions about the contingency of the physical constants². I undermine the usefulness of Lowe's analogy by examining the purposes of attributions of properties. I also show that the essentialist's position can allow it to accommodate the intuitions of contingency in a way that fits best with the purpose behind property attributions.

2. The Identity of Properties and the Necessity of Laws

There are a number of ways to construct theories of the transworld

¹ See *Bird 2007, Ellis 2001* for good examples of necessitarianism.

² All references to arguments by Lowe are from his 2006 book. Lowe does accept that some laws are necessary in the strong sense, but criticizes the more general argument.

³ See *Shoemaker 1998*.

⁴ Hawthorne interprets Shoemaker in roughly this way. See *Hawthorne 2001* for an example. ² All references to arguments by Lowe are from his 2006 book. Lowe does accept that some laws are necessary in the strong sense, but criticizes the more general argument.

identity of properties which will result in a necessitarian view of the laws of nature. For our limited purposes we will introduce the general idea via a view similar to that elaborated by Sydney Shoemaker³. Shoemaker holds that the identity conditions of properties are wholly determined by their causal role. One way to understand this is in terms of Ramsey sentences⁴. If we took our best theory of the universe and replaced all the occurrences of a property like mass with a variable, we would be left with an open sentence which expressed the causal roles of all the properties in the universe. Now, one reading of Shoemaker has him holding that any property that could figure into this sentence in the place of mass would just be mass. On this view there is nothing to being mass over and above performing a particular causal role. It should be easy to see how this is a form of essentialism about properties. The view implies that the causal role of a property is a necessary feature of that property. If it lacked that role or that power, then it would be a different property. Since one way of giving the causal role of a property is in terms of the laws of a theory, we can formulate Shoemaker's idea like this: properties depend for their identity on the laws in which they figure.

Someone can rely on this view of properties to construct a direct argument for the metaphysical necessity of the laws of nature. This is the rough form of such an argument⁵:

(P1) For all properties and all worlds, the property F in w_1 is identical

³ See *Shoemaker 1998*.

⁴ Hawthorne interprets Shoemaker in roughly this way. See *Hawthorne 2001* for an extensive critique of what he calls "causal structuralism."

⁵ See *Lowe 2006*, pp. 149-152 for something like this argument. I actually think this argument is flawed in another way because it is only plausible for laws concerning *intrinsic* dispositional properties. It will fail for extrinsic dispositions like those proposed by *McKittrick 2003*.

with the property G in w_2 iff F and G figure in the same laws.

(P2) Suppose that there exists a property F in $@$.

(P3) Suppose that in some arbitrary world w_1 there exists a property G such that $G = F$.

(C1) Therefore, all laws concerning G s in w_1 will be the same as those concerning F s in $@$. (From P1, P2, P3.)

(C2) Therefore, for any world, if it contains a property G such that $G = F$, then laws concerning G s in that world will be the same as those concerning F s in $@$. (Discharging P3.)

Premise one is simply a statement of something like Shoemaker's notion of the identity of properties applied to the transworld case. A relatively strong necessitarian conclusion follows. Necessarily, the laws of nature will hold in any world with the same properties as the actual world. This argument is simple and direct, but Lowe thinks that there are significant problems with it.

3. Trans or Intraworld Identity?

The argument of the previous section hinged explicitly on a premise about the transworld identity of properties. In his objection, Lowe uses this to formulate an analogous argument to that of the previous section that is deeply problematic. Spatiotemporal continuity figures into the intraworld identity conditions of objects. An object A can only be identical with an object B if A is spatiotemporally continuous with B . This seems to at least be a plausible part of the identity conditions of physical objects within the physical universe. Now imagine that we tried to utilize this notion not as an

intra-world identity condition, but rather as a transworld identity condition. We could then make the following argument:

(AP1) For all objects x and y and all worlds, if x in w_1 is identical with y in w_2 , then x and y must be at the same space-time locations.

(AP2) Suppose there exists some object A in $@$.

(AP3) Suppose that in some arbitrary world w_1 , object A in $@$ = object B in w_1 .

(AC1) Therefore, the space-time location of A in $@$ = the space-time location of B in w_1 .

(AC2) Therefore, for any world, if it contains an object B such that $B = A$, then the space-time location of B in that world = the space-time location of A in $@$. (Discharging AP3.)

Using spatiotemporal continuity as a transworld criterion of the identity of physical objects renders the absurd conclusion that it is impossible for the same object to be at different locations in different possible worlds. This means that any physical object's location in space is necessary! This is obviously an intuitively absurd conclusion. It should be possible for objects to be in locations other than their actual locations. The troubling part of this argument obviously isn't the supposition that something exists. The trouble, as Lowe sees it, is with using an intra-world criterion of identity as a transworld criterion, i. e. (AP1).

Of course the essentialist (and I) will attempt to argue that the two arguments are going to be disanalogous because properties are different from individuals, but, even if successful, this alone would not be sufficient to fully counter Lowe's worry. Not only are the arguments analogous, but

Lowe thinks that the conclusion rendered by the essentialist argument about properties also leads to an unintuitive conclusion, that *all* the aspects of the laws will be necessary, including the values of all physical constants. If the appeal to the unintuitiveness of it being impossible for objects to have a different location is sufficient to reject the spatiotemporal transworld theory of identity about individuals, then it seems that the unintuitive results of essentialism about properties should have a similar impact on it.

4. Intuition, the Inconstant Constants, and the Reasons for Attributing Properties

Many philosophers have an intuition that the laws of nature are in some sense contingent. One of the most common examples of this intuition is the common belief that the various force constants might have had slightly different values. I certainly have no doubt that many scientists talk about the possibility of variations in the physical constants. It also seems obvious that we have no adequate explanation for the values that the constants have. It is hard to imagine just what such an explanation would look like. This lack of mechanism and explanation may give us a sense that the values must have been “randomly set”. The question is just how seriously we should take such talk about the possibility of different physical constants. Often, talk of possibility can be cashed out in terms of epistemic possibilities or possibilities in which our words had slightly different references. These kinds of possibilities can create the illusion of real metaphysical possibility.

However, the most common ways of expressing our intuitions about the laws of nature support the contingency theorist’s contention and Lowe’s

argument that essentialist identity conditions for properties have non-intuitive consequences. The common expression of the intuition seems to be that there are other possible worlds that have exactly our properties but slightly different laws governing such properties. So for example, mass could exist in that universe, but the attraction between masses could be weaker because the gravitational constant has a lower value.

This way of understanding the intuition is flatly at odds with what the essentialist holds. The strength of the attraction is part of the causal relations that forms the “mass role.” If the constant of the law changes, then there will be a different law and there will be a different property. A universe with a slightly different law of “gravity”, according to essentialism, is a universe where there is at best some counterpart property of mass, schmass. But, this possibility is not enough to capture the intuition, if the intuition is really best thought of as being about the exact same property.

However, I think that understanding the intuitions as involving strict identity is actually at odds with the purpose behind our attributions of properties. When a layman or even a scientist is attempting to explain the differences in the behavior⁶ of two objects, she has two choices. She can either attribute different intrinsic properties to the objects or different extrinsic properties to the object. If neither of those features is different, then there is no explanation of the difference in behavior. When there are no known differences in properties of the object to account for the difference, we think that we have stumbled upon a new property. Many of the fundamental properties in particle physics, like spin, etc., were discovered in

⁶ Different behavior here is narrowly construed. Same probabilistic behavior counts as same behavior even though particles might behave differently on particular occasions.

just this way.

Now, perhaps the critic can maintain that, although this is common practice *within* worlds, there is no reason to think this practice should hold when we go modal. However, there is good reason to think that maintaining this mixed position is actually untenable. A non-essentialist about the identity of properties can give two accounts of why the constants of the laws of nature are contingent: (i) differences in laws in different world lead to different behavior, (ii) laws are mere generalizations of regularities in behaviors which can just be different via brute facts. It seems to me that (i) is either (a) a version of attributing different extrinsic properties to objects, (b) senseless, or (c) a cloaked version of (ii). One way of understanding the laws is that they attribute properties to universes as a whole⁷ and behavior emerges via the interaction of the particulars with their individual properties and the properties of the universe. However, this way of understanding it is consistent with essentialism. We could formulate statements about the interaction of particulars and these more general properties and these statements could be the more basic laws that are in fact necessary. If the explanation isn't due to different properties in either the particulars or the universe, the question becomes: what exactly does this law talk amount to? What kind of thing is a law and how does it change the behavior of individuals without itself having properties? It is hard for me to see how this would be anything but an empty explanation. The other option (ii) is no better off. Reducing the laws to mere regularities undermines the purpose behind property attributions, even in the actual world. If laws are mere

⁷ Perhaps one could attribute it to parts of the universe not normally thought of to have substantial properties such as space. So, for example, gravitational "constants" would be different in different spaces, etc...

regularities, then of course there are possible worlds in which all the masses follow some different regularity, but there will also be possible worlds in which half the masses behave in one regular manner and the others in another. In such a world, the people would no doubt appeal to a difference in property between the two groups to explain the difference in behavior, but they would be mistaken. The difference is just an inexplicable brute fact. If this is possible, then there is really no reason to think that our attributions of properties do any of the explanatory work they are meant to do. If the critic tried to explain away the half and half universe by contending that properties are stipulative - and thus there are two different properties in that world just due to usefulness of thinking of the two groups of entities as having different properties -, then he has conceded too much to the essentialist position. He is then forced to give some reason why carrying the stipulation over to the modal cases isn't just as useful. Isn't it extraordinarily useful and intuitive to think that differences in the behavior of other possible worlds are explicable by differences in the properties of the worlds or their contents?

However, perhaps there is another problem for the essentialist. There is good reason to think that the causal roles of many properties are so deeply interconnected that there cannot be single changes in properties⁸. For example, if someone took our world and replaced mass with schmass which was slightly less attractive, then the effect would ripple out to affect the other properties. Charge, spin, color and any other property which can impose forces on particles will have mass⁹ in its causal role (roughly, since $F = ma$). It seems that in order for charge, spin, color, etc to interact with

⁸ See *Schaffer 2005* for an argument that alien properties would infect all other properties.

⁹ I'm assuming gravitational mass and inertial mass are the same property. Perhaps I shouldn't, but the opponent's worry is actually less effective without this assumption.

schmass, they too will have to be replaced by schmarge, schmin, and schmolor. This picture is hardly as intuitive. Should one really think that a universe with a slightly different gravitational-like law would have to contain not just one different property, but perhaps completely different fundamental properties? This doesn't seem to accord with our standard explanatory practice.

Now it is true that properties like mass are deeply interconnected with the causal roles of other properties. However, it is not obvious that a change in the presence of mass actually precludes the existence of properties like charge. To attempt to understand why this is so, let's consider a quick thought experiment. Suppose that something were to remove mass from the universe. Would this remove charge from the universe? It doesn't seem that it would. Charge would still exist but perhaps it wouldn't be able to manifest part of its causal role¹⁰. It could simply be an unmanifesting disposition. Now suppose I next inserted schmass in mass's former place. There seems to be three *epistemically* possible outcomes which I can imagine: (i) charge would be unable to interact with schmass, (ii) charge would interact with schmass in an analogous way to how it interacts with mass, or (iii) charge and schmass would interact in some unknown way. The first possibility suggests that charge only has powers or dispositions to interact with actual properties. It "doesn't know how to work" with alien properties like schmass. Since dispositions can already have potentially unmanifested aspects, I don't see why we would believe this first possibility must be the only possibility. The second and third possibilities suggest that properties

¹⁰ It is actually quite hard to imagine what such a universe would be like. Would charge enact infinite acceleration on particles or would it not impart any force at all? It isn't clear. But the next step is the critical one.

like charge have certain hidden powers or dispositions to interact with alien properties. This suggests that properties are like boy scouts, always prepared for any contingency, even those that wouldn't arise in the actual world. The third possibility would imply that a large number of laws are hidden and unknowable in the actual world. Charge would interact in some way with schmass, some law would be true about charge and schmass, but we could never know what form it has. This seems possible to me and I don't think that its epistemological consequences are that bad. We can of course still know about the interaction of actual properties with other actual properties and this is all that science should care about. The second possibility is exactly the kind of picture that is friendliest to the essentialist. It is just the kind of picture that the point about the interrelatedness of properties was supposed to rule out.

A critic might complain that, given the actual nature of charge, only one of these *epistemically* possible scenarios would be *metaphysically* possible, but, since the criticism of the essentialist view is that it can't allow for "imaginable" worlds of the necessary type, epistemic possibility is enough to defuse the worry. There is a scenario that it makes sense to talk about and imagine. The main thing an essentialist needs, in order to dodge the objection due to interrelated properties, is some possibility where gravity could be weaker without the wholesale replacement of properties. The second possibility does just that.

5. Conclusion

I have defended essentialist transworld identity conditions for properties. These identity conditions can be used in an argument for the strong necessity

of the laws of nature. Strong necessity is definitely non-intuitive on the surface, but I don't think that its consequences are untenable. Our intuitions about contingency can quite easily be mistaken and there are very similar possibilities available that we could be mistakenly imagining. Furthermore, the essentialist theory of the identity of properties fits more naturally with the usefulness of appeals to properties in explanations of differences in behavior. I see no untenable consequences of extending this useful thought about properties to the transworld case.

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BRADLEY RETTLER

RESPONSE TO ELWONGER (22 FEBRUARY 2011)

In this paper, Luke Elwonger seeks to defend the conjunction of property essentialism and law necessitarianism from an argument by E. J. Lowe. He also seeks to reconcile essentialism and necessitarianism with our intuitions that the laws could be slightly different.

First Lowe, who offers the following parody argument. Since no two material objects can be in the same place at the same time, spatial location provides us with the identity conditions for objects. This is, of course, contentious; some people think statues and clay are co-located and not identical. But suppose it's true; it doesn't follow that what it is to be a certain material object located at R is to be located at R . This amounts to the claim that objects have their spatial locations essentially; but clearly they do not.

Lowe accuses the essentialist of making the same fallacious reasoning. No two properties figure into the same laws in the same ways; so supposing property P is involved in laws $L_1 \dots L_n$ in way W , being involved in $L_1 \dots L_n$ in way W is sufficient for being P . But of course, any world that has P has laws $L_1 \dots L_n$, and any world that doesn't have P has laws $L_1 \dots L_n$ trivially satisfied. So, the laws are metaphysically necessary. But, Lowe says, just because *being involved in $L_1 \dots L_n$ in way W* is actually sufficient for being P , it doesn't mean that: Necessarily (*being involved in $L_1 \dots L_n$ in Way W* is sufficient for being P). This conclusion is too counter-intuitive to accept, so we should reject scientific essentialism.

'No!' says Luke. 'It's not that counter-intuitive. If it is counter-intuitive, it

is because our intuitions about the trans-world identity of properties are at odds with our ordinary reasoning about properties.’ I must confess that I do not understand why Luke thinks this, and I am at odds trying to formulate an argument the first premise of which is our intuitions about the trans-world identity of properties and the conclusion of which is the denial of our ordinary reasoning about properties. (I take it that ‘*x* is at odds with *y*’ means ‘*x* entails not-*y*’ or at the very least ‘*x* gives us good reason to deny *y*’.) I will note one thing: Luke thinks that the reason (or at least the main reason) that we attribute properties is to explain the difference in behavior of objects. But certainly this is not the only reason. We use property attributions to explain resemblances and differences, to provide grounds for predication. Also, we can just see that some objects have properties! Even if we didn’t need them to explain differences, we’d need them to explain our experience of, say, red things. Also, we attribute properties to things that don’t ‘behave’ at all (if I pretend to understand behavior, which I take entails being physical.) I’ll let others bring this up in Q&A if they desire.

However, I do join Luke in thinking that Lowe’s parody is not a very good argument against essentialism. It is an argument against the inference from ‘*x* is a criterion of identity for properties in the actual world, therefore it must also serve as a principle for transworld identity’. But the essentialist just thinks that participation in the same laws is sufficient for trans-world identity. She isn’t reasoning fallaciously from a criterion of intraworld identity. So giving a criterion of intraworld identity and then showing that it fails as a criterion of transworld identity is no argument against essentialism.

My objection to the conjunction of essentialism and necessitarianism is that together they entail that there can’t be changes of a single property across worlds. Luke concludes with a response to this objection. He asks

what would happen to charge if we ‘took out’ mass and ‘put in’ schmass (forgive the metaphorical word picture)? Is it that (i) charge does not interact with schmass, (ii) charge and schmass interact ‘in an analogous way’, or (iii) charge and schmass interact in some unknown way? Luke doesn’t like (i) or (iii), for good reason. He thinks (ii) is the friendliest to essentialism.

A side note. I don’t know what Luke means by ‘interaction’. One option is ‘property P interacts with property Q ’ means that ‘objects with P exert causal influence on objects with Q and/or vice versa’. Or it means ‘property P and property Q are co-instantiated’. I am tempted by the discussion to think Luke means the latter, but this means we’re not taking mass out of objects and putting in schmass. Rather, we’re taking mass out of the world and putting in schmass, and (i) just means charge and schmass are not co-instantiated. But if schmass isn’t co-instantiated with anything with which mass was co-instantiated, then does anything instantiate it? In any case, the language is clearly metaphorical, and I don’t know how to make it more precise. So I’ll try to play along with the metaphor with the proviso that I’m not exactly sure what I’m doing.

(ii) is certainly the most intuitive, but I do not think it is the friendliest to essentialism. First, either in (i)-(iii) ‘analogous’ really means analogous, or it does not. If it does, then the options are not exhaustive. A further option is that charge and schmass interact in the very same way as charge and mass. If that’s an additional option, then I don’t know what (ii) means. It is much more likely that Luke intends (i)-(iii) to be exhaustive. If they are exhaustive, then (ii) means that schmass and charge interact in the very same way as charge and schmass. This means that every law in which mass appears, there is a law that differs only in the substitution of ‘schmass’ for ‘mass’. But given the essentialist view Luke adopts, this means that mass

and schmass are identical! After all, they figure in all the same laws in the same ways. In order to say they're distinct, one would have to posit a property that one has and the other lacks. And certainly the essentialist wouldn't want to use hacceties.

Thus, the essentialist must say that the original scenario is misdescribed. We don't take out mass and put in schmass. We can't do that! On the essentialist picture, in order to take out mass, we've got to take out as least one other property along which mass enters to some laws. So the essentialist can't account for our intuition that changes of single properties are possible. This is a significant cost to the view. Luke is right to try to answer the objection but this proposal does not show that essentialism does not entail that single property changes between worlds are possible.

FABRICE PATAUT

COMMENTS ON ELWONGER (AND RETTLER)
(APRIL 2011, REVISED MAY 2011 AND MAY 2012)

Luke defends the view that it is metaphysically necessary that p when p is a law of nature. He claims that this view follows from essentialist transworld identity conditions for natural properties.

I have a remark to make and a question to ask. The remark concerns the particular construal of transworld identity conditions that Elwonger advocates. The question concerns the content of the notion of metaphysical necessity involved in the law necessitarianism he thus defends; it is also related to one of Rettler's criticisms.

Critical Remark. The theory of transworld identity of properties is obtained here via an analogy with Shoemaker's idea that identity conditions for properties are determined by their causal role (*Shoemaker 1998*) or, better, with Hawthorne's particular construal of the view (*Hawthorne 2001*).

This causal role is understood by way of Ramsey sentences. Take mass. If we replace all occurrences of the indexed constants m_1, m_2 for mass in Newton's law of universal gravitation with a variable and existentially quantify in the result, we obtain a Ramsey sentence. Instead of claiming that two masses attract each other by a force proportional to their product and inversely proportional to the square of the distance between them, i.e.:

$$(1) \quad F = G \frac{m_1 m_2}{r^2},$$

we're now claiming there are things which behave in just that way.

I don't see that we get a ground here for the idea that there is *nothing over and above* the property mass than performing that specific causal role. It seems to me that this 'nothing over and above' claim very much inflates what the Ramsey sentence actually offers and that a generalized Ramsey sentence strategy yields a threat rather than a promise.

If we keep on doing this with all the theoretical terms of Newton's theory, we'll get a Ramsey sentence of the theory, i.e., a conjunction of sentences obtained by the replacement of each theoretical term by an existentially quantified variable of the appropriate type, taking the entire conjunction as the scope of the quantifier. As Newman remarked long ago¹¹, if you carry this out for all terms save the logical terms of the theory, by the Lowenheim-Skolem theorem you get a result which is interpretable in any domain with sufficient cardinality. Any domain you'll care to pick up may be arranged or carved up so that it will possess some abstract structure compatible with its cardinality.

The cost of getting identical causal roles for mass across all possible worlds is that the theory claiming, say, that (1), is now neutral concerning which entities turn out to satisfy that law of nature. You've lost the content of the law and the fact that your result is interpretable in any domain with sufficient cardinality turns the necessity Luke claims is built in natural properties like mass into something very odd. Oddness isn't the problem, though. The result isn't merely counter-intuitive, so that one might see this

¹¹ See M. H. A. Newman's 'Mr Russell's "Causal theory of Perception"', *Mind*, 1928, vol. 37, pp. 137-148 (the article is a review of Russell's *The Analysis of Matter*). See also the informative article by W. Demopoulos and M. Friedman: 'Critical Notice: Bertrand Russell's *The Analysis of Matter*: its Historical Context and Contemporary Interest', *Philosophy of Science*, 1985, vol. 52, pp. 621-639.

as just another reason to get rid of our ordinary or quasi-ordinary intuitions about the way theoretical notions help us understand how the world works. One may well wonder at this point whether an open sentence really *expresses* “the causal roles of all the properties of the universe”. Expressing, after all, should amount to expressing a *content*.

Luke replies to this (in correspondence) that he’s not seriously committed to the Ramsey sentence strategy, that other strategies might help spelling out the view that natural properties’ causal roles are an essential part of them. (They’re not just *some* essential *part* of them, by the way; they are strictly speaking identical to them, according to his view.) The prospect before us, though, isn’t quite to *spell out* that view but to find *an argument* for it. My criticism of the view points out that the Ramsey strategy, thus construed, spells out indeed the contentious view *and* provides no warrant for it.

Luke (still in correspondence) replies to my objection that the Ramsey strategy (or, rather, as we perhaps should call it, the Ramsey-Shoemaker-Hawthorne strategy — “RSH” for short) yields a content-less view of the causal roles of natural properties like mass (or schmass, or whatever queer properties we might think of) only if we presuppose *(i)* pan-dispositionalism and that *(ii)* all properties, rather than just the dispositional ones, have to be replaced by bound variables in the Ramsey sentences.

I’m not convinced by this rejoinder. If we’re pan-dispositionalists and *all* predicates standing for properties are to be subjected to the RSH strategy, then *no* categorical properties may be concerned by the strategy since, ex hypothesi, there aren’t any. Luke then remarks that the thesis he defends is nevertheless compatible with a mixed view which would allow for both categorical and dispositional properties. But since categorical properties exert *no* causal influence, they just can’t bear on the question of knowing

whether or not we may infer that any number of worlds have the same causal laws from the premise that they all happen to have the same properties.

It seems to me, then, that Luke has put himself in a rather difficult position. His predicament amounts to this: either he's a pan-dispositionalist and, applying the RSH strategy, gets content-less laws of nature, or he grants that some properties (the categorical ones) are such that the predicates which stand for them in whatever theory of nature we'll care to consider can't be replaced by variables bound by an existential quantifier (so that no application of the RSH strategy is available here). Given that he must avoid the first horn of the dilemma, he's left with the option of showing that categorical properties are precisely those properties which remain identical across possible worlds. My worry is that even if they did, they still wouldn't have the required causal powers and so couldn't be identified with causal roles. This further implies that the necessity Lukes needs for law necessitarianism wouldn't at all be *built in* these natural properties.

Question. One way of reading "metaphysically necessary" is by way of an opposition with "epistemically necessary". What is metaphysically necessary is necessary independently of us. What isn't is on the contrary necessary relative to us, necessary in our world. In particular, it is epistemically necessary that p if p is consistent with what we know, or implied by what we know. (This is, I gather, the current construal of "epistemically necessary".)

Now if isn't merely nomically necessary (i.e, contingent) that p , but indeed strongly or metaphysically necessary that p , then it might be the case that p whether or not we know that p or may come to know that p . I wonder whether Luke also wishes to defend that view.

Luke (still in correspondence) wonders where my worry comes from. It comes from several interconnected quarters and I shall try to spell out what they are.

(i) It comes from the contention that a law necessitarian could help himself to the possibility of uninstantiated properties. Luke claims that “a lot what [he says] is dependent upon it being sensible to talk about merely possible [i. e. uninstantiated] properities”. Schmass, I take it, is such an unrealized or uninstantiated property. Yet schmass, according to him, is identical to mass. So how could it be uninstantiated ? Not only should it be instantiated in our world, but it should be in all worlds governed by laws such that “mass” and “schmass” play the exact same role in them. Or so the necessitarian contends.

(ii) The last contention in (i) is the target of one of Bradley’s criticisms. Towards the end of his response, Bradley complains that essentialism and necessitarianism conjunctly entail that there can’t be changes of a single property across worlds. It seems to me that Luke’s view not only *entails* the substitution *salva veritate* of a large number of “mass”/“schmass” cases but that such a substitutivity claim *is part of it*. Once again, essentialism claims that mass *is* schmass and that “mass” may be substituted for “schmass” and so on... But isn’t saying that they’re identical (or, alternatively, that their corresponding predicates figure in the very same laws) just another way of saying that these predicates as it were rigidly designate the same property?

(iii) Since Luke holds that the causal role of properties is a necessary feature of them in some strong metaphysical sense, he should also stick to the claim that laws of nature involving such causal roles hold in all worlds instantiating the properties of the actual world. But then there just can’t be worlds *not* instantiating the properties of the actual world. We’ve ruled them

out. The worry, this time, comes not so much from the contention that a law necessitarian could help himself to the possibility of uninstantiated properties, but from the contention that the identities will hold in any world *whether accessible or not*, which must indeed be the case since “mass” and “schmass” rigidly designate the same causal role (just as they rigidly designate the same property) and so on.... That view is, to say the least, contentious: it rules out the possibility of unknown or *pro tempora* unknowable natural properties, i.e., unknowable given our current epistemic shortcomings. I’m not sure a law necessitarian would like to go that far.