



# The non-governing conception of laws of nature

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## The non-governing conception of laws of nature<sup>1</sup>

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### I INTRODUCTION

There are two main camps in the debate about the metaphysics of laws of nature. In one corner, there is the anti-Humean view of David Armstrong: laws are relations of necessity between universals.<sup>2</sup> And in the other corner there is the Ramsey-Lewis view: laws are those generalizations which figure in the most economical true axiomatization of all the particular matters of fact that obtain.<sup>3</sup> The Ramsey-Lewis view counts as a Humean view because it does not postulate any necessary connections. The debate between the rival camps can be read as a debate about whether or not supervenience holds for laws of nature: whether or not nomic facts supervene on non-nomic facts or, to put it in more Lewis-esque terms, whether or not laws supervene on the overall distribution of particular matters of fact.<sup>4</sup>

It’s worth pointing out that in principle the upholder of supervenience with respect to laws has two options: she can view the supervenience of laws on particular matters of fact as either contingent or necessary. That is, she can hold that laws of nature supervene on particular matters of fact only at our world and worlds reasonably similar to ours, or, more strongly, that it’s true at *all* possible worlds that laws supervene on particular matters of fact. Indeed, it’s quite easy to imagine the form which a contingent supervenience thesis might take. Taking our cue from

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<sup>1</sup> This paper was written while I was a Postdoctoral Fellow at the Philosophy Program in the Research School of Social Sciences, Australian National University. I thank the staff and students there for helpful discussion. Thanks are also due, for criticism of earlier drafts, to David Armstrong, Henry Fitzgerald, Michael Smith, Nick Zangwill, and two anonymous referees for this journal.

<sup>2</sup> See Armstrong (1983). The view is sometimes called the “Dretske-Tooley-Armstrong view”, since Dretske (1977) and Tooley (1977) came up with similar views at the same time as, but independently of, Armstrong. I shall confine myself to Armstrong’s formulation of the view since it is the most well-known and detailed of the three.

<sup>3</sup> See Ramsey (1978); Lewis (1973), pp.73-75; and Lewis (1986), Postscript C. The Ramsey-Lewis view is sometimes known as the Mill-Ramsey-Lewis view, in recognition of the fact that it originated with Mill; see Mill (1875), Book III Chapter IV.

<sup>4</sup> Throughout the paper, the expression “particular matters of fact” is taken to cover facts about objects and their natural, *non-nomic* properties and relations. I leave it as an open question whether laws of nature obey the stronger condition which Lewis calls “Humean supervenience”, according to which laws of nature (*inter alia*) supervene on the arrangement of qualities of point-sized entities (see the Introduction to Lewis (1986a)).

functionalism in the philosophy of mind, we might try to identify a “folk theory” of lawhood, analogous to folk theories of, say, pain and belief. The literature on laws of nature points to a good deal of agreement about what a “folk theory” of laws of nature might look like (laws are those features of the world which make true universal, counterfactual-supporting generalizations; laws are explanatory; and so on). And we could then use the folk theory to pick out laws of nature non-rigidly, so that at our world laws of nature are those generalizations which figure in the best axiomatic system, whereas at other worlds laws are relations of necessity between universals, or the rules God uses for deciding how the universe is going to evolve, or whatever.

As far as I know, nobody has tried to articulate or defend the contingent supervenience view (though it might turn out to be an attractive position for those Humeans who are more concerned than I am about the thought experiments discussed in sections V and VI below). I shall therefore ignore the contingent supervenience option for the remainder of this paper, and identify Humeanism with the stronger, reductionist thesis that laws supervene on particular matters of fact at all possible worlds. With Humeanism thus construed, the debate about laws of nature is a classic realism-versus-reductionism dispute, with the anti-Humean realists wanting to ground the distinction between laws and accidentally true generalizations in some metaphysically substantive feature of the world - something irreducibly nomic - and the Humean reductionists wanting to preserve the law-accident distinction without recourse to any suspiciously anti-Humean ontology.

A fairly standard way of criticizing the Humean view has been the use of thought experiments; this is a method employed by, for instance, Bas van Fraassen, Michael Tooley, and John Carroll.<sup>5</sup> We are asked to consult our intuitions about some remote possible world, and then shown how those intuitions conflict with the verdict of Humeanism about laws (or more specifically with the verdict of the Ramsey-Lewis view). My purpose in this paper is to show that two such thought experiments do not succeed in finishing off the Humean conception of laws, because they presuppose a conception of laws which Humeans do not share: a conception according to which the laws *govern* what goes on in the universe.

My strategy is going to be as follows. First of all (in section II) I’ll give a brief characterization both of the Ramsey-Lewis view and of Armstrong’s view, and show how they both do justice to some of our more obvious common-sense intuitions about the nature of laws. In section III, I discuss what I see as the fundamental difference

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<sup>5</sup> See van Fraassen (1989), Chapter 3; Carroll (1990); Carroll (1994), Chapter 3; and Tooley (1977).

between the two views, which is a difference over whether or not laws govern. I bring out the distinction between the “governing” conception favored by anti-Humeans and the “descriptive” conception favored by Humeans by showing how the distinction informs debates about free will and determinism. The intuition that laws govern is, I think, deeply felt - at least implicitly - by a lot of philosophers, and probably by a lot of the folk too. But it is an intuition that the Ramsey-Lewis view - and Humeanism about laws in general - refuses to endorse. And it’s no accident that it refuses to do so: the intuition that laws govern is precisely the intuition which leads one to postulate the necessary connections - as ontological grounds of the governing nature of laws - which the Humean refuses to allow into her ontology.

The prevalence of the view that laws play a governing role suggests a quick refutation of Humeanism: if it is a *conceptual* truth that laws govern, then Humeanism, which accords laws of nature no such status, must be false on conceptual grounds. In section IV, I argue that it is *not* a conceptual truth that laws of nature govern, since the only motivation for the claim that it *is* a conceptual truth is a false analogy with other kinds of law.

The point of sections III and IV is to show that the Ramsey-Lewis view is, at least *prima facie*, a coherent, well-motivated view - and one which cannot be dismissed simply on the grounds that it fails to accord laws of nature a governing role. In sections V and VI, I look at two thought experiments that are supposed to be counter-examples not just to the Ramsey-Lewis view but to Humeanism about laws in general. I argue that the alleged “common-sense” intuitions which the counter-examples appeal to - the intuitions that are supposed to refute Humeanism - are explicitly anti-Humean intuitions, and therefore just the sort of intuition to which the dedicated Humean ought not to be doing justice. In particular, the primary anti-Humean intuition appealed to in the thought experiments is the intuition that laws of nature govern. But if the argument of section IV is right, this is an optional intuition; it is one which the Humean need not, and indeed should not, share. Thus Humeanism about laws - and the Ramsey-Lewis view in particular - is not refuted by the thought experiments.

I’m going to assume determinism in what follows. I dare say this is a false assumption, but it is one that is warranted by the purposes of this paper: partly because the counter-examples discussed below assume determinism, and partly because matters are very much more complicated without the assumption. However, while the details differ once the assumption of determinism is dropped, the fundamental dispute about whether or not laws govern remains. Under indeterminism,

the anti-Humean will say that laws govern chances of events rather than events themselves, or that probabilistic laws govern only in those cases where the consequent of the law is realized, or some such. On the other hand, the Humean will say that laws are merely true general *descriptions* of the chances of events (where ‘chance’ is given a suitably Humean reading), or that laws describe not constant co-occurrences but merely more or less frequent co-occurrences.

## II TWO THEORIES OF LAWHOOD

### The Ramsey-Lewis view

In a short note written in 1928, Ramsey defined lawhood like this: “... if we knew everything, we should still want to systematize our knowledge as a deductive system, and the general axioms in that system would be the fundamental laws of nature” (1978, p.131). In *Counterfactuals*, Lewis recasts the definition as follows: “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” (1973, p.73).

So the idea is something like this. Suppose God wanted us to learn all the facts there are to be learned. (The Ramsey-Lewis view is not an epistemological thesis but I’m putting it this way for the sake of the story.) He decides to give us a book - God’s Big Book of Facts - so that we might come to learn its contents and thereby learn every particular matter of fact there is. As a first draft, God just lists all the particular matters of fact there are. But the first draft turns out to be an impossibly long and unwieldy manuscript, and very hard to make any sense of - it’s just a long list of everything that’s ever happened and will ever happen. We couldn’t even come close to learning a big list of independent facts like that. Luckily, however (or so we hope), God has a way of making the list rather more comprehensible to our feeble, finite minds: he can axiomatize the list. That is, he can write down some universal generalizations with the help of which we can derive some elements of the list from others. This will have the benefit of making God’s Big Book of Facts a good deal shorter and also a good deal easier to get our rather limited brains around.

For instance, suppose all the facts in God’s Big Book satisfy  $f=ma$ . Then God can write down  $f=ma$  at the beginning of the book, under the heading “Axioms”, and cut down his hopelessly long list of particular matters of fact: whenever he sees facts about an object’s mass and acceleration, say, he can cross out the extra fact about its

force, since this fact follows from the others together with the axiom  $f=ma$ . And so on. God, in his benevolence, wants the list of particular matters of fact to be as short as possible - that is, he wants the axioms to be as strong as possible; but he also wants the list of *axioms* to be as short as possible - he wants the deductive system (the axioms and theorems) to be as simple as possible.<sup>6</sup> The virtues of strength and simplicity conflict with each other to some extent; God's job is to strike the best balance. And the contingent generalizations that figure in the deductive closure of the axiomatic system which strikes the best balance are the laws of nature.<sup>7</sup>

The extent to which we can axiomatize the particular matters of fact depends on how regular our world is. In nice deterministic worlds, we can in principle axiomatize to such an extent that we only need a list of initial conditions under the "facts" heading. At nasty, irregular worlds, only some very small proportion of the particular matters of fact might be axiomatizable, so there won't be very much under the "axioms" heading, and there'll be quite a lot of particular matters of fact left over under the "facts" heading. A regular but indeterministic world will, I suppose, fall somewhere between these two extremes.

Now, why does this get to count as a *prima facie* plausible analysis of lawhood? Answer: because it seems to preserve a good number of our intuitions about what a theory of lawhood ought to do. I'll run through three of the most important.<sup>8</sup>

First up is the thought that any adequate analysis of laws of nature has to distinguish between laws and accidents: between generalizations that are true as a matter of law and those which merely happen to be true. The Ramsey-Lewis view makes this distinction on the basis of whether or not the generalization in question figures as an axiom or theorem in the best system. Consider, for example, the true generalization that everyone currently in Seminar Room E is a philosopher. This is not a law of nature. According to the Ramsey-Lewis view, the reason why it isn't is that it does not figure as an axiom or a theorem in the best deductive system. Adding this generalization to our system - or adding some other axiom that entails it - would yield

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<sup>6</sup> Of course, simplicity isn't really that simple, for there is also the question of how simple the axioms individually are, which I take to be a matter of their logical form and the sorts of predicates which they employ.

<sup>7</sup> If there is a tie for the best system, then the laws of nature are whichever axioms and theorems appear in all the tied best systems (see Lewis (1986), p.124).

<sup>8</sup> A more comprehensive list of intuitions about lawhood, together with a discussion of which of these beliefs are accommodated by the Ramsey-Lewis view, is to be found in Loewer (1996), section IV. Loewer points out, as I do in section III below, that the Ramsey-Lewis view fails to do justice to the intuition that laws govern events.

hardly any gain in strength but would detract significantly from simplicity, so the generalization is not a law.

Next up is the fact that laws support counterfactuals, whereas accidental generalizations do not. This fact is nicely accommodated by Lewis's theory of counterfactuals. According to Lewis, the extent to which the laws are the same is an important feature in determining how similar worlds are to each other. So for example it ought to come out true that if I were to drop my pen now, it would fall with an acceleration equal to the force exerted on it divided by its mass. And on Lewis's analysis this *does* come out as true. We are required to hold the laws fixed as far as possible when looking for the closest world where I drop my pen. We might need a small miracle to get me to drop it in the first place, but we don't need to tinker with the law that  $f=ma$ . So the closest world where I drop my pen will be one where it is a law that  $f=ma$ ; hence at that world my pen falls with the appropriate acceleration and the counterfactual is true.<sup>9</sup>

Accidental generalizations, on the other hand - like the generalization that everyone currently in Room E is a philosopher - do not in general support counterfactuals on Lewis's account. It's not true, for instance, that if Gavin (who is not a philosopher) were to walk into Room E now he would become a philosopher, since we are not required to hold the truth of the generalization that everyone there is a philosopher fixed when looking for the closest world where Gavin walks in. Thus a world where he enters and retains his status as a non-philosopher is closer than any world where he walks in and his brain bizarrely reconfigures itself in a way which makes him count as a philosopher. (Obviously being a philosopher isn't just to do with what state your brain is in. But whatever it takes to be a philosopher, it won't happen to Gavin in the closest world where he enters the room.)<sup>10</sup>

Third and finally comes the connection between laws of nature and physical necessity: "It is a law that A" is supposed to entail "it is physically necessary that A". Lewis gets this right by means of stipulative definition: A is defined to be physically necessary if and only if it follows from the laws of nature.

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<sup>9</sup> What if we *do* need to tinker with the law that  $f=ma$  in order to get me to drop my pen? Then  $f=ma$  will not be a law in the closest world where I drop it. Even so, since  $f=ma$  is a law at *our* world, we hold it fixed *as far as possible* when determining similarity. We only need the one violation of  $f=ma$  in order for me to drop my pen; hence at the closest world where I do so there will only be that one violation. Hence in that world the pen, once dropped, will fall according to  $f=ma$ .

<sup>10</sup> I have appealed to Lewis's theory of counterfactuals here. Of course, in principle one can hold the Ramsey-Lewis view without endorsing Lewis's theory of counterfactuals. My point here is merely to show that *there is* a theory of counterfactuals to which a defender of the Ramsey-Lewis view can appeal in order to do justice to the intuition that laws support counterfactuals.



### Armstrong's view

Those are the three respects in which the Ramsey-Lewis view preserves our intuitions about laws of nature that are going to be most important in what follows. Just for the sake of comparison, I'll give a rough account of how Armstrong's view does the same thing.

For Armstrong, laws of nature are necessary relations between universals. He writes this " $N(F, G)$ ": the second-order relation  $N$  (" $N$ " for "necessitation") hold between first-order universals  $F$  and  $G$ . According to Armstrong, the holding of  $N$  entails the generalization that all  $F$ s are  $G$ s: since  $F$ -ness necessitates  $G$ -ness, all  $F$ s are going to turn out to be  $G$ s.

(In fact, Armstrong thinks that the entailment from  $N(F, G)$  to "all  $F$ s are  $G$ s" does not go through for all deterministic laws. It might be that  $N(F, G)$  holds but only for those  $F$ s that are not  $H$ s:  $F$ s that *are*  $H$ s are not  $G$ s. Hence  $N(F, G)$  does not entail that all  $F$ s are  $G$ s. Armstrong calls laws like this "oaken laws", to be contrasted with "iron laws" for which the entailment does hold.<sup>11</sup> Thus when I talk about the entailment between  $N(F, G)$  and "all  $F$ s are  $G$ s", the reader should take it that I am talking about iron laws. Note that the iron/oaken distinction does not apply to the Ramsey-Lewis view, according to which *all* deterministic laws are true universal generalizations.)

The distinction between laws and accidents, then, is simply a matter of whether or not the relevant universals are related by  $N$ . There is a necessary connection between force, mass and acceleration, but not between being in this room now and being a philosopher.  $N$  provides the ground for counterfactuals too: if  $N(F, G)$  holds, then, Armstrong says, there is every reason to suppose that it would continue to hold under the counterfactual supposition that some object is  $F$ ; hence that object would be  $G$  too, as required.<sup>12</sup> Finally the connection between lawhood and necessity is pretty obvious: laws just *are* physically necessary relations.

So those are the two competing views. The Ramsey-Lewis view is (or at least I'm construing it as) a reductionist view, and therefore one according to which the supervenience of laws on non-laws holds at all possible worlds: if two worlds are

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<sup>11</sup> See Armstrong (1983), pp.147-149. The distinction springs from Armstrong's thesis that there are no negative universals; hence  $N$  cannot relate, say,  $F$  and not- $H$  with  $G$ , since one of the alleged relata does not exist.

<sup>12</sup> See Armstrong (1983), p.103

identical with respect to their particular matters of fact, those facts will have the same best axiomatization and hence the worlds will have the same laws. Armstrong's realist view does not respect supervenience: two worlds can be identical with respect to all their particular matters of fact and yet differ with respect to which universals bear *N* to each other. Indeed it's part of Armstrong's view that there is a world identical to ours with respect to all its non-nomic facts but which has no laws of nature at all - just accidentally true generalizations.<sup>13</sup>

### III DESCRIPTIVE VS. GOVERNING CONCEPTIONS OF LAWS

I just said that both the Ramsey-Lewis view and the realist view preserve common-sense intuitions about laws and accidents, about the counterfactual-supporting nature of laws, and about physical necessity. What I want to do now is draw attention to the main difference between them. The fundamental difference, I think, is that for the Humean laws are purely descriptive of the particular matters of fact, whereas for the anti-Humean laws *govern* what the particular matters of fact are.<sup>14</sup>

One way of bringing this out is to consider the thesis of determinism. We can characterize determinism in the following rough and ready way: the state of the universe at any given time together with the laws of nature *determines* what the state of the universe will be at any future time. But what does "determines" mean here? For the Humean, the laws and current facts determine the future facts in a purely logical way: you can *deduce* future facts from current facts plus the laws. And this is just because laws *are*, in part, facts about the future. So for the Humean, the notion of determination is, as it were, a metaphysically thin one. This contrasts sharply, I think, with the notion of determination which the anti-Humean has. For the anti-Humean, the notion of determination is a metaphysically meaty one. It isn't just that the laws plus current facts *entail* future facts; rather the laws "make" the future facts be the way they will be: the laws are the ontological *ground* of the future facts.

Another way of putting this is to say that for the anti-Humean the laws are already present in the current state of the universe. Imagine Armstrong writing down everything that's true of the universe up to this moment. One of the things that will appear in his list will be the obtaining of *N* between various pairs of universals. And

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<sup>13</sup> See Armstrong (1983), p.71

<sup>14</sup> The difference has of course been noticed before; see for instance Swartz (1995) and Loewer (1996). However there has been a tendency amongst anti-Humeans to ignore the difference and to simply assume that laws' ability to govern is obvious and uncontroversial.

it's in the nature of  $N$  that its obtaining entails that those universals will carry on occurring together. " $N(F, G)$ " expresses a relation that is already with us, so the future really is determined by some current feature of the universe. For the Humean, on the other hand, a complete list of everything that's true of the universe up to now entails nothing whatever about the future, since if future facts by definition are banned from the list, then so are laws of nature. Amongst the current facts will be true generalizations about what's happened up to now, but none about what's *going* to happen. The current state of the universe in and of itself does not, as it were, contain the seeds of the future.

Still another way of bringing out this fundamental clash of intuitions is to consider one formulation of the problem of free will. One way of putting the main intuition behind incompatibilism is this: If determinism is true, then, given the laws and the current state of the universe, I could not have acted otherwise than the way I did act. Since I could not have acted otherwise, my act was not free.

Now, the premise of the argument is obviously true: if determinism is true, then, given the laws and the current state of the universe, I could not have acted otherwise than the way I did act. But I think a Humean about laws of nature ought to question why this premise is supposed to entail that we are not free. Suppose the act in question is the raising of my arm. Suppose further (rather implausibly) that the relevant law is that every person in state  $P$  raises their arm, and that I am in state  $P$ . It follows that I will raise my arm. It doesn't follow, I don't think, that I am not free. For on the Humean conception of lawhood, its being a law that everyone in state  $P$  raises their arm depends upon what happens in the world - and in particular upon whether or not I, who am in state  $P$ , raise my arm. Given that I really am in state  $P$ , to say that it is a law that everyone in state  $P$  raises their arm is already to presuppose that I'll raise my arm; and the sense in which I am thereby constrained to raise it is a purely logical one. And this logical sense surely cannot be an obstacle to free will. Whether or not determinism is true, and however much free will we have, we logically cannot make what will happen fail to happen. If  $P$  will be true, nobody - not even God - can bring it about that not- $P$ . *Qué serà serà* is a logical truth and therefore not something with profound metaphysical implications.

I think those who are moved by this argument for incompatibilism are implicitly adopting an anti-Humean conception of laws of nature - and in particular, a conception of laws according to which laws are not just generalizations about what has happened and will happen, but rather *govern* what will happen. It is this thought which prompts one to think that the laws of nature place a constraint on our actions

that is in some way incompatible with freedom: a constraint which forces us in some metaphysical, not-purely-logical sense to act in the way we do.<sup>15</sup>

This detour into determinism and free will is a way of making vivid the profound difference between seeing laws as descriptive, as the Humean does, and seeing them as governing, as the anti-Humean does. For the Humean, since the laws are descriptive, what the laws are depends on what the facts are - including future facts. For the anti-Humean, what the facts are depends upon what the laws are. Humeans and anti-Humeans therefore have completely opposite conceptions of what provides the metaphysical basis for what.

The Humean and anti-Humean positions, then, differ radically with respect to the roles that they expect laws of nature to perform; and it is these different expectations that give rise to the differences in ontology. For the anti-Humean, laws (unlike accidentally true generalizations) *do* something - they *govern* what goes on in the universe - and they therefore require some sort of ontological basis (*N*, for instance) that gives them this ability. Humeans, on the other hand, do not require laws to “do” anything: like accidentally true generalizations, laws are at bottom merely true descriptions of what goes on. Thus for the Humean there is no need for any ontological distinction between laws and accidents.

#### IV IT IS NOT A CONCEPTUAL TRUTH THAT LAWS GOVERN

I would guess that unreflective common sense favors the governing conception of laws over the descriptive conception: it appears to be natural and tempting to think that the laws of nature determine how things behave in the metaphysically meaty, anti-Humean sense. It would also be natural and tempting for the anti-Humean to try to use this fact about the common-sense conception of lawhood as the basis of a quick and devastating argument against Humeanism: if it is part of the concept of lawhood that laws of nature play a governing role, and Humeanism accords them no such role, then Humeanism about laws must be false. According to this line of argument, Humeanism is based on a conceptual error: that of thinking that it is conceptually possible for something which does not govern to be a law of nature.

As far as I know, nobody has ever used such a blunt and direct argument against Humeanism. But it will become evident in sections V and VI below that some

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<sup>15</sup> The argument that a Humean conception of laws undermines incompatibilism is presented in greater depth in Swartz (1985), chapters 10 and 11, and Berofsky (1987).

purported counter-examples to Humeanism are essentially rather heavily disguised versions of the argument. So if it can be shown that the argument does not succeed in its blunt form, then the counter-examples do not succeed either.

In what, then, does the alleged conceptual connection between lawhood and government have its roots? The only answer that suggests itself lies in the conceptual connection which undoubtedly does exist, at least in some cases, between the notion of law and the notion of a *lawgiver*: some being, institution or other authority (Her Majesty's Government, the MCC, or God, for instance) whose decrees constitute the laws of the land, the rules of cricket, or whatever. Given the naturalness of the connection between laws and a lawgiver, it is natural to think of laws of nature in the same light: as decrees, rather like the Ten Commandments, laid down at the beginning of the universe, to be obeyed without exception by everything from the smallest particle to the largest galaxy.

The idea that the laws of nature represent something like God's cosmic plan for the universe is an old one; and it is a view which has undoubtedly survived, at least in some quarters, to the present day - a fact to which a glance at the popular science titles in any bookshop will testify.<sup>16</sup> Still, it is one thing to claim that the laws of nature represent a piece of divine legislation; it is quite another to think that we are conceptually *required* to think of laws of nature in this way. I take it to be just plainly true that belief in laws of nature does not conceptually presuppose belief in a divine lawgiver; hence if it is supposed to be a conceptual truth that laws govern, then we must look elsewhere for a vindication of the alleged conceptual connection between the notion of lawhood and the notion of government.

Perhaps a pertinent analogy is to be found between laws of nature and moral laws. We take it to be conceptually necessary that moral laws have some sort of jurisdiction over us; but we do not take it that the idea of a moral law conceptually presupposes that there is an author of those laws. So - given that we ought not to think that the idea of a law of nature presupposes that there is an author either - it might still be regarded as conceptually necessary that laws of nature have some sort of jurisdiction too.

Is there any sound conceptual basis for taking this analogy with moral laws seriously enough to merit the claim that it is a conceptual truth that laws of nature govern? I

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<sup>16</sup> See Wertheim (1997) for an illuminating popular account of the relationship between science - particularly physics - and religion. Wertheim argues that physicists have always had, and continue to have, a tendency to regard their discipline as a quest for "God's cosmic plan" - the most obvious recent example being Hawking (1988).

think not; for there is an important difference between the ways in which moral (and other) laws on the one hand, and laws of nature on the other, are supposed to have jurisdiction over the entities which fall within their scope; and this difference undermines the analogy. The difference is that moral (and other) laws are *prescriptive*, whereas laws of nature are supposed to “govern”; and whatever governing amounts to in this context, it is a very different kind of jurisdiction to that of prescriptive laws.

For one thing, prescriptive laws only establish how agents *ought* to behave - they do not logically constrain agents to behave in accordance with them - whereas laws of nature *do* logically constrain objects to behave in accordance with them. “Thou shalt not steal” is not at all like “thou shalt not transmit signals faster than the speed of light”. People do violate moral laws; in fact it seems to me to be essential to the idea of a moral law that it is breakable. It’s hard to see how something could count as a moral law - or a rule of cricket, or whatever - if nobody was capable of breaking it. Consider, for example, the absurdity of the idea of having a rule of cricket which states that nobody may bowl faster than 500 miles per hour. Since human beings are physiologically incapable of bowling that fast, it’s not clear how there could be such a rule, since it is a rule that is incapable of influencing anyone’s behaviour. Laws of nature, by contrast with other kinds of law or rule, cannot be broken, since they *do* entail true generalizations. If it is essential to the prescriptive force of other kinds of law that they can be broken, and laws of nature cannot be broken, then laws of nature are unsuited to being cast in a way that is supposed to be analogous to the prescriptive nature of other laws.

For another thing, laws and rules in general, with the exception of laws of nature, govern behaviour by means of imposing sanctions on those who do not obey them: you go to Hell, suffer from guilt, get slung in jail or sent off the pitch. Even if nobody ever violates a law, part of what gives the law its prescriptive force is the fact that if you *were* to break it something bad would, or might, happen to you as a result. Laws without the threat of sanctions again seem not to make much sense; for instance I can’t imagine a world where there is a rule banning handling the ball in soccer, but where there is no threat of punishment for offenders. For in such a world the rational soccer player will handle the ball whenever it’s in his interests to do so, and the game will end up indistinguishable from the way it’s played in a world where there is no such rule. So the alleged “rule” doesn’t seem to be doing anything and hence seems not to deserve to be called a genuine rule. Again, the notion of sanction makes no sense when applied to laws of nature: it’s hardly as if potentially recalcitrant objects

are kept in line by the threat of punishment. Hence, again, no analogy seems possible between laws of nature and other kinds of law.

What does all this show? Well, it is very plausible to think that if common sense *does* take it to be part of the concept of a law of nature that those laws govern, then it does so only because of a tacit assumption that laws of nature operate in a way that is analogous to the way that other laws - laws which really do govern - operate. But, as I have argued, that assumption cannot be maintained, since the alleged governing nature of natural laws would have to be entirely unlike the prescriptive nature of moral and other laws. In other words, it would be highly *implausible* to maintain that a conceptual connection can be traced between the concept of a law of nature and the concept of government that is independent of that assumption. *A priori* reflection on the nature of natural laws by themselves does not yield any requirement to think of them as playing a governing role.

This is not, of course, to say that it is merely a linguistic accident that laws of nature came to be so called. On the contrary: I dare say that the term was introduced in order to capture the belief that what happens in the universe happens as a matter of divine decree - in which case the expression "law of nature" really did start out with an explicitly legislative connotation.<sup>17</sup> But the cultural context in which the expression was coined is not ours. If we are to use the expression, as we do, in a way that is consistent with the laws of nature being nobody's decree, then we thereby lose any presumption in favor of regarding them as having any kind of jurisdiction over what happens in the universe.

Of course, none of this establishes that there is anything incoherent, or even wrong, in taking laws of nature to govern. For all I have said, Armstrong may yet be right that laws are necessary relations between universals, and hence right to think that laws determine, in a metaphysically substantive sense, what happens. All I hope to have established is that we are not conceptually *required* to think that just because laws of nature are called "laws", they must play a governing role. Hence it is no objection to Humeanism to complain that it accords laws of nature no such role: the intuition that laws of nature govern is an optional one. And indeed part of the motivation for Humeanism about laws is the desire to steer well clear of the sorts of ontological commitments that are needed to shore up the intuition that laws govern.

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<sup>17</sup> Indeed, as Ruby (1986, p.341) notes, thinkers as diverse as Aquinas and Robert Boyle have voiced objections to calling laws of nature "laws", on the grounds that the prescriptive connotations of "law" cannot be applied to the behavior of non-conscious objects. Still, given that their objections went unheeded, it seems more sensible to dispute the connotations than to complain that what we call "laws of nature" are not really laws at all.

So far, then, I hope to have shown that the Ramsey-Lewis view provides a conception of laws that is a well-motivated and at least *prima facie* plausible alternative to the anti-Humean conception, since there are no persuasive reasons to think that there is something conceptually awry in the claim that laws do not govern. In sections V and VI, I shall discuss two thought experiments that are designed to show that Humeanism about laws - and *a fortiori* the Ramsey-Lewis view - is wrong: wrong because we can imagine possible situations where the verdict of Humeanism is not the verdict delivered by pre-theoretical, common sense intuition.

The reason why the thought experiments fail to establish this, I think, is that they do not address the Humean about laws on her own terms, or even on neutral terms, but rather presuppose that laws have certain features which the Humean unashamedly rejects - or at least, ought to reject. In particular the common sense intuitions which the thought experiments appeal to are ones that involve an implicit commitment to the view that laws govern. If what I've said so far is right, then the intuition that laws govern is an optional one: we need not think of laws that way. Hence the intuitions which the thought experiments try to bring to bear against Humeanism are optional too.

## V X-PARTICLES & Y-FIELDS

The first counter-example has been defended by Tooley, by Carroll and by Peter Menzies; I'm using Carroll's formulation.<sup>18</sup> It involves a possible world,  $w_1$ , consisting entirely of X-particles and Y-fields. No X-particle ever gets to enter a Y-field. But according to Carroll it might nonetheless be a law that all X-particles in Y-fields have spin up - and indeed that this might be the *only* law at  $w_1$ . (Call this law  $L_1$ .) Now consider  $w_2$ , which is identical to  $w_1$  with respect to particular matters of fact but which allegedly differs nomically: at  $w_2$  it is a law (call it  $L_2$ ) that all X-particles have spin *down*. Since  $w_1$  and  $w_2$  differ with respect to their laws of nature but not with respect to their particular matters of fact, laws cannot supervene on non-laws: the Humean conception of laws, and *a fortiori* the Ramsey-Lewis view, is false.

The only real option for the upholder of the Ramsey-Lewis view (or at least the strong version of it, according to which nomic facts *logically* supervene on particular matters of fact) is, as Carroll points out, to deny that  $w_1$  and  $w_2$  are possible worlds at all. And

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<sup>18</sup> See Tooley (1977), pp.669-672; Carroll (1990), pp.202-204; and Menzies (1993), pp.199-200.

he claims that the only grounds on which the Humean could base this claim would be to deny that there could be a world with only one basic law, or to deny that there can be vacuous laws - or both.<sup>19</sup>

Well, I'm not sure if there could be a world with only one basic law, but I'm happy to concede that there could be. And the Ramsey-Lewis view certainly allows that there can be vacuous laws. So if these are the only legitimate grounds for denying that  $w_1$  and  $w_2$  are possible, as Carroll claims, then Humeans are in trouble. Luckily they aren't the only legitimate grounds. For note that Carroll's counter-example does *not* show that the Ramsey-Lewis view fails *by its own lights*: it isn't as if the Ramsey-Lewis view *entails* that  $w_1$  and  $w_2$  are possible, thus undermining its own claim to respect the supervenience of laws of nature on particular matters of fact. The Ramsey-Lewis view *itself* judges  $w_1$  and  $w_2$  to be impossible. According to the Ramsey-Lewis view, if  $L_1$  is to count as a genuine law in  $w_1$  then it must appear in the axiomatization of the best true theory of  $w_1$ . But it doesn't. Without  $L_1$  we have - by Carroll's stipulation - no laws, and hence no axioms, at all. *With*  $L_1$  we have a single law which contributes no positive virtue whatever, since - being vacuous - it does not systematize a single fact. So the Ramsey-Lewis view dictates that  $L_1$  is not a law in  $w_1$ , and similarly that  $L_2$  is not a law in  $w_2$ . In other words, according to the Ramsey-Lewis view  $w_1$  and  $w_2$  are not possible worlds at all.

Now, all I've really done here is relocate the problem. Carroll will say, I suppose, that the Ramsey-Lewis view renders  $w_1$  and  $w_2$  impossible whereas common sense intuition says they are possible. So the Ramsey-Lewis view violates our intuitions about laws. Well, the Ramsey-Lewis view clearly violates Carroll's intuitions - and indeed the intuitions of anyone who already thinks that laws are somehow "out there", prior to and watching over the particular matters of fact to make sure they don't step out of line. If you think that way, then of course you'll be able to make sense of the idea that  $w_1$  might be "governed" by  $L_1$  even though  $L_1$  never gets instantiated.

But of course the fact that the Ramsey-Lewis view violates *these* sorts of intuition is no cause for alarm, since the whole starting point of the Ramsey-Lewis view in the first place, as I said earlier, was to deny this mysterious supposed "governing" feature of laws. To assert that  $w_1$  and  $w_2$  are possible is, at bottom, merely to assert that laws govern rather than describe; and to deny their possibility is merely to assert the opposite. Carroll's alleged counter-example, then, is really just a restatement of this basic anti-Humean intuition, and as such poses no threat to the Humean.

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<sup>19</sup> See Carroll (1990) p.203.

There are two further points that need to be made about this counter-example. The first is that I'm in no way denying the possibility of vacuous laws *in general*. For instance we *can* imagine two worlds,  $w_3$  and  $w_4$ , each of which *contains* the situation described in the counter-example and which have  $L_1$  and  $L_2$  respectively as vacuous laws. Suppose, for example, that in  $w_3$  there are lots of *other* kinds of particle which *do* get to enter  $Y$ -fields, and acquire spin up when they do so. And suppose that  $X$ -particles are sufficiently similar to those other kinds of particle to make the best system of generalizations one which does not regard  $X$ -particles as a special case. In other words, the best system of axioms might have it that *all* particles in  $Y$ -fields have spin up, and thus have it as a theorem that all  $X$ -particles in  $Y$ -fields have spin up too. Similarly for  $w_4$  with respect to  $L_2$ . So I'm not ruling out vacuous laws *tout court*; only ones whose inclusion in the best system is not warranted by some improvement in that system.

The second point is that there is an important lesson to be learned from the counter-example's failure - namely that we ought to be very cautious about the extent to which we trust our pre-theoretical intuitions about laws, since to take Carroll's counter-example seriously commits one to a *very* strong realism about laws. The counter-example is incompatible not just with the Ramsey-Lewis view, but also with Armstrong's realism - since by hypothesis  $L_1$  and  $L_2$  are laws which "govern" properties (namely the property of being an  $X$ -particle in a  $Y$ -field and the property of having spin up) which are never instantiated. And according to Armstrong's theory of universals there are no uninstantiated properties. For Armstrong, then,  $w_1$  and  $w_2$  are impossible because  $N$  - the law relation which holds between universals - is not instantiated at either world. So commitment to the possibility of  $w_1$  and  $w_2$  commits one either to the view that  $w_1$  and  $w_2$  contain universals that are never instantiated, or to some other realist analysis of lawhood according to which laws are not relations between universals but are rather some other kind of entity capable of governing. Each option requires ontological commitments which even an anti-Humean ought to regard with a good deal of suspicion, not least because it is very hard to imagine how the postulated entities might get to perform the governing job required of them.

## VI THE MIRROR ARGUMENT

The “Mirror Argument” has a fairly central place in Carroll’s book on laws of nature.<sup>20</sup> In common with most thought experiments that are designed to scupper Humeanism about laws, it involves a dull, barren and very distant possible world, consisting only of our old friends the  $X$ -particles and  $Y$ -fields, together with a mirror on a swivel. It goes like this:

Consider a possible world,  $U_1$ , consisting of exactly five  $X$ -particles, five  $Y$ -fields, and not much else. Each of the five particles enters a  $Y$ -field at some point, and each particle acquires spin up when it does so. The particles all move in a straight line throughout all eternity. But close to the route of one of the particles - call it particle  $b$  - there is a mirror on a swivel. In fact, the mirror is in a position (position  $c$ ) such that it does not interfere with the trajectory of particle  $b$ : the particle just passes right on by. But had the mirror been swiveled round to position  $d$  (or if it had just always been in position  $d$ ), it would have been right in the path of particle  $b$ , and the particle would have been deflected away from its  $Y$ -field. Finally, let us suppose that it is a law in  $U_1$  that all  $X$ -particles subject to a  $Y$ -field have spin up. Call the statement that all  $X$ -particles subject to a  $Y$ -field have spin up  $L$ ; so  $L$  is a law in  $U_1$ .

Now consider possible world  $U_2$ .  $U_2$  is just the same as  $U_1$  except that in  $U_2$  particle  $b$  does not acquire spin up when it enters the  $Y$ -field. So  $L$  is not a law at  $U_2$  because it isn’t even true: not all  $X$ -particles in  $Y$ -fields in  $U_2$  have spin up. It’s important to note, however, that the recalcitrant particle  $b$  does not differ in respect of its natural, intrinsic properties from all the other  $X$ -particles; it’s no part of the story that there’s some sort of *explanation* of why  $b$  behaves bizarrely at  $U_2$  but not at  $U_1$ .

Now, how does this set-up tell against Humeanism about laws? Well, the alleged problem comes not from  $U_1$  and  $U_2$  themselves, but from considering what *would* have happened in each of  $U_1$  and  $U_2$  had the mirror been in position  $d$  rather than position  $c$  - that is to say, if the position of the mirror had stopped particle  $b$  from entering a  $Y$ -field. In particular, we’re interested in what the *laws* would have been had the mirror at  $U_1$  and  $U_2$  respectively been in position  $d$ .

To find this out, we have to look at the closest possible world to  $U_1$  where the mirror is in position  $d$  - call this world  $U_1^*$  - and the closest possible world to  $U_2$  where the

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<sup>20</sup> See Carroll (1994) pp.57-68

mirror is in position  $d$ ; call this world  $U_2^*$ . And we have to see what the laws are in each of  $U_1^*$  and  $U_2^*$ .

First,  $U_1^*$ . Remember that  $L$  is a law at  $U_1$ ; particle  $b$  acquires spin up when it enters a  $Y$ -field. So it seems eminently reasonable to suppose that  $L$  is a law at  $U_1^*$  too - since  $U_1^*$  only differs from  $U_1$  in that particle  $b$  never finds its way into a  $Y$ -field. Now  $U_2^*$ . Remember that  $L$  isn't true - and hence not a law - at  $U_2$ , since at  $U_2$  particle  $b$  fails to acquire spin up when it enters a  $Y$ -field. But at  $U_2^*$ ,  $L$  is true, since our troublesome particle  $b$  never gets to exhibit any troublesome behaviour. Intuitively, though, according to Carroll, although  $L$  is true at  $U_2^*$  it is only accidentally true: it is not a law at  $U_2^*$  that all  $X$ -particles in  $Y$ -fields have spin up.  $L$  only gets to be true at  $U_2^*$  in virtue of the purely contingent, fortuitous positioning of the mirror. But  $U_1^*$  and  $U_2^*$  are the same with respect to their particular matters of fact, yet they differ with respect to whether or not  $L$  is a law. So laws do not logically supervene on particular matters of fact.

Now, Carroll in fact offers a formal and, in his view, more persuasive way of getting to the same conclusion, by appealing to a couple of modal principles. I'll deal with the more formal argument first, and then come back to the rather less formal, more intuitive characterisation of the counter-example which I just outlined.

So, the formal version first. Carroll offers the following principle, (SC), as an intuitively compelling modal principle (where  $\Diamond_P$  and  $\Box_P$  mean "physically possible" and "physically necessary" respectively):

(SC) If  $\Diamond_P P$  &  $\Box_P (P \supset Q)$ , then if  $P$  were the case,  $Q$  would (still) be the case.

From this he derives two other principles:

(SC\*) If  $\Diamond_P P$  and  $Q$  is a law, then if  $P$  were the case,  $Q$  would still be a law.

(SC') If  $\Diamond_P P$  and  $Q$  is not a law, then if  $P$  were the case,  $Q$  would still not be a law.

The argument against Humeanism about laws then proceeds like this: Let  $P$  be the sentence "the mirror is in position  $d$ ". We can suppose that  $P$  is physically possible at both  $U_1$  and  $U_2$ . Hence by (SC\*), since  $L$  is a law at  $U_1$ , it's true at  $U_1$  that if  $P$  were

the case,  $L$  would still be a law. Call the world which makes this counterfactual true - that is, the world closest to  $U_1$  where  $P$  is true -  $U_1^*$ . (SC\*) entails that  $L$  is a law at  $U_1^*$ . Furthermore, by (SC'), it's true at  $U_2$  that if  $P$  were the case  $L$  would still *fail* to be a law, since  $L$  isn't a law at  $U_2$ . Call the world which makes *this* counterfactual true - that is, the world closest to  $U_2$  where  $P$  is true -  $U_2^*$ . (SC') entails that  $L$  is not a law at  $U_2^*$ . But since  $U_1^*$  and  $U_2^*$  are identical with respect to particular matters of fact and differ with respect to whether  $L$  is a law, laws do not supervene on particular matters of fact.

Doubtless the argument is valid; but in order for it to be persuasive we need to have good reason to believe the premises, (SC\*) and (SC'). And one good reason to *doubt* the premises is that according to one popular analysis of counterfactuals, namely Lewis's, they are false.

(SC\*) and (SC') are both false on Lewis's analysis because they both assume that the closest possible world to a given world  $w$  where  $P$  is true is a world that is physically possible with respect to  $w$ ; and on Lewis's analysis this does not hold in general. I'll just give an example to show that (SC\*) is false; parallel reasoning can be applied to (SC').

Suppose the actual world is deterministic. Then worlds that are physically possible relative to our world will in general be radically different to ours with respect to their particular matters of fact. For example let

$P =$  Natalie drops her pen at  $t$

and suppose that in fact Natalie hangs on to her pen at  $t$ , so at the actual world,  $P$  is false.

Now, doubtless there are physically possible worlds where  $P$  is true. Call the closest such physically possible world  $w^*$ .  $w^*$  must differ from ours in at least some respect for all times before  $t$ , since if it were identical to ours at some time before  $t$  it would also be identical to ours for all future times, including  $t$  itself; in which case  $P$  would be false at  $w^*$  too, which, by assumption, it isn't. So despite being the same as our world as far as its laws are concerned,  $w^*$  is a pretty distant world, since it doesn't ever have perfect match of particular matters of fact with our world.

Now consider not the closest *physically* possible world where  $P$  is true, but just the closest possible world where  $P$  is true. Call this world  $w_p$ . On Lewis's analysis, this

will be a world which is identical to ours with respect to particular matters of fact until just before  $t$ ; but in  $w_p$  there is a small “miracle” just before  $t$  so that *its* laws (unlike ours) allow Natalie to drop her pen. Now let  $Q$  be whichever law of ours it is that’s broken at  $w_p$ .

Relative to the actual world,  $P$  is physically possible and  $Q$  is a law. So the antecedent of (SC\*) is true. But the consequent is false: it’s false that if  $P$  had been the case,  $Q$  would still have been a law. So (SC\*) is false, because the closest possible world where  $P$  is true need not be one that is physically possible:  $w^*$  and  $w_p$  are different possible worlds.

Thus the modal principles which form the premises of the Mirror Argument are false according to Lewis’s analysis of counterfactuals. Still, one might want to claim that the modal principle (SC), from which (SC\*) and (SC') are derived, is intuitively compelling; hence we should take its verdicts, rather than those given by Lewis’s analysis, to be true. This is certainly Carroll’s view. In defense of (SC) he asks us to consider the counterfactual “if the match were struck, then the laws would be different”. After noting that this counterfactual is true according to Lewis’s analysis, he says, “there are plenty of reasons not to abandon (SC) or (SC\*) ... most importantly, it is obvious that the laws do not counterfactually depend on the striking of a match. If the match were struck, the laws would be no different. That is *so* obvious that I have trouble believing that anyone, especially Lewis, would hold that some of our laws would not still be laws if that match were struck”.<sup>21</sup>

In the light of the discussion in section III, this passage should strike the reader as one with a distinctly anti-Humean flavor: the view that “it is obvious that the laws do not counterfactually depend on the striking of a match” is clearly born of the view that particular matters of fact depend upon the laws and not vice versa. If the only support to be had for (SC) is such an explicit avowal of the anti-Humean conception of laws, then the Mirror Argument is clearly question-begging.<sup>22</sup>

However, Carroll does offer a different defense of (SC) near the beginning of *Laws of Nature*, where he argues that (SC) is a plausible consequence of his “picture” of laws

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<sup>21</sup> Carroll (1994), pp.186-7

<sup>22</sup> The issue of what question-begging amounts to is a thorny one. My use of the term here relies on Frank Jackson’s analysis, according to which (roughly) an argument is question-begging if the evidence which is adduced in support of the premises of the argument is such that it would not *count* as evidence for a sane person who already doubted the truth of the conclusion. In the present case, the “evidence” adduced by Carroll in support of (SC) would hardly be accepted as evidence by a (sane) Humean who doubted the conclusion of the Mirror Argument. See Jackson (1987), chapter 6.

of nature. “support for this principle [(SC)] comes,” he says, “from a familiar picture of reality which embodies especially vividly the concept of lawhood employed in common sense”.<sup>23</sup> And the picture looks like this: “the view of laws as the edicts of a lawgiver does provide a useful metaphor. I rely on this metaphor insofar as it underlies a more secular and more detailed picture: *the Laplacean picture*. This worldview includes a portrayal of our universe as completely determined by its temporally local history at any one time together with a statement of what propositions are laws. According to the Laplacean picture, it is *as if* God created the world by designating the initial conditions and the laws.”<sup>24</sup>

Well, this is indeed a familiar picture; but of course it’s just this picture - the “Laplacean creation myth”, as Loewer<sup>25</sup> calls it, which lies behind the anti-Humean conception of laws. As I argued in section III, and contrary to what Carroll supposes, there is an enormous difference between thinking merely that the universe is “completely determined by its temporally local history at any one time together with a statement of what propositions are laws” and thinking that “it is *as if* God created the world by designating the initial conditions and the laws”. By buying into the Laplacean creation myth at the outset, Carroll is simply justifying (SC) by appealing to a conception of laws which the Humean explicitly repudiates. Thus no Humean ought to be persuaded by Carroll’s justification of (SC); hence the formal version of the Mirror Argument begs the question against the Humean.

This leaves the rather more intuitive informal version of the argument. This differs from the formal argument in that rather than deriving  $L$ ’s lawful status at  $U_1^*$  but not  $U_2^*$  from precise modal principles, it invites us to consult our *intuitions* about its lawful status at each world. And intuition, Carroll thinks, delivers the same result:  $L$  is a law at  $U_1^*$  but merely an accident at  $U_2^*$ ; hence Humeanism about laws is false.

Recall that  $U_2$  is the world just like  $U_1$  except for its rogue particle which fails to acquire spin up as it goes through the  $Y$ -field.  $U_2^*$  is the closest world to  $U_2$  where the mirror is in position  $d$ , so that the rogue particle doesn’t get to pass through the  $Y$ -field at all. The intuition, then, is that it’s just an accidental feature of  $U_2^*$  that  $L$  is true; hence  $L$  is not a law there.

Carroll locates the source of this intuition in the following thought: “it is natural”, he says, “to think that  $L$ ’s status as a law in  $U_1$  does not depend on the fact that the

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<sup>23</sup> Carroll (1994), p.17

<sup>24</sup> *ibid.*

<sup>25</sup> Loewer (1996), p.115

mirror is in position  $c$  rather than position  $d$  ... It is just as natural to think that  $L$ 's status as a non-law in  $U_2$  also does not depend on the position of the mirror.  $L$  would not be a law in  $U_2$  even if the mirror had been in position  $d$  ... The question the friends of supervenience must face is how they are going to ground the fact that  $L$  is a law in  $[U_1^*]$  but not  $[in U_2^*]$ ." (1994, p.62)

Well, as a friend of supervenience, I have no desire to find a way of grounding the "fact" that  $L$  is a law in  $U_1^*$  but not in  $U_2^*$ , since I think  $L$  is a law in  $U_2^*$  and not an accident. This commits me to the apparently unacceptable claim that the position of the mirror in  $U_2$  affects what the laws of nature are, since I am committed to the truth of the counterfactual "if the mirror had been in position  $d$ ,  $L$  would have been a law". But I truly see no harm on that. Recall that in our world, what the laws of nature are depends upon whether or not Natalie drops her pen in just this counterfactual sense – since, as we've seen, if Natalie *had* dropped her pen, the laws of nature would have been different. As I said earlier, part of the Humean creed is that laws of nature depend on particular matters of fact and not the other way around; it is no surprise to the Humean, then, that by counterfactually supposing the particular matters of fact to be different one might easily change what the laws of nature are too.

The intuition that's really doing the work in this counter-example, then, is the intuition that laws are not purely descriptive: the thought being that since particle  $b$ 's behaviour is not *governed* by any law at  $U_2$ , it can't be governed by a law at  $U_2^*$  either. Hence  $L$  can't be a law at  $U_2^*$ , and hence Humeanism is false. But to describe the example in those terms is not to describe it in neutral terms but to describe it in terms which explicitly presuppose an anti-Humean starting point. Indeed I don't think there's any way of trying to motivate the intuition that  $L$  is not a law in  $U_2^*$  that *doesn't* presuppose an anti-Humean starting point, either by appealing to the notion of government, or to a modal principle like (SC), or by making the claim that the laws do not depend on the facts. On the other hand, if you start off by buying into the story I told earlier about the descriptive conception of laws, I can't see how Carroll's thought experiment could possibly move you to say that  $L$  isn't a law at  $U_2$ .

One reason I may not have convinced you yet is that you may be tempted by the following thought: There is an obvious *counterfactual* difference between  $U_1^*$  and  $U_2^*$ ; hence they cannot have the same laws, and therefore cannot be the same world – contrary to what I am insisting. And the counterfactual difference you might point to is this: at  $U_1^*$ , if the mirror had been in position  $c$ , particle  $b$  would have had spin up. But at  $U_2^*$ , if the mirror had been in position  $c$ , particle  $b$  would *not* have had spin up. This seems to be a way of explaining the intuition that  $L$  is not a law at  $U_2$  which does

not explicitly make reference to any off-limits anti-Humean views: it just appeals to nice, neutral counterfactual intuitions.

Well, it does on the surface. But I deny that there is such a counterfactual difference between  $U_1^*$  and  $U_2^*$ . On what basis, after all, might one claim that the counterfactual difference exists? I can think of three options, and none of them succeeds.

First, you might have a worry which goes something like this: Look, particle  $b$  at  $U_2$  is a really weird particle, since it doesn't do what all the other  $X$ -particles do. When you get to  $U_2^*$  by flipping the mirror, you stop particle  $b$  from displaying any aberrant behaviour. But it's still the same particle, so it must somehow be in  $b$ 's nature not to be *disposed* to acquire spin up in a  $Y$ -field. So it's still true at  $U_2^*$  that if particle  $b$  were to go through a  $Y$ -field, it would fail to get spin up; hence the counterfactual difference between  $U_1^*$  and  $U_2^*$  really does obtain, since particle  $b$  at  $U_1^*$  is disposed to acquire spin up in the presence of a  $Y$ -field - although of course this is not a disposition which it ever gets to manifest.

But this appeal to the difference between  $b$ 's alleged dispositional properties in different worlds doesn't work. By stipulation,  $U_1^*$  and  $U_2^*$  are identical with respect to their particular matters of fact. *A fortiori* there is no difference in intrinsic non-nomic properties between  $U_1^*$ , where  $b$  is disposed to acquire spin up, and  $U_2^*$ , where it isn't. What, then, is the difference in dispositional properties supposed to amount to? You can't say that the  $U_1^*$  version of  $b$  has a different disposition to the  $U_2^*$  version of  $b$  because of any difference in their non-nomic properties, since by hypothesis there are no such differences. Nor can you say that the  $U_1^*$  version of  $b$  has a different disposition to the  $U_2^*$  version of  $b$  because the laws of nature are different at  $U_2^*$ , since the claim that they have different laws is precisely the conclusion you're trying to motivate. So the appeal to dispositions fails.

Second, you might be convinced by the following argument. The mirror is in position  $c$  at  $U_2$ .  $U_2^*$  is the closest possible world to  $U_2$  where the mirror is in position  $d$ . So  $U_2$  must be the closest possible world to  $U_2^*$  where the mirror is in position  $c$ . Therefore at  $U_2^*$  it must be true that if the mirror had been in position  $c$ , particle  $b$  would have had spin up. Luckily this is a fallacious piece of reasoning. Just because it's true at  $U_2$  that  $U_2^*$  is the closest possible world where the mirror is in position  $d$ , it doesn't follow that it's true at  $U_2^*$  that  $U_2$  is the closest possible world where the mirror is in position  $c$ . There might easily be other worlds where the mirror is in position  $c$  that are closer to  $U_2^*$  than  $U_2$  is;  $U_1$  for instance.

You might still want to say that the alleged counterfactual difference between  $U_1^*$  and  $U_2^*$  exists. But - and this is the third attempt - in that case you need to find an analysis of counterfactuals which backs you up. However, since analyses of counterfactuals typically require that the laws of nature be held fixed as far as possible when looking for the closest world where the counterfactual's antecedent is true, the only way you're going to be able to make it true at  $U_2^*$  that if the mirror had been in position  $c$ , particle  $b$  would not have had spin up is by presupposing that  $L$  is not a law at  $U_2^*$ . And since  $L$ 's status at  $U_2^*$  is precisely what's under dispute, you can't presuppose that it's not a law without begging the question.

So I think there's absolutely nothing wrong with saying that  $L$  is a law at  $U_2^*$ ; hence the counter-example fails. I should add that I don't at all mean to suggest that there's anything *incoherent* about thinking that  $U_1^*$  and  $U_2^*$  have different laws. I just think that if you *have* that intuition, you aren't going to be able to spell out *why* it's a plausible intuition without appealing to the sorts of anti-Humean assumptions which by definition the Humean isn't the least bit interested in accommodating.

## VII CONCLUSION

Humeanism about laws - and the Ramsey-Lewis view in particular - is a well motivated view, and an attractive one for those driven by either a desire for ontological economy or the Humean suspicion that necessary connections are unintelligible. But it's not a position to be taken on board lightly. If you want to be a Real Humean - one who is genuinely unmoved by counter-examples like Carroll's Mirror Argument - you have to purge a lot of intuitions about laws that are quite widely accepted both in the philosophical literature and amongst the rather less philosophically reflective.

But I still maintain that the Ramsey-Lewis view does justice to enough of our intuitions about the role of laws of nature to be a viable alternative to Armstrong's realism. I suspect this is a claim which some anti-Humeans will deny, on the grounds that while the Ramsey-Lewis view does justice on a superficial level to the "gross" intuitions about laws mentioned in section II, it does not do justice to the deeper intuition that there must be some sort of fundamental ontological grounding for the gross intuitions. Thus, with respect to the law/accident distinction, Armstrong says "My sense of the matter is that there is a huge ontological gulf here [between laws and accidents], where a regularity theory can find only a relatively small

distinction”.<sup>26</sup> The anti-Humean might try (though Armstrong does not explicitly do so) to claim that it is *these* intuitions about the nature of laws - that is, intuitions which demand some sort of ontological *grounding* for the law/accident distinction and so on - which need to be satisfied by any adequate theory of laws. But of course the Humean response is to say that there *is* no feature of the world which can satisfy *those* intuitions; if that’s what something has to do in order to count as a law of nature, then there are no laws of nature.

We can either conclude that there are no laws, or abandon some of our rather more controversial intuitions about what laws are like, and proceed with a rather less metaphysically rich account of lawhood. Part of the Humean claim is that even if we eschew the notion that laws govern, we are still left with things which deserve the title “law of nature” - although perhaps, given the connotations of “law” discussed in section IV, it would have been better if laws of nature had been given a rather less suggestive name.

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<sup>26</sup> Armstrong (1993), p.174

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