

Hume's Dictum and Metaphysical Modality

Lewis's Combinatorialism

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Introduction

Many contemporary philosophers accept a strong generalization of Hume's denial of necessary causal connections, in the form of Hume's dictum (HD), according to which there are no metaphysically necessary connections between distinct, intrinsically typed entities.¹ Such widespread endorsement of HD is somewhat puzzling, however, since proponents typically do not accept Hume's empiricism; nor (as I have argued elsewhere²) is HD motivated either as analytic, as synthetic *a priori* (motivated by intuitions we have no good reason to question), or as presupposed by the best account of counterfactuals. Tacit in David Lewis's work, however, is a promising potential motivation for HD, according to which one should accept HD as presupposed by the best account of the range of metaphysical possibilities – namely, a combinatorial account, applied to spatiotemporal fundamenta. Here I elucidate and assess this Ludovician motivation for HD. In section 10.1 I refine HD, and note its key, recurrent role in Lewis's work, as reflected in his thesis of Humean supervenience and his accounts of laws of nature and counterfactuals. In section 10.2 I present Lewis's specific appeal to HD as providing a broadly axiomatic generating basis for the space of metaphysical modality, and canvas the *prima facie* advantages of the resulting combinatorial principle – HD (L-combinatorialism) – as being *principled*, *extensionally sufficient* (in particular, leaving “no gaps” in the space), and *modally reductive*. Most criticisms of Lewis's combinatorialism have targeted seeming ways in which the theory overgenerates the desired space, letting in as possible what, by some or other lights, is impossible. In section 10.3 I rather argue that HD (L-combinatorialism) seriously *undergenerates* the desired space, for possibilities involving broadly scientific entities in particular, in three different ways. For each way I argue that available means of overcoming the undergeneration either fail to close the gap, undermine the claim that HD (L-combinatorialism) is a principled generator of metaphysical modal space, undermine the reductive status of Lewis's combinatorialism, or call into question the truth of HD. These results don't entirely close off a modal combinatorial motivation for HD, however; as I discuss in section 10.4, there are other combinatorial accounts on offer which presuppose HD, and more generally the end game here depends on whether any comparably principled alternative account

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of the space of metaphysical modality can do better. Moreover, discussion of the foundational role HD plays in Lewis's philosophy suggests another potential motivation for HD – namely, as presupposed by the best overall “systematic” philosophy. As in so many areas of philosophy, Lewis's views, both general and specific, remain the ones to beat.

10.1 HD and Its Recurrent Role in Lewis's Work

10.1.1 From Hume to HD

Hume's version of his dictum occurs during his investigation into the source of the idea of causal connection. Recall Hume's methodology in *A Treatise of Human Nature*:

To begin regularly, we must consider the idea of causation, and see from what origin it is deriv'd. 'Tis impossible to reason justly, without understanding perfectly the idea concerning which we reason; and 'tis impossible perfectly to understand any idea, without tracing it up to its origin, and examining that primary impression, from which it arises. . . . Let us therefore cast our eye on any two objects, which we call cause and effect, and turn them on all sides, in order to find that impression, which produces an idea of such prodigious consequence. (1978 [1739], Part III, S II)

After arguing that in experience of singular instances of casual relation we find no impression of necessary efficacy, Hume considers and rejects the suggestion that ideas of necessary causal connections might arise from broadly demonstrative inference, in what is the most explicit statement of Hume's version of his dictum:

There is no object, which implies the existence of any other if we consider these objects in themselves, and never look beyond the ideas which we form of them. Such an inference wou'd amount to knowledge, and wou'd imply the absolute contradiction and impossibility of conceiving any thing different. But . . . 'tis evident there can be no impossibility of that kind. (Part III, S VI)

It is worth pointing out that this line of thought makes good sense if one is an empiricist of Hume's comparatively strict variety. As we learned at mother's knee, on Hume's view our ideas are ultimately grounded in “simple” sense impressions, with more complex ideas and associated beliefs being built up using a highly restricted set of associative elements, which includes only resemblance, spatiotemporal contiguity, and causation (and where the last turns out to be a construction of the first two). Most importantly, Hume's framework rejects inference to the best explanation (IBE) – for example, to the existence of unobservable forces, powers or dispositions necessarily connecting causes and effects – as a warranted mode of inference. Barring perception of modality, the only way such a framework can accommodate necessary connections between distinct existences is if these hold as a matter of meaning or definition, accessible to reason; so far as broadly scientific goings-on are concerned, we must rest with the fairly superficial appearances or (resemblance- or contiguity-based) constructions thereof; and connections between these are plausibly always contingent. There is, to expand on Hume's favored example, no contradiction in supposing that the superficial form of one billiard ball might interact in some unexpected way with the superficial form of another billiard ball.

The contemporary version of Hume's dictum, HD, is both more general and more specific than Hume's version. In HD, Hume's talk of objects and events is generalized to talk of effectively any goings-on whatsoever, including properties, states of affairs, facts, or other varieties of being. His talk of implication is generalized as talk of necessity, and more specifically of metaphysical necessity. His talk of entities “considered in themselves” is made precise as talk of entities characterized, or typed,

in terms of their intrinsic features. And his indirect talk of entities that are distinct (“any other”) is qualified, at least typically, as requiring not just bare or numerical distinctness, but rather “whole” distinctness, understood, for example, in terms of failure of spatiotemporal overlap. The general contemporary version of Hume’s dictum is then as follows:

HD: There are no metaphysically necessary connections between wholly distinct, intrinsically typed, entities.³

Such generalizations and specifications make for a more interesting philosophical thesis, but insofar as HD is supposed to be so generally applicable it requires correspondingly greater motivation. It is here that contemporary support of HD poses something of a puzzle. To start, contemporary proponents of HD do not accept Hume’s strict empiricism, and as such cannot cite his reasons for endorsing even his restricted version of the thesis. Moreover, perhaps the most salient reason for contemporary rejection of strict empiricism lies in contemporary acceptance – shared by proponents of HD – of IBE as a warranted mode of inference. If proponents of HD are comfortable with IBE, what motivates their thinking that we cannot or should not so infer to the existence of (perhaps unobservable) necessary connections between wholly distinct, intrinsically characterized, entities? Hence it is that, notwithstanding widespread acceptance of HD, there remains a serious question about what, post-empiricism, motivates this acceptance.

10.1.2 *HD’s Recurrent Role in Lewis’s Work*

As prefigured, I will later consider whether post-empiricist acceptance of HD can be taken to lie in its serving as an appropriately principled generator of the space of metaphysical modality. But we can gain some antecedent insight into the shared motivation(s) for contemporary and historical versions of HD by considering the foundational role HD plays in other of Lewis’s projects.

10.1.2.1 Humean supervenience (HS) Lewis says, in introducing the second volume of his collected papers, that “many of the papers, here and in Volume I, seem to me in hindsight to fall into place within a prolonged campaign on behalf of the thesis I call ‘Humean supervenience’” (1987a, ix). He then characterizes this thesis as follows:

Humean supervenience is named in honor of the greater denier of necessary connections. It is the doctrine that all there is to the world is a vast mosaic of local matters of particular fact, just one little thing and then another. . . . We have geometry: a system of external relations of spatiotemporal distance between points. Maybe points of spacetime itself, maybe point-sized bits of matter or aether or fields, maybe both. And at those points we have local qualities: perfectly natural intrinsic properties which need nothing bigger than a point at which to be instantiated. For short: we have an arrangement of qualities. And that is all. There is no difference without difference in the arrangement of qualities. All else supervenes on that. (ix)

It was ultimately in service of this broader project that Lewis was concerned to establish that laws of nature, counterfactuals, causation, mental states, and other phenomena supervene on the distribution of fundamental intrinsic qualities. Now, why, exactly, does Lewis name his doctrine in honor of Hume, and more specifically in honor of Hume qua “great denier of necessary connections”? First note that the question here isn’t motivated by the fact that (notwithstanding Lewis’s use of the indicative in characterizing the supervenience at issue) supervenience theses typically record necessary connections between distinct entities; for after all the supervenient and base entities here aren’t

wholly distinct. Rather, the question is motivated by the fact that Lewis departs from Hume in accepting that IBE might support the posit of entities beyond the reach of (at least in being underdetermined by) sensory experience – for example, the posit of the fundamental physical qualities (that is: properties) that Lewis takes to enter into the supervenience base. As such, what guarantees that Humean supervenience is genuinely “Humean”? In particular, what prevents wholly distinct occupants of the mosaic from being necessarily connected?

The question becomes more pressing upon recognizing that Lewis's specification of the fundamental properties as “intrinsic” doesn't suffice to rule out this non-Humean possibility, though he often speaks as if it does. For a property may be intrinsic, in that its instantiation does not require the existence or instantiation of any other objects or properties (in evocative terms: it could be instanced by an object in a “lonely” world), and yet still be “modally loaded,” in that, for example, the property is necessarily such that when instanced *in certain circumstances*, it (its instance) brings about certain effects. What then prevents the “intrinsic” fundamental physical properties in Lewis's supervenience base from standing in various necessary connections to other (actually or possibly instanced) properties?

The answer to this question is, I think, that Lewis is simply *stipulating* that the local, intrinsic fundamental properties satisfy HD; alternatively, perhaps he thinks science as it stands gives us reason to think that fundamental physical properties are not modally loaded (though what would count for or against this claim is unclear). Either way, for clarity's sake it would be better to use an expression such as “Hume-intrinsic” rather than just “intrinsic” in characterizing Lewis's supervenience base, to flag that the elements of the base are assumed not to be irreducibly modal. More importantly, here we have arrived at the reason why, in spite of its departures from various aspects of Hume's empiricism, Lewis's supervenience thesis is appropriately deemed Humean; namely, Lewis is on Hume's side so far as the status of necessary connections is concerned. Hence in describing the sort of world he has in mind as involving “just one little thing and then another” Lewis echoes Hume's famous remark:

[U]pon the whole, there appears not, throughout all nature, any one instance of connexion which is conceivable by us. All events seem entirely loose and separate. One event follows another; but we never can observe any tie between them. They seem conjoined, but never connected. (1978 [1739], Part II)

Lewis agrees; and this agreement is registered in his assumption that the fundamental qualities in the Humean supervenience base conform not just to physicalism, but to HD.

10.1.2.2 Lewis's account of laws of nature Given that the elements in the Humean supervenience base are to conform to HD, Lewis requires an account of laws of nature on which such laws are contingent, such that elements in the base might enter into causal or other nomological connections different from those into which they actually enter. Hence it is that Lewis says that he is “prepared to take the offensive against alleged unHumean lawmakers,” including Armstrong's account of laws of nature as involving second-order relations of so-called “necessitation” between universals, and accounts on which laws are grounded in modally loaded dispositions or powers, as per Swoyer (1982), Shoemaker (1998), and Bird (2007). Hume, of course, grounded (causal) laws of nature in experienced regularities. Even objectively construed, however, a regularity account faces well-known difficulties, both in distinguishing accidental from genuine causal regularities, and in accommodating probabilistic laws and laws that are singly or even never instanced. One of Lewis's notable contributions is in developing a more sophisticated account of laws as grounded in spatiotemporal patterns of events, associated with his “Best System” theory of laws (see Lewis 1973, 1987a, and 1994). Lewis summarizes:

Few would deny that laws of nature, whatever else they may be, are at least exceptionless regularities. Not all regularities are laws, of course. But, following the lead of (a short temporal segment of) Ramsey, I suggest that the laws are the ones that buy into those systems of truths that achieve an unexcelled combination of simplicity and strength. That serves the Humean cause. For what it is to be simple and strong is safely noncontingent; and what regularities there are, or more generally, what candidate systems of truths, seems to supervene safely on the arrangement of qualities". (1987a, xi)

As with Hume's original conception, an account of laws as the best systematization of the spatio-temporal arrangement of Hume-intrinsic properties accommodates the supposed contingency of laws, for while different arrangements of such properties might be associated with the same set of laws, in general different arrangements will be differently systematized. Hence Lewis's Best System account of laws conforms to the presupposition of HD, as applying, in particular, to the elements of the Humean mosaic.

10.1.2.3 Lewis's account of counterfactuals With spatiotemporal arrangements of Hume-intrinsic properties and Best-System-theoretic laws of nature in hand, we can now consider the role HD plays in Lewis's preferred account of counterfactuals – that is, of subjunctive conditionals whose antecedents may be false, schematically along lines of 'P > Q' (if it were/had been that P, it would be/would have been that Q). The approach to counterfactuals Lewis favors is a similarity-based possible worlds account (see Stalnaker 1968; Lewis 1973). Roughly (sufficient for present purposes), and granting truth in cases of vacuity, such an account runs as follows:

$P > Q$ iff (i) there are no possible P-worlds, or (ii) some P&Q world is comparatively more similar overall ("closer") to the actual world than any P&-Q world.⁴

What does comparative overall similarity come to? Though Lewis initially took this to be primitive (1973, 75–7), in his (1979) he refined the relevant understanding of similarity to one involving four, differently weighted respects:

- (1) It is of the first importance to avoid big, widespread, diverse violations of law
- (2) It is of the second importance to maximize spatiotemporal region of perfect match of particular fact
- (3) It is of the third importance to avoid even small, localized, simple violations of law
- (4) It is of little or no importance to secure approximate similarity of particular fact (1979, 472)

Lewis endorses these respects, so ordered, as needed in order to preserve *CF asymmetry*, according to which future but not past states counterfactually depend on present states:

The way the future is depends counterfactually on the way the present is. If the present were different, the future would be different . . . Not so in reverse. Seldom, if ever, can we find a clearly true counterfactual about how the past would be different if the present were somehow different. (1979, 32)

So, for example, consider the following counterfactual, assumed to have an actually false antecedent, under the supposition that the actual laws are deterministic:

If these two electrons were next to one another, they would repel each other.

The 'P-worlds' – where the electrons are next to each other – most similar by lights of Lewis's weighting will turn out to be worlds where electrons enter into different laws than they actually do. Why

so? To start, in worlds where the laws are the same as the actual laws, the initial conditions must be changed in order to implement the antecedent; hence antecedent and actual pasts completely differ, making for large dissimilarity in matters of particular fact (against a desideratum of the second importance). By way of contrast, in some worlds with different laws, the actual and counterfactual past exactly match until just before the antecedent event occurs, at which time there are a few local violations of law of the sort needed to implement the antecedent. Since avoiding small, local violations of law is only of the third importance in the weighting, such a “past-fixing” P-world is more similar to the actual world than a “law-fixing” P-world. What about the future of the closest P-worlds? Does it similarly follow from the weighting that the closest P-worlds are ones where a minor variation from the actual laws somehow undoes whatever events brought the electrons together? No, says Lewis, for undoing all the propagating traces of these events requires many departures from actual law, adding up to a big, widespread, violation of law. Since avoiding such big violations of law is of the first importance, and since preserving approximate similarity of particular fact (here, as regards future events) counts for little or nothing, the future in the closest P-world will be one where events unfold just as they would were the actual laws in place. The electrons will repel, and the counterfactual will turn out both true and compatible with *CF asymmetry*, as desired.

More generally, Lewis's strategy for accommodating *CF asymmetry* relies on HD (causal) – HD as applied to the case of causal/nomological connections – since implementing this strategy requires that entities of the kind that actually exist may enter into different laws. Schaffer summarizes:

[Lewis's] account of counterfactuals requires miracles (slight variations of the actual laws) in order to implement their antecedents. That is, to implement the antecedent that there are like charges at a given location (assuming this to be actually false), we need to imagine some miraculous swerving of say, two electrons, that brings them to said location. Assuming that the actual laws are deterministic... such a miraculous swerving [of electrons] will require a slight violation of the actual laws. Hence the laws of the nearest possible world in which there are like charges here must be just slightly different from the actual laws. Thus to implement the counterfactual antecedent, one needs worlds with actual properties but alien laws. This is contingentism. (2009, 216)

Schaffer (2009) suggests that this connection, along with the superiority of Lewis's account of CFs, provides support for contingentism/HD (causal). In Wilson (forthcoming) I argue that this IBE doesn't go through.⁵ Here I simply want to flag the crucial role that HD plays in Lewis's account of counterfactuals.

10.2 HD and Lewis's Combinatorialism

As above, HD is foundational in nearly every aspect of Lewis's framework. The most powerful role that HD plays in Lewis's system, however, concerns its providing a basis for, as Lewis puts it, a “principle of plentitude” that will guarantee “that the worlds are abundant, and logical space is somehow complete” (1987a, 86). It is with respect to this role, I believe, that (an instance of) the most promising IBE for HD is to be found.⁶ I will start by presenting Lewis's motivations for appealing to HD as a broadly axiomatic combinatorial generator of the space of possibility.⁷ Some of these specifically pertain to Lewis's concrete modal realism, according to which possible worlds are of the same (concrete, particular) ontological type as our very own actual world, with combinatorial elements correspondingly taken to be spatiotemporal fundamenta or Hume-intrinsic duplicates thereof. As I will next try to bring out, however, the deeper motivation for Lewis's appeal to HD is to some extent neutral both on the metaphysics of possible worlds and on the preferred base of entities suitable for recombination.

10.2.1 HD as a Principle of Recombination

To see the deeper motivation for HD, it's useful to start by considering how the space of *syntactically* logical possibility is generated. On this conception, while 'There is something that is a bachelor and is not a bachelor', and 'There is something that is both red and not red' are each impossible, 'There is a married bachelor' and 'There is something that is both red and green all over' are each possible. Here, the job of generating the precise boundaries of the space of broadly syntactic possibility is done by a principle of syntactic consistency, according to which a represented state of affairs is syntactically logically possible iff it is syntactically consistent.

Though the space of syntactically logical possibility admits of consistency as a single principled generator, the associated conception of possibility is too weak to be of interesting use in characterizing what is metaphysically possible. It is metaphysical or "broadly" logical possibility that is of interest to metaphysicians. As Sider puts it:

There are ... different "strengths" of necessity and possibility, which can be signified by modal words (like 'can') in different contexts. Philosophers have tended to concentrate on a very broad sort, so-called "metaphysical" possibility and necessity. ... What is not metaphysically possible? Almost everyone agrees that contradictions are metaphysically impossible – it is metaphysically impossible to both give a talk in California and also not to give a talk in California. And everyone who accepts the legitimacy of the notion of analyticity – of truth that is in some sense guaranteed by meaning – agrees that the negations of analytic sentences like 'all bachelors are unmarried' are impossible. But it is usually thought that there exist further impossibilities. Examples might include the existence of a round square, someone's being taller than himself, someone's being in two places at once, George W. Bush's being a donkey, there existing no numbers, and there existing some water that is not made up of H₂O. (2003, 181)

But how is the space of metaphysical modality to be generated? Is there any principle that can serve as the basis of metaphysical/broadly logical possibility in the non-arbitrary, extensionally adequate way that the principle of consistency does vis-à-vis the space of syntactically logical possibility? The appeal to HD in Lewis's and other combinatorial theories of modality is, I suggest, best seen as motivated by its promise in providing such a non-arbitrary, extensionally correct generator of metaphysical modal space.

That Lewis intends HD to serve as an extensionally correct generator is indicated by his concern with ensuring that the space of (broadly) logical possibility is "complete," without "gaps"; that he intends HD to serve as a principled or systematic such generator is indirectly suggested by his consideration of an alternative two-part principle as doing this work, according to which:

- (1) absolutely every way that a world could possibly be is a way that some world is, and
- (2) absolutely every way that a part of the world could possibly be is a way that some part of some world is (1986, 86)

Lewis's first concern with this two-part principle is that, if worlds are understood as concrete entities, then the principle ends up being contentless:⁸

[G]iven modal realism, it becomes advantageous to identify 'ways a world could possibly be' with worlds themselves. Why distinguish two closely corresponding entities: a world, and also the maximally specific way that world is? Economy dictates identifying the 'ways' with worlds. (1986, 86)

But then (substituting) that makes (1) and (2) contentless:

- (1) absolutely every world is a world, and
- (2) absolutely every world that is part of a world is a world that is part of some world (perhaps itself).

As Lewis notes, one can avoid the triviality results by reading the two-part principle in epistemic terms, so that (1) says that every way we think a world could possibly be is a way that some world is; but in that case (1) "indiscriminately endorses offhand opinion about what is possible" (1986, 87). What is wanted is a principled and accurate *metaphysical* guide to the space of metaphysical possibility.

It is at this point that Lewis famously invokes a version of HD as his preferred generator of metaphysical modal space:

We need a new way to say . . . that there are possibilities enough, and no gaps in logical space. To which end, I suggest that we look to the Humean denial of necessary connections between distinct existences. To express the plentitude of possible worlds, I require a *principle of recombination* according to which patching together parts of different possible worlds yields another possible world. Roughly speaking, the principle is that anything can coexist with anything else, at least provided they occupy distinct spatiotemporal positions. Likewise, anything can fail to coexist with anything else. (Lewis 1986, 87–8)

Various qualifications are encoded in or ensue from Lewis's appeal to HD qua combinatorial principle.

First, the combinatorial elements to which HD is intended to apply are occupants of space–time. Following a common understanding of what it is for spatiotemporally located entities to be "wholly distinct," HD is guaranteed to apply only to non-overlapping such entities ("at least provided they occupy distinct spatiotemporal positions," Lewis 1986, 88).

Second, the combinatorial elements may be either actual or (merely) possible. (Given Lewis's concrete modal realism, the reference to possibilities here is supposed not to invoke irreducible circularity, for reasons I discuss in section 10.3.) Hence, as Lewis observes, if there could be a dragon and there could be a unicorn (neither of which presumably actually exist), then the principle would allow for the possibility of a dragon and a unicorn existing side by side. A minor complication here is that in discussing alien worlds, involving alien individuals or (more importantly) alien properties, Lewis says "it won't do to say that all worlds are generated by recombination from parts of this world, individuals which are possible because they are actual. We can't get the alien possibilities just by rearranging non-alien ones. Thus our principle of recombination falls short of capturing all the plentitude of possibilities" (1986, 92). This makes it sound as if Lewis *doesn't* take his recombinatorial principle to be a complete generator of metaphysical modal space. But since there was no presupposition that the principle applied only to actual spatiotemporal occupants, the principle doesn't *really* (in this respect) fall short, and indeed Lewis goes on to note that "Although recombination will not generate alien worlds out of the parts of this world, it nevertheless applies to alien worlds. . . . Anything alien can coexist, or fail to coexist, with anything else alien, or with anything else not alien, in any arrangement permitted by shape and size" (92). It is the more general recombinatorial principle that is ultimately at issue in Lewis's combinatorialism.

Third, reflecting Lewis's concrete modal realism, and associated supposition that possible worlds do not "overlap", applications of the principle involve recombinations not of the occupants of actual or possible space–times themselves, but rather of their *duplicates*:

I cannot altogether accept the formulation: anything can exist with anything. For I think the worlds do not overlap, hence each thing is part of only one of them. A dragon from one world and a unicorn from a second world do not themselves coexist either in the dragon's world, or in the unicorn's world, or in a third world. An attached head does not reappear as a separated head in some other world, because it does not reappear at all in any other world. . . . It is right to formulate our principle of recombination in terms of similarity. . . . But extrinsic similarity is irrelevant here, so . . . I should say that a *duplicate* of the dragon and a *duplicate* of the unicorn coexist at some world, and that the attached talking head has at some world a separated duplicate. (1986, 88–9)

Hume-intrinsicity and duplication form a tight circle here, with (as a first pass) duplicates sharing all Hume-intrinsic properties, and Hume-intrinsic properties being shared by all duplicates. More precisely, according to Lewis, duplicates share their “perfectly natural” properties, where natural properties are supposed to make for greater objective resemblance among their possessing particulars, and where perfectly natural properties are assumed to be “basic intrinsic” – that is, to be fundamental Hume-intrinsic properties; in reverse, fundamental Hume-intrinsic properties are again those shared by all duplicates. Hence notwithstanding Lewis’s case studies of dragons and talking heads, the elements guaranteed to be subject to recombination are in the first instance Hume-intrinsic duplicates of points (or regions) instantiating local qualities, or intrinsic duplicates of entities built up out of such points or regions. (The question of how Lewis aims to accommodate possibilities involving macro-level entities will be revisited in section 10.3.)

Fourth, and finally, the principle requires a proviso blocking unlimited recombinations of duplicates from being “too big” to fit in single space–time continuum:

Our principle . . . requires a proviso: “size and shape permitting”. The only limit on the extent to which a world can be filled with duplicates of possible individuals is that the parts of a world must be able to fit together within some possible size and shape of spacetime. Apart from that, anything can coexist with anything, and anything can fail to coexist with anything. (1986, 89–90)

Putting Lewis’s primary statement and associated qualifications together, we arrive at the following combinatorial principle:

HD (L-combinatorialism): Every occupant of spacetime existing at any actual or possible world is such that one of its duplicates (sharing all Hume-intrinsic properties) can coexist with one of the duplicate(s) of any non-overlapping occupant(s) of spacetime existing at any actual or possible world(s), or fail to coexist with one of the duplicate(s) of any occupant(s) of spacetime existing at any actual or possible world(s).

The principle requires that there be worlds enough to accommodate all the combinations; hence it is that it acts as a principled generator of the space of metaphysical modality. Given Lewis’s Humean inclinations, he no doubt found HD (L-combinatorialism) intuitively plausible. Most importantly, however, Lewis invokes HD (L-combinatorialism) as sufficing to express or ensure that there are no gaps in metaphysical modal space.

In particular, and importantly for Lewis’s larger project (that is, his “sustained campaign” in favor of Humean supervenience), HD’s application here confirms and moreover provides needed support to Lewis’s supposition that the laws of nature are contingent. We saw earlier that contingentism is plausible, given Lewis’s understanding of laws as best systematizations of the regularities, but this result hinges on whether worlds having sufficiently different spatiotemporal distributions of Hume-intrinsic properties are genuinely possible. Indeed, such worlds are possible, by the lights of Lewis’s HD (L-combinatorialism). As Lewis notes:

Another use of my principle is to settle – or as opponents might say, to beg – the question of whether laws of nature are strictly necessary. They are not; or at least laws that constrain what can coexist in different positions are not. (1986, 91)

More generally, the principle effectively generalizes Hume’s original application of his dictum to apply to any connections between spatiotemporally (wholly) distinct entities whatsoever:

It is no surprise that my principle [of recombination] prohibits strictly necessary connections between distinct existences. What I have done is to take a Humean view about laws and causation, and use it instead as a thesis about possibility. Same thesis, different emphasis. (91)

10.2.2 *Prima Facie Advantages of Lewis's Combinatorialism*

There are three *prima facie* advantages of Lewis's combinatorialism, understood as involving HD (L-combinatorialism) against the backdrop of concrete modal realism.

First, as above it would be desirable if the space of metaphysical modality were generated in something like the principled and elegant way that the space of syntactically logical modality is generated by the principle of syntactic consistency. On a combinatorial account we have a single principle that has *prima facie* promise of doing this job.

Second, given that HD is in the business of denying necessary connections (to speak in terms that, as I'll next discuss, appear to be dischargeable), one might be *prima facie* confident, as Lewis was, that the metaphysical modal space generated by this principle would not leave any gaps.

One might be concerned here that, even granting (what I'll shortly question) that HD (L-combinatorialism) leaves no gaps in metaphysical modal space, nonetheless the principle *overshoots* the desired space. Indeed, by far the most common criticism of Lewis's combinatorialism is that it lets in possibilities that are not in fact such (allowing, e.g., that I might exist at a world though my mother never existed there, contra Kripkean origin essentialism, or that massy entities might repel, contra dispositional essentialism).⁹ There is a case to be made, however, that undergeneration is a worse sin than overgeneration in a theory, since contextual, quantificational, and other resources exist for restricting the space in such a way that the letter, if not the spirit, of the objection is accommodated. Hence Lewis refines his view in counterpart-theoretic terms to allow for contexts conforming to the essentialist's constraints, and Schaffer (2005) appeals to Kratzer's (1977) account of quantifiers as multiply ambiguous, in the course of responding to overgeneration concerns. Given such resources, the main thing, one might reasonably think, is to ensure that all the desired genuine possibilities are generated in principled fashion; extras can be excluded in one or other semi-principled fashion. Correspondingly, insofar as HD (L-combinatorialism) denies any and all necessary connections between wholly distinct occupants of space-time, one might think that this principle at worst overshoots in a treatable fashion, hence has promise of being an *extensionally adequate* generator of metaphysical modal space.

The first and second *prima facie* advantages are shared by other combinatorial accounts, which coincide in citing something like HD, but for which the combinatorial elements are different, as with Armstrong's (1989) account on which the base elements are universals.

The third *prima facie* advantage appears to be unique to Lewis's account, however, and reflects another way in which Lewis's appeal to HD is deeply in the Humean vein. The potential advantage here lies in HD (combinatorialism) appearing to serve, when implemented inside the framework of Lewis's concrete modal realism, as the basis for a distinctively *reductive* account of modality. Above we observed that contemporary proponents of HD typically do not follow Hume in rejecting IBE as a warranted mode of inference. Where contemporary proponents – in particular, Lewis – typically *do* follow Hume is in their distaste for ontologically irreducible modality, notwithstanding that, for Lewis and others, this scruple is born of metaphysical rather than epistemological considerations. Modality is to be analyzed, or at least accounted for, in non-modal terms.¹⁰ But if so, the question arises: how are we to understand the 'can' that enters into HD (combinatorialism)?

Lewis's concrete modal realism provides him with an answer; namely, that the 'can' is to be analyzed as an 'is' – the 'is' of extension across the available space of concrete possible worlds. To say that any occupants of any space-time can exist, or not exist, with any occupants of any space-time, is to say that duplicates of these occupants *do* exist, or *do not* exist, together in some concrete possible world. As such, possibility is ultimately analyzed in purely extensional terms. Note that forms of combinatorialism, such as Armstrong's, on which the combinatorial elements are universals or some other non-extensional phenomena, do not so clearly discharge the modal implication associated with

their combinatorial element, and indeed, Lewis's primary objection to Armstrong's view was that it was not appropriately reductive, in requiring appeal to a notion of consistency in order to construct "ersatz" possible worlds from universals or other abstracta (see Lewis 1992).

Lewis's HD-based combinatorial approach to modality thus has promise of generating the space of metaphysical modality in a way that is not just principled and extensionally correct, but reductive. It may be that non-combinatorialist approaches can correctly draw the boundaries of metaphysical modal space; here we would have to attend to details. But whatever the details, it's hard to see how a non-combinatorial approach might be as promising as is HD (L-combinatorialism) in either the first or third respects. To start with the question of reduction: pragmatic, conventionalist, dispositionalist, or essentialist approaches will likely advert to modal notions (such that, e.g., what is possible is what we find useful to take to be possible, or is consistent with the natures of the entities involved, where the notion of a nature has immediate, potentially irreducible, modal implications). Not everyone has reductive ambitions, but supposing one does, Lewis's HD-based combinatorialism appears to be the best game in town; and even those not inclined towards modal reductionism can acknowledge that *if* one can generate the space of metaphysical modality in non-modal terms, that would be a win from the perspective of ontological and/or ideological parsimony.

More importantly, in my view, is that existing non-combinatorial accounts do not begin to approach an HD-based combinatorial account in terms of providing a principled and systematic basis for generating metaphysical modal space. Even supposing a single generative principle can be associated with a given such account, actually implementing the account will require – what? Canvassing conventionalist intuitions? Asking the scientists? The end of metaphysical inquiry? Of course, the truth about metaphysical modality might be messy. But if it weren't, that would be incredibly useful, especially since so much philosophy requires that we be able to make informed judgments about what is or is not possible.

10.3 Undergeneration Concerns for Lewis's Combinatorialism

Prima facie, Lewis's combinatorialism promises to provide a *principled, extensionally adequate, and reductive* generator of metaphysical modal space. But is the promise really fulfilled?

As refigured, I will argue that this promise is undermined by attention to a variety of ways in which Lewis's combinatorialism undergenerates the space of metaphysical modality, as pertaining, in particular, to broadly scientific entities.

10.3.1 Spatiotemporally Overlapping Hume-Intrinsic Fundamenta

Lewis's combinatorialism applies only to (duplicates of) non-overlapping occupants of space–time ("at least provided they occupy distinct spatiotemporal positions"; 1986, 88). Hence, as it stands, HD (L-combinatorialism) does not specify what is or is not possible for spatiotemporally overlapping entities; the principle is simply silent on the matter.

Is this a significant failure of plenitude? In the next subsection, I'll consider this question as directed at possibilities involving overlapping macro-level objects or properties. Here I'll focus on possibilities involving overlapping Hume-intrinsic fundamenta, for which the answer appears to be "yes," since, after all, possibilities can substantively differ as regards such entities. Some objects may overlap (e.g. bosons), but some may not (e.g. fermions). Some objects and properties may overlap (e.g. electrons and negative charge), but some may not (e.g. electrons and positive charge, being square, or being prime).¹¹ Most importantly, and most uncontroversially, some properties – negative charge and mass – may overlap (be coinstantiated), others – negative and positive charge – may not (and

more generally, proponents and opponents of HD alike agree that determinates falling under the same determinable can't overlap). Both opponents and proponents of HD typically allow that there may be such substantive modal facts about overlapping entities, and the acceptance of restrictions on overlapping determinates is especially common. Hence, for example, in discussing how HD (L-combinatorialism) supports the contingency of laws of nature, Lewis qualifies: "... perhaps with the exception of laws constraining what can coexist at a single position, for instance the law (if such it be) that nothing is both positive and negative in charge" (1986, 91). And later, when assessing pictorial ersatzism, he says: "[W]e noticed that it is all too easy to *say* that the same particle is both positive and negative in charge. But if in fact these are incompatible determinates... then nothing whatever... has them both" (1986, 168). Interestingly, however, Lewis never discusses, head-on, the fact that his own recombinatorial principle fails to apply to such cases. Of course, in remaining silent on the cases Lewis's view doesn't explicitly fall into error; but it remains that as it stands HD (L-combinatorialism) undergenerates the space of metaphysical modality, and so fails to be extensionally adequate.

One might wonder whether HD might be extended, one way or another, to appropriately treat possibilities for overlapping fundamenta. Doing so requires a notion of "distinct" or "wholly distinct" different from that applying to spatiotemporally non-overlapping entities; it is unclear, however, whether any alternative understanding will do the trick.¹² Mere numerical distinctness results in an extreme version of HD, which in addition to incorrectly deeming it possible that fermions are collocated, that electrons are positively charged, and that some fundamental entity is both positively and negatively charged, would more generally render it possible for sets to have different (individual) members, fusions to have different (individual) parts, and so on. Lewis, it seems, didn't have such a weak notion of distinctness in mind, at least so far as HD (L-combinatorialism) is concerned, since as above he seems willing to allow that there could be barriers to coinstantiation of numerically distinct properties. Taking this route thus doesn't resolve the problem of extensional inadequacy.

Certain other notions of distinctness (besides spatiotemporal non-overlap and numerical distinctness) are given in modal terms, according to which entities are wholly distinct if it is possible for one or both to exist without the other's existing. But a modal characterization of distinctness won't do in a context where HD is being invoked in order to *generate* the space of possibilities. Taking this route to overcoming undergeneration would thus undermine the reductive status of Lewis's combinatorialism.

The remaining and initially promising suggestion takes the relevant notion of distinctness to involve constitution, such that (in particular, spatiotemporally overlapping) entities are wholly distinct just in case neither at all constitutes the other, with HD (L-combinatorialism) extended accordingly. This strategy faces four difficulties, however.

First, a constitution-based extension of HD (L-combinatorialism) only partly overcomes extensional inadequacy. It will correctly deem it impossible that electrons fail to be negatively charged (since electrons are partly constituted by negative charge), and perhaps it will also explain why determinates of a single determinable cannot overlap, if these are each partly constituted by a single determinable. But it will not explain why an electron cannot also be positively charged, prime, or square – after all, in general it is possible for entities to have properties that do not enter into constituting them. Nor will it distinguish between the possibilities for overlap among bosons and fermions, since while bosons do not constitute one other, neither do fermions. Second, invocations of constitution as a basis for necessary connections may tacitly reintroduce necessary connections between wholly distinct entities, contra HD (L-combinatorialism). As I have argued (Wilson 2010b), in many cases, the best explanation of why we are justified in taking there to be necessary constitutional connections – again, accepted by Humeans and non-Humeans alike – presupposes that there are necessary causal connections, contra the core applications of HD, and more specifically contra Lewis's

intended use of HD (L-combinatorialism) (not to mention his assumption of Humean supervenience as involving Hume-intrinsic fundamenta) as establishing the contingency of laws of nature. So, for example, the best explanation of why we are justified in accepting that necessarily, electrons are negatively charged – accepted by both friends and foes of HD – adverts to there being a modally stable overlap in the causal profiles of the two entities, contrary to HD (L-combinatorialism). Third, a constitution-based understanding of whole distinctness, and associated version of HD (L-combinatorialism), relies on our having some principled means of saying when some entities do or do not constitute some others, but we do not have any such principled means: such investigations are both methodologically opaque and tangled up with various of one’s other commitments. If applications of HD (L-combinatorialism) to cases of spatiotemporally overlapping fundamenta must rely on the outcomes of investigations into the constitution of such entities, then its claim to provide a principled and elegant generator of the space of metaphysical modality is undermined. Fourth, a constitution-based understanding also threatens to undermine the claim that HD (L-combinatorialism) provides the basis for a reductive account of modality, for investigations into questions of constitution typically proceed by consideration of what is possible or necessary for a given entity.

Summing up: the failure of Lewis’s combinatorialism to specify what is possible or necessary for spatiotemporally overlapping Hume-intrinsic fundamenta poses a serious problem for the claim that HD (L-combinatorialism) is an extensionally adequate generator of metaphysical modal space. Moreover, attempts to overcome this deficiency by extending the combinatorial principle in one or other fashion either fail to overcome extensional inadequacy, undermine the claim that HD (L-combinatorialism) is a principled generator of metaphysical modal space, undermine the reductive aspirations of Lewis’s account, or indirectly entail the falsity of HD. A similar menu of concerns will attach to the other cases of undergeneration that I’ll now mention.

10.3.2 Undergenerated Macro-Possibilities

Let us turn now to possibilities concerning macro-entities. It is possible, I hope you’ll agree, that there be a plaid kangaroo. Is this possibility generated by HD (L-combinatorialism)? Not without further assumptions. HD (L-combinatorialism) generates “juxtapositional” possibilities – for example, it generates the possibility that there be a kangaroo wearing (that is, appropriately proximate to) a plaid coat. But the possibility of a plaid kangaroo is not a juxtapositional possibility, but rather requires that the property of being plaid somehow overlap (that is, be instantiated in) a kangaroo.

What further assumptions are needed? Here Lewis will appeal to his doctrine of Humean supervenience, according to which “all else” supervenes on the distribution of Hume-intrinsic qualities. Recall: “[W]e have an arrangement of qualities. And that is all. There is no difference without difference in the arrangement of qualities. All else supervenes on that” (1986, ix). As such, and notwithstanding Lewis’s case studies involving kangaroos, dragons, talking heads and other macro-entities, the possibilities to which HD (L-combinatorialism) is in the first instance directed are possibilities involving juxtapositions of elements in (actual or possible) Humean supervenience bases. Hence when the proponent of HD (L-combinatorialism) speaks of what is possible for a kangaroo, they are *really* speaking of what is possible for the presumed supervenience base of kangaroos; and in saying that it is possible that there be a plaid kangaroo, they are saying, of entities in that presumed supervenience base, that (duplicates of) these entities might be configured so as to provide a supervenience base for a plaid kangaroo.

Before assessing this strategy, a qualification is in order, reflecting that the supposition that there is such a base doesn’t follow from HD (L-combinatorialism) alone. This principle guarantees that (duplicates of) the entities (actual or possible) at each world may exist together, or exist apart, at a

world; but it doesn't guarantee that coexisting duplicates will stand in the relations requisite unto providing a supervenience base for, for example, a plaid kangaroo. Hence Divers and Melia note:

[Lewis's stated] principle of recombination is insufficient to generate worlds where donkeys talk or where there are blue swans. Grant that there is a set of actual particles such that were those particles arranged in a certain way they would constitute a talking donkey. It is not enough for a world to represent that possibility that it should contain a duplicate of each such particle, for obviously such particles could exist, scattered to the corners of the universe, without constituting a talking donkey. (2002, 16)

To overcome this sort of undergeneration, they rather suggest formulating the recombinatorial principle in a way that requires that there is a distinct possibility for *every* way of spatiotemporally relating the relevant duplicates:

For any individuals x_1, x_2, \dots, x_n there is a world containing any number of duplicates of each, if there is a spacetime big enough to hold them all, and such that for any spatiotemporal relation the duplicates in question stand in that relation.¹³

By doing so, they claim that "we achieve the effect of capturing those arrangements of the particles in question that constitute a talking donkey" (16).

The need to ensure that HD (L-combinatorialism) generates duplicates that are spatiotemporally related in the right way seems correct (for simplicity I won't carry this qualification through), though as I'll argue down the line there is a difficulty for Lewis's reductive aspirations here, as regards what metaphysically determines that some Hume-intrinsic goings-on serve as the basis for a macro-entity of a given type. In any case, more important than the need to quantify over spatiotemporal relations in the combinatorial principle is the tacit assumption that Humean supervenience must be presupposed if HD (L-combinatorialism) is to have any chance of capturing the sort of macro-level possibilities in question.

This assumption undermines the claim that HD (L-combinatorialism) provides a principled generator of the space of metaphysical modality. It is not HD (L-combinatorialism) that generates the space, but this principle in tandem with another, substantive principle, according to which "all else supervenes" on the distribution of Hume-intrinsic qualities at space-time points. When Lewis looks to HD (L-combinatorialism) he is looking not just for a principle that will generate all the possible worlds, but for a principle that will generate all the *possibilities*. What HD (L-combinatorialism) generates is worlds containing recombinations of Hume-intrinsic fundamenta. Do any such worlds contain plaid kangaroos? Well, that depends on whether Humean supervenience is true. After all (to focus on one of their salient features), kangaroos are sentient creatures. If consciousness is a robustly emergent property of complex combinations of micro-level (here, Hume-intrinsic) goings-on, then HD (L-combinatorialism) alone would not axiomatically generate a world of the desired plaid, kangaroo-y variety.

So the assumption of Humean supervenience is in fact an additional principle, that must be added to HD (L-combinatorialism) if Lewis's combinatorialism is to be extensionally adequate. That two principles, rather than one, are required to generate metaphysical modal space to some extent undermines the claim that HD (L-combinatorialism) is a principled generator of this space. But the failure of systematicity here goes far beyond multiplicity. One can talk oneself into thinking of combinatorial principles as broadly mathematical means of expressing (or aiming to express) an extremum along the spectrum of conceptions of metaphysical modality – namely, a conception of such modality as highly unrestricted (exceeded only by broadly syntactic logical modality), such that everything not forbidden is possible. But Humean supervenience is another sort of principle altogether. Its truth is

not appropriately seen as a broadly axiomatic stipulation; rather, it is an empirical thesis, contingent on whether or not any properties of macro-entities are constituted or otherwise grounded in fundamental configurational interactions (see McLaughlin 1992). As is indicated by the ongoing disputes in the physicalism debates over the status of mentality and other features whose physical acceptability remains controversial, the confirmation (or disconfirmation) of this thesis is a messy, unprincipled, broadly piecemeal affair. Moreover, given the broader goal of overcoming undergeneration, it won't do to simply refer to a "representative sample," since any exception will break the rule. Undergeneration is thus avoided only by undermining the claim that HD (L-combinatorialism) is a principled (systematic, elegant) generator of metaphysical modal space.¹⁴

The considerations here also indirectly undermine the reductive aspirations of Lewis's account. To start, as above, Lewis's combinatorialism appears to have a reductive advantage over alternative forms of combinatorialism (e.g. Armstrong's) when it comes to the construction of possible worlds, representing the possibilities for the combinatorial fundamenta (sometimes said to be "true of" a given world). Some also claim that Lewis's account is the only one able to reductively accommodate possibilities pertaining to macro-entities (sometimes said to be "true in" a world). So, for example, here Sider argues that a sort of "best-case" alternative combinatorial account will be modally circular:

Identifying worlds with sets of space-time points may eliminate modality from the definition of "possible world," but as Lewis has argued, modality reappears in the definition of "true in". What would it mean to say that it is true in a certain set, S, of space-time points that there exists a talking donkey? ... If we could analyze "talking donkey" in terms of occupied points of space-time then we could determine precisely which patterns of occupation would suffice for the existence of a talking donkey, and then we could say that it is true in S that there is a talking donkey iff S contains one of these patterns. But no one knows how to provide this sort of analysis of "talking donkey". Moreover, a general analysis of modality requires a general definition of "proposition p is true in set S" for arbitrary propositions p; a series of one-off definitions for a few chosen propositions is no progress toward a general analysis. We might define "p is true in possible world w" as meaning "necessarily: if all and only the points in w are occupied by matter then p is true." But this definition uses necessity. No other definition seems available; "true in", therefore, renders the account of modality circular. (2003, 189)

By way of contrast, Sider claims, a concrete modal realist like Lewis does not face a circularity concern. Why not? Effectively, the strategy here aims to apply Lewis's "extensional gambit", according to which what "can" or "must" be the case is to be analyzed in terms of what "is" the case in some or all concrete possible worlds. In particular, on the assumption that Humean supervenience is true, whether a given macro-entity (e.g. a kangaroo) exists at a world and has a given property (e.g. being plaid) will just be true, or not – if the appropriate base exists, the associated macro goings-on will exist, as an extensional matter of fact. Moreover, the seemingly modal implications of the supervenience conditional will also be extensionally discharged, now across worlds rather than within a world: so long as every world containing (a duplicate of) such a base also contains (an overlapping duplicate of) the associated macro-entity, Lewis is, it seems, reductively good to go.

But, as I'll now argue, Lewis's treatment of possibilities involving macro-entities ultimately does not avoid commitment to irreducible modality. There is an interesting contrast in this respect with the case of Hume-intrinsic fundamenta, so let me start by discussing this case. Suppose that it is possible that some actual electron be one foot left of where it actually is, and consider a non-actual concrete world that is supposed to provide a ground for this claim. What ensures, metaphysically speaking, that some Hume-intrinsic entity at this non-actual world is appropriately taken to be a representative, so to speak, of the electron, such that the situation of the duplicate

appropriately bears on what is possible for the actual electron? Here the answer is easy: this is ensured by the duplicate's being *exactly intrinsically similar* to the actual electron. More generally, the relevance of some non-actual Hume-intrinsic fundamenta to what is possible or necessary for some actual Hume-intrinsic fundamenta is ensured by exact intrinsic similarity of the fundamenta in question.¹⁵

Not so, at least typically, for possibilities involving macro-entities. In the actual world, there are brown kangaroos, grounded, on Lewis's operative assumption, in some Hume-intrinsic supervenience base. Given this, which non-actual worlds are relevant to the possibility that there be a plaid kangaroo? These cannot be worlds containing exact intrinsic duplicates of (the appropriately related Humean supervenience base for) actual kangaroos, since these wouldn't be *plaid* kangaroos: kangaroos of different colors must be at least somewhat intrinsically different.¹⁶ So the non-actual worlds grounding the macro-possibility in question will be ones that are somewhat, but not exactly, intrinsically similar to actual brown kangaroos. But which respects of, and how much, similarity is required? More generally: which non-actual goings-on give rise to kangaroos, and which don't?

Sider (and also Divers and Melia) seems to assume that an extensionalist answer to this question can be given, to the effect that we can just read off of the space of concrete possible worlds which Hume-intrinsic goings-on serve as supervenience bases for non-actual kangaroos. But that's incorrect. Even if it's true that *if* some Hume-intrinsic goings-on serve as a kangaroo base, *then* from the existence of the base it will "extensionally" follow (without any need, in particular, for an analysis of kangaroos in Hume-intrinsic terms) that a kangaroo exists, the question here at issue remains: *which* Hume-intrinsic goings-on serve as bases for (e.g. plaid) kangaroos differing from actual kangaroos? One might take this to be primitive, but this answer would leave open that some irreducible modality was involved. Moreover, we are now in position to give a *tu quoque* against Sider and his associated defense of the reductive status of Lewis's combinatorialism. For even if one could give a non-primitive answer to the question of whether some Hume-intrinsic goings-on serve as a basis for a non-actual kangaroo, "what is needed for a general account of modality" is a *general* account of what it takes for some Hume-intrinsic goings-on to serve as a basis for a non-actual macro-entity of a given type. And here it seems that the only available account is one according to which the relevant Hume-intrinsic goings-on are those serving as the basis for a *possible* macro-entity of the type, where the notion of possibility here is perforce intensional rather than extensional (as per the first point). Hence proper accommodation of possibilities pertaining to macro-entities renders Lewis's combinatorialism circular.

Here again, then, HD (L-combinatorialism) fails to be a complete generator of the space of metaphysical modality, and available ways of closing the gap undermine the supposed methodological advantage and/or the reductive credentials of this principle.

10.3.3 *The Presupposition of Spatiotemporal Fundamentality*

My third and final undergeneration concern stems from Lewis's supposition that the elements whose recombination is supposed to serve as a generative basis for the space of metaphysical modality are occupants of actual or possible space-times. This assumption is problematic, since it is unclear that the most fundamental elements are occupants of space-time, as opposed to some more abstract space – most saliently, configuration space (see Paul 2012; Ney 2012, and others). If this last is correct, then a comparatively vast array of possibilities – all those associated with spaces in some or other respects different from ordinary spatiotemporal space) – are simply left out of Lewis's account. Lewis might try to maintain that these possibilities are not genuine, but in doing so he would be on shaky ground, by his own lights, for he counsels us to look to the sciences to get a handle on what is

fundamental (or “perfectly natural”), and it is the sciences that have raised to salience the possibility of non-spatiotemporal spaces.

One might try, as with the previous undergeneration of possibilities associated with overlapping entities, to expand HD (L-combinatorialism) so as to apply to occupants, “overlapping” or not, of more abstract spaces. Here an approach along lines of Armstrong’s universal-based version of combinatorialism seems potentially promising, though there remain questions about how to individuate universals (or more to the point, their instantiations) as wholly distinct or not. But Lewis cannot accept this strategy for overcoming undergeneration, since as previously noted he rejects Armstrong’s combinatorialist account as failing to appropriately accommodate reductionism.

Indeed, Lewis’s reductive aim is threatened, no matter how HD (L-combinatorialism) might be expanded to accommodate configuration and other more abstract spaces. As above, while Lewis follows Hume in thinking that there is no irreducible modality, a mere appeal to HD as a generative principle does not in itself ensure that modality is so reducible, since HD itself involves modal vocabulary. It was specifically Lewis’s appeal to HD as applying to *occupants of space–time*, in the context of his *concrete modal realism*, that ensured that this modal vocabulary was discharged, as really involving merely extensional facts. Once the combinatorial principle is applied to more abstract elements, however, which are not (at least in the first instance) occupants of space–time but rather of some more general space, it is no longer clear that Lewis’s extensional gambit applies.

10.4 The End Game

I have argued that HD is not motivated as an inference to the best explanation of the range of metaphysical modality – that is, as presupposed by Lewis’s combinatorialism. For, I have argued, Lewis’s account undergenerates the space in several important respects, and available means of narrowing the gaps in metaphysical modal space either (1) fail to close the gap, leaving HD (L-combinatorialism) extensionally inadequate; (2) require supplementing HD (L-combinatorialism) with principles, such as a constitution-based understanding of ‘wholly distinct’ or the thesis of Humean supervenience, which undermine HD (L-combinatorialism)’s claim to be a *principled* generator of metaphysical modal space; (3) undermine the reductive status of HD (L-combinatorialism); or (4) undermine the truth of HD, as applied, in particular, to the case of causal or nomological connections.

This result does not entirely rule out that HD might be indirectly motivated as a combinatorial generator of the range of metaphysical modal space. Two considerations are especially salient as regards the “end game,” so to speak.

First, there exist other combinatorial accounts which presuppose a version of HD – most notably, Armstrong’s combinatorial account, on which the combinatorial elements are the fundamental universals and particulars entering into atomic states of affairs, and possible worlds are understood as maximally consistent states of affairs. Though I cannot enter into details here, such a combinatorial account has some promise of systematically generating at least some of the possibilities left ungenerated on Lewis’s account.

As above, Lewis rejects Armstrong’s account as not genuinely modally reductive, in appealing to a notion of broadly semantic (as opposed to merely logically syntactic) consistency. One might worry that, as such, Armstrong’s combinatorialism does not really motivate HD, understood as incorporating Hume’s rejection of irreducible modality. This worry can be addressed, however. Hume’s rejection of irreducible modality targeted, in the first instance, powerful essences or other purportedly suspicious or inaccessible phenomena involving broadly scientific entities. He was perfectly happy with

semantic consistency as a generator of possibilities. Recall Hume's initial statement of his version of HD in the *Treatise*:

There is no object, which implies the existence of any other if we consider these objects in themselves, and never look beyond the ideas which we form of them. Such an inference wou'd amount to knowledge, and wou'd imply the absolute contradiction and impossibility of conceiving any thing different. (1978 [1739], Part III, S VI)

Hume doesn't think, in the causal cases he is considering, that there is any such "contradiction" in the relevant states of affairs, but the present point is simply that he doesn't seem opposed to semantic consistency (of the sort presumably operative in instances of conceiving) playing a role in generating the relevant space of possibility. So while one may aim to out-Hume Hume, as Lewis does, in characterizing metaphysical modal space in completely non-modal terms, doing so isn't a prerequisite of appropriately implementing HD as a combinatorial principle, or so it seems to me. So for all that I have argued here, HD might be motivated as presupposed by a combinatorial account of modality other than Lewis's, even if that account fails to be strongly modally reductive.

Beyond combinatorialism, there are many other accounts of metaphysical modality that need to be considered, not just with an eye to extensional adequacy but also to the clear desideratum to provide an account of the space of metaphysical modality that is *principled*, in something like the way the space of logically syntactic possibility is generated by the single principle of syntactic consistency. And here one might think that the prospects of doing without combinatorialism are not so promising.

So, to consider just one example, take Kit Fine's (2002) conjecture that modal facts can be analyzed as follows: for it to be necessary that *p* just is for there to be some things, *X*, such that *p* holds in virtue of the natures of the *X*s. Here the suggestion might be that the space of metaphysical modality is generated by a principle to the effect that any scenario compatible with the natures of the entities in the scenario is possible. Such a "nature" or "essence"-based view appeals to broadly semantic consistency; but so does the remaining combinatorialist contender, so this appeal doesn't count as a serious disadvantage. A more telling disadvantage is that a nature- or essence-based view is only superficially principled. Essences are often thought to be mysterious; but the concern at issue here is more specifically that – at least insofar as the essence of essence remains elusive – this generator of metaphysical modal space really adverts to a huge multiplicity of identity and individuation conditions, whose methodology and metaphysical standing remain opaque, both as directed at particular cases, and in general. As with the appeal to constitution as a means of extending HD (L-combinatorialism) to accommodate possibilities for spatially overlapping entities, the appeal to essence seems to count more as an admission of defeat in the goal of providing a principled basis for metaphysical modal space, than it counts as a way of satisfying this goal. Supposing so, that might throw us back towards some form of combinatorialism, and hence to some form of HD.

Second, at the end of the day there is one other consideration that might lead us to endorse HD, as presupposed by Lewis's account of combinatorialism. While, as I've here tried to show, Lewis's account of combinatorialism has its problems, other accounts also have their problems. And even if *on this specific issue* Lewis's account, and associated appeal to HD, does not come out ahead, it might be that *all things considered* Lewis's overall framework motivates HD, as presupposed not just in his account of the space of metaphysical modality but moreover, as we have seen, as presupposed in nearly every important aspect of his systematic philosophy. And so far as the end game of deciding which systematic philosophy is best,¹⁷ Lewis's views are very much still in the running.

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Notes

- 1 See, for example, Armstrong 1983, Lewis 1992, Paull and Sider 1992, Bennett 2004, and Moyer 2008.
- 2 See Wilson 2010a, 2010b, and 2014.
- 3 See Wilson 2010a for detailed discussion of these interpretive options (including, e.g., as applying to individuals or types – a distinction that nothing turns on here) for contemporary versions of HD.
- 4 In cases of ties, all the closest P-worlds must be Q-worlds; in cases where there is (are) no closest P-world(s), the usual strategy is to require that all P-worlds within a certain range of proximity be Q-worlds.
- 5 In brief, the strategy of Wilson (2014) is as follows. Lewis's (and Schaffer's) main cited motivations for endorsing a "miracle-based" account of comparative overall similarity are, first, that some salient contexts of counterfactual evaluation presuppose *CF asymmetry*, and, second, that accounts of counterfactuals failing to presuppose or impose *CF asymmetry* are epistemologically problematic, in that under conditions of determinism, the variations in initial micro-conditions needed to implement a given counterfactual antecedent would result in so many changes to ensuing macro-states that evaluation of CFs would be rendered practically impossible. Against the first reason, I argue that no non-artificial contexts involving counterfactual reasoning presuppose *CF asymmetry*; against the second, I observe that micro-variation associated with variations in initial conditions is compatible, in principle, with significant similarity as regards macroscopic states of affairs – enough, in particular, to allow counterfactuals to be appropriately evaluated.
- 6 I say "instance" since there are other HD-presupposing implementations of combinatorial accounts (e.g. Armstrong's) on which the base elements, and corresponding understanding of "whole distinctness," are different from Lewis's. Assessment of alternative combinatorial accounts must await another day.
- 7 The reference to HDs being taken to be a "broadly axiomatic" generator of metaphysical modal space (I won't always carry this qualifier through) is meant to flag that the principle is intended to characterize certain worlds (namely, the metaphysically possible ones) in something like the way that the Peano axioms are intended to characterize certain mathematical entities (namely, the integers), as opposed to metaphysically cause or otherwise bring into existence the worlds in the space, or to select these worlds from a pre-existing broader space. Lewis clearly also sees HD as giving us an epistemic handle on which worlds exist; while in this paper the primary focus is on HD's usefulness as a metaphysical principle, the question of HD's epistemic usefulness will come up in section 10.3.2.
- 8 A related concern, not discussed by Lewis, is that the two-part principle does little more than encode, for worlds or parts of worlds, the operative assumption that modal claims involve quantification over possible worlds (such that, e.g., Ps being possible is understood in terms of Ps being true in some possible world). The two-part principle thus provides a translation strategy for modal claims, but does not provide any independent handle on which worlds are in the space.
- 9 See, e.g., Carroll 1990, Shoemaker 1998, Bird 2007, and many others.
- 10 That said, there are stronger and weaker ways of interpreting (hence accommodating) Hume's distaste for irreducible modality, as I'll discuss in section 10.4.
- 11 Here I assume that overlap is a necessary condition for property instantiation; if not, then it remains that such modal differences are not generated by HD (L-combinatorialism).
- 12 See Wilson (2010a) for detailed discussion of different notions of distinctness that might enter into formulating HD, and assessment of the resulting theses.

- 13 This is not perspicuously phrased (as it stands its interpretation is compatible with the claim that the duplicates in question exist at a single world and somehow stand in every single spatiotemporal relation), but the idea is clear enough.
- 14 Indeed, as Christopher Gibilisco pointed out, undergeneration will not be avoided, even at this price. For, as Lewis qualifies, "I concede that Humean supervenience is at best a contingent truth. Two worlds might indeed differ only in unHumean ways, if one or both of them is a world where Humean supervenience fails" (Lewis, 1987, x); and again: "Humean Supervenience is meant to be contingent: it say that among *worlds like ours*, no two differ without difference in the arrangement of qualities" (Lewis, 1994, 474; emphasis in text). But if the recombination principle requires Humean supervenience in order to fill some gaps in logical space, then Lewis's combinatorialism will rule out the non-Humean worlds that he thinks are possible, and so introduce other such gaps.
- 15 Hence it is that, according to Lewis, the perfectly natural properties – that is, perfectly (Hume-intrinsic) fundamental properties – make for perfect objective intrinsic similarity among their possessing particulars (see Lewis 1984, 227, and 1986, 60).
- 16 Here we are ignoring potential overgeneration concerns stemming from the fact that Lewis's view does not explicitly incorporate resources for the (commonly supposed) historic and relational individuation of species types and tokens.
- 17 This is assuming it makes sense to ask what systematic philosophy is best, of course. That this makes sense might be questioned for, for example, Carnapian reasons, or on grounds that philosophy is in the business of creatively identifying and rigorously exploring the space of alternative theories (as Benj Hellie suggested), as opposed to honing in on a supposed one true theory.

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