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ISOLATION AND UNIFICATION: THE REALIST ANALYSIS OF POSSIBLE WORLDS

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Realism about possible worlds bears analytical fruit. The prize plum, perhaps, is the analysis of modality, in particular, the analysis of modal operators as quantifiers over possible worlds. But if the goal is the elimination, and not just the systematization, of primitive modality, it won't do for the realist simply to "take possible worlds as primitive." For, what sort of primitive is "possible world"? It wears its modality right on its face! Nor will it do for the realist to "take the worldmate relation as primitive," the relation that holds between things inhabiting one and the same possible world. On a realist account, 'possible world' and 'worldmate' are trivially interdefinable. No, the realist must provide an *analysis* of possible world (and worldmate) – or forfeit the prize.

The modern champion of realism about possible worlds, of course, is David Lewis; but a realist need not accept all of Lewis's "modal realism."[1] The core of realism about possible worlds, I think, is captured by the following five claims. (1) Worlds exist.[2] (2) Worlds are individuals rather than classes, or functions, or mathematical structures. (3) Worlds are particulars rather than properties or universals. (4) Worlds are "concrete" in this sense: they are fully determinate in all qualitative respects. (5) Worlds are (for the most part) mereologically complex rather than simple – for example, many worlds have parts that stand in spatiotemporal relations to one another.[3] The mereological complexity of worlds suggests that worlds can, and should, be analyzed.

How should the realist analysis of world proceed? Let *reality* be the sum of whatever exists. Let *logical space* be that portion of reality over which (alethic) modal operators range, in other words, the sum of *possibilia*. There are two tasks for the realist, two distinct

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problems of demarcation. First, there is the problem of demarcation for logical space: Where does logical space end and the rest of reality begin? What is the criterion for determining which parts of reality are parts of logical space, and so ingredients for making the worlds? (Of course, if logical space is the whole of reality – if, for example, there are no "abstract" mathematical entities, no transcendental universals – then this problem doesn't arise.) Second, there is the problem of demarcation for the worlds themselves: Where does one world end and another begin? What is the criterion for determining when two (or more) parts of logical space are parts of one and the same world? I believe that both problems cam be satisfactorily solved. In particular, criteria of demarcation can be found that do not rely upon anything modal – a prerequisite for the elimination of primitive modality. In this paper, I discuss only the demarcation of worlds.

David Lewis has tackled the problem of demarcation for worlds.[4] The basic strategy for a solution is this. Some regions of logical space are *unified*; the maximal such unified regions are the worlds. On this basic strategy, Lewis and I agree. But I disagree with Lewis over two substantial issues having to do with the manner of unification. First, for Lewis, all worlds are *globally* unified (or *almost globally* unified): at any world, (almost) every part is directly linked to (almost) every other part.[5] I hold instead that some worlds are *locally* unified: at some worlds, parts are directly linked only to "neighboring" parts. I have discussed local unification elsewhere (with respect to spatial and spatiotemporal relations); here I cover the issue only in passing.[6] Second, for Lewis, each world is *spatiotemporally* unified; every world is *spatiotemporally* isolated from every other.[7] I hold instead: a world may be unified by non-spatiotemporal relations; every world is *absolutely* isolated from every other. If I am right with respect to (either or both) of these issues, then Lewis's conception of logical space is impoverished: perfectly respectable worlds are missing.

I will proceed as follows. First, in order to properly frame these disputes, I need to introduce some basic metaphysical machinery. Second, I develop notions of isolation and unification, and the analysis of world in terms of them, with sufficient generality to allow for locally unified worlds. Third, I give my argument against Lewis's requirement that worlds be spatiotemporally unified. Fourth, I present an alternative analysis which allows for non-spatiotemporal

unification of worlds, and I defend it in detail, first against an objection raised by Lewis, then against five further objections. Fifth and finally, I briefly discuss how the problem of demarcation for worlds is related to the problem of "island universes."

I

To start, I need the distinction between the *fundamental* or (perfectly) *natural* properties and relations, and the rest.[8] The natural properties and relations are those that correspond to immanent universals or tropes, if there are universals or tropes. They make for qualitative similarity: if two things instantiate the same natural property, or each divides into parts that stand in the same natural relation, then the things are objectively similar in some qualitative respect. Moreover, the qualitative supervenes on the natural: fixing the natural properties and relations suffices to fix all the qualitative properties and relations.

In terms of naturalness, a number of indispensable metaphysical notions can be defined. I will be brief. Things are (intrinsic, qualitative) *duplicates* just in case there is a *similarity map* from one to the other: a one-to-one correspondence between their parts that preserves all natural properties and relations (and the part-whole relation). An *intrinsic nature* is a property had by all and only the duplicates of some thing. An *intrinsic* property is one that never differs between duplicates; a property is *extrinsic* just in case it is not intrinsic. An *internal* relation is a relation that supervenes on the intrinsic natures of its *relata*. Having-the-same-mass-as is an example of an internal relation, assuming the mass properties are intrinsic. An *external* relation is one that although it fails to supervene on the intrinsic natures of its *relata*, does supervene on the intrinsic natures of its *relata*, and of the fusion of its *relata*.[9] Being-adjacent-to is an example of an external relation: whether two things are adjacent to one another is not determined by their intrinsic natures, taken separately, but it is determined if one also takes into account the intrinsic nature of their fusion. A relation that is either internal or external is *intrinsic*; all others are *extrinsic*. Note that it is built into the definitions that all natural properties and relations are intrinsic.

II

Now we are ready to begin our task proper: to define isolation, and in terms of isolation to analyze the notion of world. Isolation, I take it is to be characterized in terms of the holding or failing to hold of certain natural external relations. But which relations? Different choices yield different notions of isolation. For the sake of generality, I first present the definitions in the form of a *schema*. Let $\mathcal{F}$ be a family of natural external relations. Two parts of logical space are *$\mathcal{F}$-isolated* if and only if they are non-overlapping, and no part of one stands in any relation from $\mathcal{F}$ to any part of the other. A part of logical space is *$\mathcal{F}$-connected* (or *$\mathcal{F}$-unified*) if and only if it is not the sum of two $\mathcal{F}$-isolated parts; otherwise it is *$\mathcal{F}$-disconnected* (or *$\mathcal{F}$-disunified*). Two parts of logical space are (directly or indirectly) *$\mathcal{F}$-related* if and only if some $\mathcal{F}$-connected part of logical space includes them both. Note that parts of logical space can be (indirectly) $\mathcal{F}$-related even though they are $\mathcal{F}$-isolated, and so not related by any member of $\mathcal{F}$. (An illustration follows shortly.)

Worlds can now be analyzed schematically in terms of $\mathcal{F}$-connectedness: a different analysis results for each choice of $\mathcal{F}$. A *world* is any maximal $\mathcal{F}$-connected part of logical space; that is, an $\mathcal{F}$-connected part not properly included in any other $\mathcal{F}$-connected part. It follows from the analysis that any two worlds are $\mathcal{F}$-isolated from one another, and, in particular, that no two worlds overlap.[10] Finally, parts of worlds are worldmates if and only if they are part of the same world, if and only if they are $\mathcal{F}$-related. Since worlds do not overlap, the worldmate relation is an equivalence relation over parts of worlds.

Worlds may be unified to a greater or lesser degree. At one end of the spectrum, we have *globally $\mathcal{F}$-unified* worlds at which no part is $\mathcal{F}$-isolated from any other part. At a globally $\mathcal{F}$-unified world, points of spacetime (if such exist and are mereologically atomic) are directly linked to one another by some natural relation in $\mathcal{F}$, presumably, by some external relation of spatiotemporal distance (interval). At the other end of the spectrum, we have *locally $\mathcal{F}$-unified* worlds at which the only parts that are *not* $\mathcal{F}$-isolated are overlapping or adjacent parts.[11] (The $\mathcal{F}$-isolated parts are nonetheless *$\mathcal{F}$-related* in virtue of belonging to a single $\mathcal{F}$-connected region of logical space.) At a locally $\mathcal{F}$-unified world (with continuous spacetime),

distinct points of spacetime are $\mathcal{F}$-isolated (being non-adjacent), and so are not directly linked by any natural relation in $\mathcal{F}$; relations of spatiotemporal distance are *extrinsic*, rather than external, because the distance between points depends upon the intervening spacetime, upon the lengths of paths from one point to the other.[12]

Lewis does not allow for locally unified worlds. Let me recast his account within my framework for purposes of comparison. For Lewis, worlds are maximal $\mathcal{F}$-interrelated regions of logical space, where $\mathcal{F}$-interrelatedness is defined narrowly as follows: a part of logical space is *$\mathcal{F}$-interrelated* if and only if every part stands in some relation from $\mathcal{F}$ to every other (non-overlapping) part.[13] For Lewis, then, interrelatedness is the only kind of unification for worlds: all worlds are globally unified. That worlds are $\mathcal{F}$-isolated from one another, and never overlap, cannot be proven on Lewis's account; it is a substantial extra postulate.

III

What should we take $\mathcal{F}$ to be in the analysis-schema for world? According to Lewis, $\mathcal{F}$ is the family of natural spatiotemporal relations: worlds are maximal *spatiotemporally* unified regions of logical space; all and only worldmates are *spatiotemporally* related.[14] But this proposal, I think, is open to a decisive objection. Physicists have often speculated, in trying to make sense of quantum mechanical mysteries such as wave-particle duality, that spacetime is not physically fundamental, that the spatiotemporal relations holding at the "macroscopic" level are reducible to more fundamental properties and relations holding only at the "microscopic" level, in the way that say, relations of chemical bonding are reducible to more fundamental physical properties and relations. Moreover, it may be that none of the fundamental, (perfectly) natural relations are even structurally analogous to the spatiotemporal relations. Suppose this speculation is true. Then, had the fundamental physical laws or the "initial" conditions been otherwise than they are, there might have been no spacetime at all, just as had the physical laws or "initial" conditions been different, atoms might never have clumped into molecules. If logical space is to make room for these possibilities, there must be worlds that are unified by *non*-spatiotemporal relations. Indeed, if

actual spatiotemporal relations hold only at the "macroscopic" level, then not even the actual world is spatiotemporally unified: the "microscopic" parts of actuality stand in no spatiotemporal relations to anything, just as quarks stand in no relations of chemical bonding. Lewis's analysis, by requiring that worlds be spatiotemporally unified, in effect rules out the physicist's speculation *a priori*. That's not right. Any possibility for actuality must find a place in logical space. Lewis's conception of logical space, then, is too narrow.[15]

IV

In the analysis of world, the family $\mathcal{F}$ must contain natural external relations that are not spatiotemporal. But which ones? It would be arbitrary, I think, to include some while excluding others. I propose, then, that we take $\mathcal{F}$ to contain *all* natural external relations: worlds are maximal *externally* unified regions of logical space; all and only worldmates are *externally* related. Worlds are *absolutely isolated* in this sense: no part of one is (directly or indirectly) externally related to any part of another. Lewis considers this proposal, but then rejects it (tentatively) for a reason I find unconvincing. In what follows, I will first present and respond to Lewis's objection, and then, more briefly, to five other objections that naturally come to mind.

Lewis bases his objection on the case of *relational charge*. Suppose, as can be argued on physical grounds, that the charge properties, such as having-unit-positive-charge, and having-unit-negative-charge, are not intrinsic.[16] Suppose instead that there are natural external relations of like-chargedness, and opposite-chargedness (and, perhaps, of all ratios of chargedness); all the facts about charge supervene on the holding or failing to hold of these relations. If this is the case, a charged particle and its anti-matter twin – say, an electron and a positron – may be intrinsically exactly alike; they differ relationally, however, in that whenever one is like-charged a given particle, the other is opposite-charged that same particle.

Now, the case of relational charge, Lewis thinks, makes trouble for the absolute isolation of worlds. He writes: "Could two particles in different worlds stand in these external relations of like- and opposite-chargedness? So it seems, offhand; and if so, then the

[proposal] fails."[17] But this offhand judgment can, and should, be resisted. It is a holdover, I suspect, from the (more customary) view that charge is intrinsic. On that view, of course, transworld comparisons of charge are always meaningful. But on the view that charge is relational, it is unnecessary and gratuitous to suppose that transworld comparisons of charge are always meaningful, or that the fundamental charge relations ever link world to world. The actual distribution of charge, and the laws it obeys, are determined by *intraworld* relations of charge at the actual world; the possible distributions of charge, and the possible laws, are determined by *intraworld* relations at other possible worlds. Wherefore the supposition of *transworld* relations of like- and opposite-chargedness?

Might transworld relations of charge be needed to *individuate* possibilities, to avoid conflating possibilities that, intuitively, are distinct? Consider these possibilities. It is possible that the world be just as it is except for the addition of a single electron; or, it is possible that the world be just as it is except for the addition of a single positron. Surely, these possibilities are distinct. But the objector asks, on the relational account of charge, what could distinguish them other than the fact that, according to the first possibility, there is an extra particle *like*-charged actual electrons, whereas, according to the second possibility, there is an extra particle *opposite*-charged actual electrons?

The possibilities are distinct, all right, but no transworld external relations of charge are needed to distinguish them. At worlds where the possibilities are realized, there are particles that are *counterparts* to our actual electrons, particles that play the same role vis-à-vis their world as the electrons play vis-à-vis ours. This determination of counterparts rests upon global comparisons of similarity; it requires only the holding of internal, not external, relations between worlds. The two possibilities can then be distinguished as follows: one is realized at worlds containing some particle that is not a counterpart of any actual particle, and that is *like*-charged its worldmates that are counterparts of actual electrons; the other is realized at worlds containing some particle that is not a counterpart of any actual particle, and is *opposite*-charged its worldmates that are counterparts of actual electrons. Only *intra*world relations of like- and opposite-chargedness ever come into it.

But the objector persists, consider these possibilities. It is possible that nothing exists but a single electron; or, it is possible that nothing exists but a single positron. If these possibilities are distinct, the objector continues, they can only be distinguished by transworld external relations of charge. But the relational account of charge, as I understand it, can and should deny that these possibilities are distinct. After all, a world realizing the first possibility and a world realizing the second are exact qualitative duplicates. What independent grounds could there be for distinguishing them?

I can think of one other way of arguing for transworld external charge relations. Consider the following plausible principle: if some natural relation, or family of natural relations, has some general structural feature at every world, then it has that feature *simpliciter*. For example, if some natural relation is necessarily symmetric, is always symmetric between worldmates, and if (contrary to my view) it holds also between non-worldmates, then it is always symmetric between non-worldmates. For, if the necessary symmetry does not (somehow) come from the nature of the relation, whence does it come? To deny the principle would be to impose arbitrary necessities not grounded in the natures of things. Now, the relevant structural feature of the family of external charge relations is this. At any world, the charge relations are universal over their field of application: if *a* stands in some charge relation to something, and *b* stands in some charge relation to something, then *a* stands in some charge relation to *b*. But then, the argument goes, taking *a* and *b* to be charged particles in different worlds with relational charge, the principle demands that there be some transworld external charge relation between *a* and *b*.

I do not dispute the principle, but I reject the argument. I deny that at every world, the family of external charge relations is universal over its field of application. Perhaps that holds at the actual world. But then it holds contingently, as a matter of physical law. I accept a principle of recombination for relations: any natural relation, or family of natural relations, can be instantiated in any pattern whatsoever.[18] Thus, at some worlds, two things stand in charge relations to other things, but not to one another. The argument never gets off the ground.

I know of no other argument that supports transworld external relations of charge. They can be rejected, I think, with impunity.

But there are other objections to the view that worlds are absolutely isolated. I will briefly consider five. The first three are easily dealt with; the last two are potentially more serious.

Objection. According to realists, we are related to other worlds by our thoughts, for example, whenever we contemplate what might have been. Then, with us as intermediaries, these other worlds are linked by a unifying chain. They are not absolutely isolated.

Reply. Our thoughts relate us to other worlds, all right, but not by way of any natural external relation. Rather, our mental representations, which are part of the actual world, stand in relations of similarity to the worlds they represent, and these similarity relations, being internal, are no threat to absolute isolation. In short, we are related to other worlds, not by any sort of acquaintance, but only by description.

Objection. There is no such thing as absolute isolation: any two things stand in the external relation of non-identity. Every plurality, then, is unified by external relations.[19]

Reply. Indeed, non-identity comes out external according to the definition.[20] But non-identity is not a natural relation; it does not make for *qualitative* similarity.[21] If it did, then every composite individual would be qualitatively similar to every other composite individual in virtue of being composed of non-identical parts, which is absurd. Moreover, for any natural relation, there are worlds at which distinct things fail to stand in that relation, which is absurd when applied to non-identity. Finally, for any natural property or relation, the negation of that property or relation is not natural: its instances are too miscellaneous to make for qualitative similarity. But identity and non-identity would have an equal claim on being natural, which disqualifies them both. Identity and non-identity are properly classified as *logical* relations; they are not qualitative, much less (perfectly) natural.[22]

Objection. There is no such thing as absolute isolation if mereological composition is unrestricted. For then parts of different worlds are always unified by the transworld fusions that include them.

Reply. This objection can be handled along the same lines as the preceding. The relation of part to whole, though external, is not natural; mereological relations, no less than identity and non-identity,

are properly classified as logical. As such, they have no power to unify. In particular, a transworld fusion cannot serve as a unifying intermediate link between its worldbound parts: any such link would have to be wholly distinct from the parts that it unifies, which the fusion is not.

Objection. There can be no absolute isolation if class formation is unrestricted. For then parts of different worlds are always unified by the transworld classes of which they are members.

Reply. I grant that classes, as ordinarily conceived, make trouble for the absolute isolation of worlds. Classes are wholly distinct from their members. Transworld classes, then, unlike transworld sums, seem able to serve as intermediate links in a unifying chain. Can we say that the membership relation, though external, is not natural? Indeed, membership imposes necessary connections that violate principles of recombination for natural relations. But if membership is not natural, what is it? Unlike part-whole, it does not seem to be properly classified as logical. There doesn't seem to be anything coherent for it to be!

I see two options. The more radical option is to reject classes outright. This option carries with it the substantial burden of showing how essential uses of classes – for example, in semantics – can be accomplished by other means.[23]

A more conservative option is to invoke Lewis's mereological theory of classes: a class is the fusion of the singletons of its members; the singleton relation, not membership, is (perfectly) natural.[24] On this option, the objection involving transworld classes can be assimilated to the objection involving transworld sums. Parts of different worlds are, indeed, linked to their singletons; no problem there, the singletons are confined each to their own world. Are the singletons linked to one another? No; the singletons are no more linked to one another by way of the transworld set that includes them, then the parts are linked to one another by way of their transworld sum. There is no unifying chain from world to world. But there is a catch. For this reply to work, the transworld sets cannot themselves have singletons. I don't think such singletons will be much missed. Within each world, the entire set-theoretic hierarchy can be constructed.

Objection. Universals unify their instances. If the instantiation relation is the relation of whole to part, then universals unify by overlap. If the instantiation relation is some non-mereological external relation, then universals are an intermediate link in a unifying chain. Either way, parts of different worlds are not absolutely isolated when they instantiate the same universal.

Reply. I grant that universals make trouble for the absolute isolation of worlds. But I would argue, universals are to be rejected on independent grounds. I lean, instead, towards a theory of tropes. When parts of different worlds instantiate the same natural property, each world has as a part its own particular trope. These tropes are duplicates of one another; they are internally related. There is no threat to absolute isolation.

V

The view that worlds may be unified by non-spatiotemporal relations, I have argued, is needed to allow for the possibility that spacetime isn't fundamental. There *appears* to be a second advantage to the view. Consider the following question. Is it possible that physical reality divides into two or more spatiotemporally isolated parts, into so-called "island universes"? I join a chorus of others in answering "yes."[25] Perhaps we could never have good reason to believe we inhabited one such island among many; but it is possible nonetheless. Lewis's criterion of demarcation, however, leads him to reject the possibility: all worlds are spatiotemporally unified; so no world divides into spatiotemporally isolated parts; assuming the standard analysis of possibility as truth at some world, it follows that spatiotemporally isolated island universes are impossible. The criterion of demarcation I am defending, on the other hand, allows the possibility to be easily accommodated. If worlds may be unified by non-spatiotemporal relations, there is nothing to exclude a world that divides into parts, each spatiotemporally unified, but each spatiotemporally isolated from the others, a world with island universes.

This advantage for my view, however, is more apparent then real. Arguments that support the possibility of *spatiotemporally* isolated parts often support with equal force the possibility of *absolutely* isolated parts. The view that worlds are externally unified does no

better at accommodating the latter possibility than the view that worlds are spatiotemporally unified does at accommodating the former. The problem of absolutely isolated island universes is still with us. Should we, then, seek some further broadening of the criterion of demarcation for worlds, one that gives up on the idea that worlds are, in any sense, unified? I think not. The best solution to the problem of island universes lies elsewhere.[26,27]

NOTES

[1] On Lewis's brand of realism, there is no absolute actuality: the actual world and the merely possible worlds are ontologically all on a par. I find that implausible, perhaps even incoherent. I would argue, *contra* Lewis, that realism with absolute actuality is a viable alternative. The fullest presentation and defense of Lewis's realism is in Lewis (1986), *passim*.

[2] I use 'world' and 'possible world' interchangeably; for the realist (excepting a few deviants), there are no "impossible worlds." I use 'exist' without restriction to cover everything "real," with any sort of "being."

[3] I assume familiarity with mereology, the theory of part and whole. In particular, I assume unrestricted mereological composition: for any things whatsoever, there is a (mereological) *sum*, or *fusion*, of those things, the least inclusive thing that includes each of those things as a part.

[4] In the section entitled "Isolation" in Lewis (1986), pp. 69–81.

[5] This follows from Lewis's claim that the unifying relations are "pervasive." See Lewis (1986), p. 76.

[6] See Bricker (1993). I argue that if Einsteinian relativity is true (on its most natural interpretation), then we live in a locally unified world. Such worlds had better be possible!

[7] Actually, Lewis holds that worlds may also be unified by what he calls *analogically* spatiotemporal relations – relations appropriately analogous to the actual spatiotemporal relations. Since this complication won't matter for what follows, I will simply use 'spatiotemporal' broadly so as to include what Lewis calls "analogically spatiotemporal." See Lewis (1986), pp. 74–6.

[8] In this paragraph and the next, I more or less follow Lewis (1986), pp. 59–63.

[9] More precisely, say that a(n) (ordered) pair $\langle a, b \rangle$ and a(n) (ordered) pair $\langle c, d \rangle$ are *internal duplicates* iff a is a duplicate of c and b is a duplicate of d; *external duplicates* iff, in addition, the composite of any similarity map from a to c and any similarity map from b to d induces a similarity map from the fusion of a and b to the fusion of c and d. Then, an *internal* (dyadic) relation is one, the holding of which never differs between pairs that are internal duplicates; an *external* (dyadic) relation is one that is not internal, but the holding of which never differs between pairs that are external duplicates. (Analogously for relations of three or more places.)

[10] *Proof.* Let W and V be two worlds, two maximal $\mathcal{F}$-connected parts of logical space; and suppose, for a *reductio*, that W is not $\mathcal{F}$-isolated from V. *Claim*: $W + V$ (the sum of W and V) is $\mathcal{F}$-connected, violating the maximality of W or of V. For

consider any Z and Y such that $Z + Y = W + V$. There are two cases (by mereology). (1) W and/or V overlaps both Z and Y; then Z is not $\mathcal{F}$-isolated from Y owing to the $\mathcal{F}$-connectedness of W and/or V. (2) $W = Z$ and $V = Y$ or $W = Y$ and $V = Z$; then Z is not $\mathcal{F}$-isolated from Y since, by assumption, W is not $\mathcal{F}$-isolated from V. Therefore, in all cases, Z is not $\mathcal{F}$-isolated from Y, and $W + V$ is not the sum of two $\mathcal{F}$-isolated parts; that is, $W + V$ is $\mathcal{F}$-connected, as was to be shown.

[11] Topologically speaking, two regions are *adjacent* iff they are non-overlapping, but one contains a boundary point of the other. (For example, on the real line, the open interval (0, 1) is adjacent to the closed interval [1, 2], but not to the open interval (1, 2).) Only worlds with topological structure can be locally unified.

[12] In Bricker (1993), I argue that distance relations are extrinsic, rather than external, at (some) worlds with continuous spacetime.

[13] See Lewis (1986), p. 70. On p. 76, Lewis allows that some exceptional parts of an $\mathcal{F}$-interrelated world may be indirectly linked by a chain of relations from $\mathcal{F}$, rather than directly linked by a single relation from $\mathcal{F}$. Worlds, then, may be *almost* globally $\mathcal{F}$-unified, but still not locally $\mathcal{F}$-unified.

[14] Lewis (1986), p. 71. I henceforth speak only of unification; the difference between interrelatedness and unification plays no role in what follows.

[15] For an early discussion of the possibility that space and time are not fundamental, and further references, see Smart (1963), pp. 44–6.

[16] Symmetries at the actual world suggest that charge and handedness are coordinate: either both or neither are intrinsic. But handedness is not intrinsic. For example, a right-handed glove can be superimposed upon a left-handed glove by taking a trip through higher-dimensional space.

[17] Lewis (1986), pp. 77–8. Lewis says no more: the amplifications considered below are not his.

[18] Roughly speaking. For some discussion and supporting argument, see Armstrong (1989), pp. 84–6.

[19] Lewis mentions this objection, but does not endorse it. See Lewis (1986), p. 77.

[20] Let a and b be two duplicates. Then, the ordered pairs $<a, a>$ and $<a, b>$ are internal duplicates, but only the latter is a non-identity pair. So, non-identity is not internal. Let the ordered pairs $<c, d>$ and $<e, f>$ be external duplicates. Then there is a one-to-one correspondence taking c to e and d to f which is impossible unless both pairs, or neither, are non-identity pairs. So, nonidentity is external.

[21] Warning: there is a broader sense of 'natural' afoot that is not tied to qualitative character; it applies also to "fundamental" logical (or mathematical) properties and relations. The broader notion is needed to help resolve indeterminacy of the content of thought. See Lewis (1983), pp. 373–7.

[22] The failure to distinguish between qualitative relations, which can unify their instances, and non-qualitative relations like non-identity, which cannot, appears to be behind the idealist doctrine that there is unity in every plurality. See, for example, Bradley (1893), pp. 140–3 on the unity of the Absolute.

[23] What about uses of classes in mathematics? As I see it, the "pure" sets needed for mathematics are not as problematic as the "impure" classes, classes with parts of worlds as their members (or members' members, etc.) Necessary connections are at home in the realm of mathematics. Perhaps only the "impure" classes need to go.

[24] See Lewis (1991).

[25] I give my arguments in Bricker (forthcoming). See also Armstrong (1989).
[26] In Bricker (forthcoming), I argue that the problem of island universes, and a number of others, can best be solved by emending the standard analysis of modality: modal operators are *plural*, rather than *individual*, quantifiers over possible worlds; to be possible is to be true at some world, *or some worlds*.
[27] Portions of this paper were presented in talks at Princeton University and at the University of Massachusetts, Amherst. Thanks especially to David Lewis for helpful comments.

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