Intrinsic Properties

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An intrinsic property, as David Lewis puts it, is a property "which things have in virtue of the way they themselves are", as opposed to an *extrinsic* property, which things have "in virtue of their relations or lack of relations to other things".[1] **Having long hair** is an intrinsic property; **having a long-haired brother** is not. Intuitive as this notion is (and valuable in doing philosophy, I might add), it seems to resist analysis. Analysis, that is, to "quasi-logical" notions such as necessity, spatiotemporal location: using stronger tools, Lewis has given an analysis of intrinsicality that I take to be roughly correct. Lewis initially described intrinsic properties in his 1983 paper "Extrinsic Properties" as follows:[2]

> If something has an intrinsic property then so does any perfect duplicate of that thing…

Later, in *On the Plurality of Worlds*, he elaborated:

> …two things are *duplicates* iff (1) they have exactly the same perfectly natural properties, and (2) their parts can be put into correspondence in such a way that corresponding parts have exactly the same perfectly natural properties, and stand in the same perfectly natural relations… an *intrinsic* property is one that can never differ between two duplicates.[3]

In giving these definitions, Lewis is assuming certain of his controversial views (although the definitions may be reformulated for other frameworks). The first is his modal realism; the import of this is that the "two duplicates" mentioned at the end of the quotation may be non-actual objects, and they may come from different possible worlds. Moreover, they are assumed to be world-bound objects, and thus have their properties absolutely, and not relative to a world. Finally, Lewis assumes the metaphysics of temporal parts; the import of this is that he does not take property instantiation as being relative to a time; thus, a property that we might ordinarily ascribe to a continuant *at* a certain time will, for Lewis, be a property of a time-slice of such an object. For

[1] Lewis (1986, 61).
[2] Lewis (1983, 197)
[3] Lewis (1986, 61–62).

the moment, I will follow Lewis in making these assumptions; thus, Lewis's definition of 'intrinsic' may be stated as follows:

> (I) Property P is intrinsic iff for any possible objects x and y, if x and y are duplicates then x has P iff y has P

Thus, Lewis defines 'intrinsic' in terms of 'duplicate', and 'duplicate' in terms of 'perfectly natural'. As for 'perfectly natural', Lewis is neutral as to whether it is to be taken as primitive, or analyzed in terms of some other strong extra-logical primitive notion, such as that of an immanent universal, that of a trope, or some complex concept of similarity.[4]

I aim to defend this project.[5] I think that (I) is a successful analysis of an important notion of intrinsicality, and moreover, that Lewis's use of the strong primitive of naturalness (or one of the other strong, extra-logical primitives) is no accident, for analyses in terms of weaker notions invariably fail. In section 1 I single out the target notion of intrinsicality, and then in section 2 I defend (I) as an analysis of that notion against objections due to J. Michael Dunn. Finally, I criticize other analyses of intrinsicality and related notions; in particular, I claim that no analysis of these concepts that proceeds purely in terms of "quasi-logical" notions is possible. (In doing so I will argue that there is no quasi-logical analysis of Lewis's notion of a perfectly natural property.) Thus, Lewis's use of the strong primitive notion of a natural property will be vindicated.

1. Conceptions of Intrinsicality

Even putting the question of *defining* 'intrinsic' to the side for the moment, there are different rough intuitive guides for distinguishing intrinsic from extrinsic properties. Dunn usefully distinguishes between the "metaphysical" and "syntactical" criteria:[6]

> Metaphysically, an intrinsic property of an object is a property that the object has by virtue of itself, depending on no other thing… Another common way of characterizing the intrinsic properties of an object (let us call it "the syntactical criterion") is to say that they are non-relational.

[4] See Lewis (1986, 59–69).

[5] I have a minor quarrel with Lewis's definition of 'duplicate'—see my Sider (1993, section 3.2). Lewis's approach to naturalness, intrinsicality, and duplication is of course separable from his modal realism, counterpart theory, and other metaphysical views.

[6] Dunn (1990, 178)

(I would prefer to restate the metaphysical criterion as saying that a property is intrinsic iff **whenever it is instantiated**, it is instantiated just by virtue of that object (I revise this further below), for a green object seems to have the property **being green or being 10 feet from some red thing** by virtue of itself.) According to Dunn, these two criteria do not always agree because of the possibility of "a relation that an item *a* has to an item *b*, but which depends in some sense on only *a* itself…" Dunn's example is a non-Humean notion of causality; he quotes Kripke as follows:[7]

> Indeed to say that *a* by itself is a sufficient cause of *b* is to say that had the rest of the universe been removed *a* still would have produced *b*.

The property **causing *b***, then, counts as extrinsic according to the syntactical criterion, for it seems relational, but, according to Dunn, a non-Humean about causation would want to say that *a* has the property of **causing *b*** "purely by virtue of itself", and so would classify the property as being intrinsic according to the metaphysical criteria.

I join Dunn in distinguishing these two criteria, but I think it is important to reject his example, because it is based on a misunderstanding of the metaphysical criterion. When we say that an object has an intrinsic property "by virtue of itself", this is intended to have strong modal force. Suppose that my father is extremely dignified. Because of his stern demeanor, he has the property of **being respected by me**. In a sense, this is in virtue of himself, since he is so dignified. But of course, it is only because of certain facts about me as well that his dignity inspires my respect. It would be possible for him to remain as dignified as he in fact is and have me disrespect him. Even if there is a psychological law of nature that necessitates my respect as a result of his dignity, we do not take this implication to be metaphysically necessary. Analogous things are true in the case of non-Humean causation. In *some* sense, *a* may cause *b* purely because of *a*, but this is not the sense relevant to the metaphysical criterion, roughly because the non-Humean will not claim that it would be metaphysically impossible for *a* to occur without causing *b*. More likely the claim is that particular cases of causation are independent of the laws of nature, or (as the quotation from Kripke suggests) independent of the existence of other objects.

The argument at the end of the previous paragraph requires qualification. I argued that **causing *b*** is extrinsic according to the metaphysical criterion

[7] Dunn (1990, 179).

because despite the fact that *a* has this property, it would be metaphysically possible for *a* to lack it. But this assumes that an accidental property of an object can't be intrinsic according to the metaphysical criterion, and we don't want that. The property of having some specified mass should turn out intrinsic on any sense of the term, but mass properties are typically accidental to objects that instantiate them. The proper way to apply the metaphysical criterion that makes its modal force plain, but does not conflate intrinsic properties with accidental properties, is as follows. Since i) *a* in fact causes *b*, but ii) it would be metaphysically possible for some event *exactly like a* to occur but fail to cause *b*, it follows that **causing *b*** fails the metaphysical criterion. In other words, we simply apply (I)—(I) correctly clarifies the intuition behind the traditional metaphysical criterion.

My reason for wanting to distinguish the metaphysical and syntactic criteria is different from Dunn's, and involves "haecceities", or "identity properties"; that is, properties like **being identical to Ted**. These properties seem non-relational, and hence intrinsic according to the syntactic criterion, at least on a sense of 'relational' that may be elaborated as 'involving relations to other things'.[8] But according to the metaphysical criterion (read as (I)), identity properties are extrinsic for they may differ between duplicates.

Some might urge the case of identity properties as a counterexample against (I), claiming that **being identical to Ted** ought to turn out intrinsic. As I see it, we have a notion of the *qualitative* intrinsic properties, which are had in virtue of the *way* objects are, and on this conception identity properties are *not* intrinsic. But I am willing to agree with G.E. Moore that there is *also* a non-qualitative sense of 'intrinsic':[9]

> It is obvious that there is a sense in which when two things are exactly alike, they must be 'intrinsically different' and have different intrinsic properties, merely because they are two…the mere fact that they are numerically different does in a sense constitute an intrinsic difference between them, and each will have at least one intrinsic property which the other has not got—namely that of being identical with itself.

We simply have two different notions of intrinsicality, one qualitative and the other non-qualitative; since (I) is intended as an explication of the former, there

[8] In Lewis's framework, '**being Ted**' might denote either the property had only by the world-bound individual Ted, or might denote the property had by all and only Ted's counterparts. Here I primarily have in mind the former.

[9] Moore (1922, 262).

is no counterexample.

This strategy for dealing with a putative counterexample must be employed with care.[10] If I offer an analysis of moral permissibility that goes awry in the case of promise-keeping, it would be lame to say "I am merely analyzing non-promise-keeping morality". But the present case differs in important ways. The notion of intrinsic properties up for analysis is to a large extent a philosopher's notion. Granted, the term 'intrinsic' is one of everyday use, but not in the sense that contemporary metaphysicians use it. In everyday speech 'intrinsic' is usually used as a part of constructions of the form 'intrinsically F' or 'intrinsic to' as in 'Politicians are intrinsically dishonest' or 'Dishonesty is intrinsic to the profession of politics'. In these constructions 'intrinsic' appears to mean something different than "had in virtue of the way an object is considered in itself". (It often appears to mean something like 'essentially', where the modality in question is of some contextually restricted sort.) So unlike the imagined account of moral permissibility, (I) is not intended as an analysis of an everyday notion. The situation is rather as follows. In their theorizing philosophers often find themselves needing to appeal to a certain distinction, which can without violence to English be called a distinction between "intrinsic" and "extrinsic" properties. What is needed is a relatively precise philosophical notion that can do the work that these philosophers need.

This does not mean that an analysis of intrinsicality has no constraints. The notion of a secondary quality, like the notion of an intrinsic property, is to some extent a technical philosopher's notion. But suppose I defend my analysis of secondary qualities, which has the consequence that only colors are secondary qualities, by saying that it is merely intended as an analysis of the *chromatic* secondary qualities; this would be as lame as the imagined defense of the defective moral theory.[11] (I) must provide a conception of intrinsicality that i) can do the work we require of it, and ii) fits the intuitive gloss we use to pick out intrinsicality in the first place (else why would it count as an analysis of *intrinsicality*?).

What (I) has to say about identity properties doesn't seem to stand in the way of its satisfying i), since all the applications of the notion of intrinsicality I've come across seem to be applications for qualitative intrinsicality only. An example from the philosophy of mind: individualism, the doctrine that is supposed to be refuted by Twin Earth examples and by Tyler Burge's case of

[10] I thank an anonymous referee for helpful criticism here.

[11] This example is due to an anonymous referee.

arthritis and tharthritis, is naturally construed as the doctrine that what one believes is determined by one's intrinsic properties—persons with exactly the same intrinsic properties must have the same beliefs.[12] If identity properties were intrinsic, Individualism wouldn't be refuted by Twin Earth examples, for those examples typically involve two distinct persons (a person and his Twin), and the only person that would have the same intrinsic properties as a given person would be that very person.[13] And even if there were some philosophical application requiring a broader notion of intrinsicality I suppose we could simply introduce a disjunctive notion—a property is intrinsic in the broader sense iff it is intrinsic as defined by (I) or it is an identity property—for I can think of no properties other than identity properties that might be thought to count as non-qualitative intrinsic properties.

Constraint ii) says that (I) must fit the intuitive glosses we use to introduce the notion of intrinsicality. Since the intuitive glosses of 'intrinsic' are capable of both qualitative and non-qualitative interpretations, it is permissible to reproduce this split at the theoretical level. For example, philosophers sometimes use the following interchangeably:

> An intrinsic property is one that is had by an object solely in virtue of that object itself.
>
> An intrinsic property is one that is had by an object solely in virtue of *the way that object is* considered in itself.

I suspect that the second forces a qualitative reading whereas the first does not. Philosophers also use the following gloss:

> An intrinsic property is one that is non-relational

which seems to allow identity properties as being intrinsic, but the examples used to convey the idea of a relational property are typically qualitative relational properties (e.g. being five feet away from some other object), which suggests that those who offer this gloss aren't even thinking of non-qualitative properties.

[12] See Burge (1979); Putnam (1975*a*).

[13] A qualification: if an object can inhabit more than one possible world, then Twin Earth examples in which the Twin Earth was not in the same possible world as the actual earth, but was rather in another possible world containing the same individual would refute this version of individualism. But Twin Earth examples are usually taken to take place within a single possible world.

This is also suggested by the fact that philosophers interested in intrinsic properties often discuss examples of two objects having the same intrinsic properties (like in the case of individualism), which would be impossible if identity properties were intrinsic.

For the remainder of this paper I will focus on qualitative intrinsicality, and interpret (I) as an explication of that notion. I turn next to Dunn's criticisms of (I).

2. Dunn's Criticisms of Lewis

2.1 Dunn's Formulation of Lewis's View

Dunn bases his construal of Lewis's theory solely on the brief presentation in Lewis's "Extrinsic Properties"—the quotation Dunn works with is:[14]

> if something has an intrinsic property, then so does any perfect duplicate of that thing.

Let ϕx be any formula with free occurrences of at most one variable 'x'; Dunn interprets Lewis as claiming that ϕx is a "formula of a kind to determine an intrinsic property" iff the following statement is true:[15]

(IPD) $\forall x \forall y[\phi y \rightarrow (x \approx y \rightarrow \phi x)]$ (Indiscernibility of Perfect Duplicates)

where '$\approx$' stands for 'is a perfect duplicate of' and ϕy is the result of substituting 'y' for all free occurrences of 'x' in ϕx. It is clear that Dunn does not intend the quantifiers here to be possibilist; he does not state his definitions in Lewis's modal realist framework.[16] The theory applied to properties (as opposed to

[14] Lewis (1983, 197), quoted in Dunn (1990, 184).

[15] Actually, Dunn officially formulates (IPD) in Dunn (1987, 184) as:

(IPD*) $\phi a \rightarrow (x \approx a \rightarrow \phi x)$

where 'a' is a name, and ϕa is the result of substituting 'a' for all free occurrences of 'x' in ϕx. (IPD) seems more natural since presumably the intent is that ϕx is of a kind to determine an intrinsic property if (IPD*) holds regardless of what 'a' denotes. In an earlier paper (Dunn, 1987, p. 361, formula (7A)), Dunn formulates his analog to Lewis's definition along the lines of (IPD), not (IPD*).

[16] His Socrates example that I consider below makes this clear.

formulas), presumably, is that property P is intrinsic iff every (some?) formula that expresses P is of a kind to determine an intrinsic property.[17]

This is schematic until the interpretation of the arrows in (IPD) is specified. According to Dunn, they are best interpreted in the sense of relevance logic, for if the conditionals are either strict or material then, he argues, the theory yields unacceptable results:[18]

> …it seems that if the "arrow" in (IPD) is the material conditional, then the definition allows that Socrates being wise is an intrinsic property of Reagan… Even if one employs strict implication, Socrates being wise or not wise ends up as an intrinsic property of Reagan.

Since there are two arrows in (IPD), we may take the first suggestion to be to take each arrow as a material conditional. Dunn seems correct in his objection to this interpretation, since the sentence:

(1) $\forall x \forall y [Fa \supset (x \approx y \supset Fa)]$

is a theorem of predicate logic. Evaluating the second suggestion is more problematic. Again, I suppose the suggestion is to interpret each arrow as a strict conditional. That is, (IPD) is to be interpreted as:

(IPD′) $\forall x \forall y [\phi y \Rightarrow (x \approx y \Rightarrow \phi x)]$

where $\ulcorner \alpha \Rightarrow \beta \urcorner$ is definitionally equivalent to $\ulcorner \Box(\alpha \supset \beta) \urcorner$. I will consider Dunn's objection below, but there is more pressing business: the theory is utterly implausible for reasons other than those Dunn considers, for if (IPD) is interpreted as (IPD′) then almost none of the properties one ordinarily thinks of as intrinsic will be correctly categorized as such. The property **roundness**, for example, turns out intrinsic only if the following sentence is true (where the predicate 'R' expresses **roundness**):

(2) $\forall x \forall y [Ry \Rightarrow (x \approx y \Rightarrow Rx)]$

[17] This raises various questions (e.g. what about properties for which we have no predicates?), but let us set them aside—what I have to say will not depend on this.

[18] Dunn (1990, 184–5).

But (2) is clearly false. Let y be a certain actual round tennis ball, and x be another actual tennis ball. It is clearly possible that there be a world w, in which neither y nor x is round, but in which x and y are perfect duplicates, and so (2) is false.[19] Clearly, we could repeat this procedure for most properties commonly thought to be intrinsic, for these properties are typically accidental to their possessors.

There seems to be no way to acceptably weaken (IPD′). We could change either the first or the second '$\Rightarrow$' to a '$\supset$':

(IPD″) $\forall x \forall y [\phi y \Rightarrow (x \approx y \supset \phi x)]$

(IPD‴) $\forall x \forall y [\phi y \supset (x \approx y \Rightarrow \phi x)]$

but neither is acceptable. (IPD″) does no better than taking both conditionals in (IPD) to be material—**being such that Socrates is wise** comes out intrinsic, for the instance of (IPD″) in this case is:

$$\forall x \forall y [Fa \Rightarrow (x \approx y \supset Fa)]$$

that is,

$$\forall x \forall y \Box [Fa \supset (x \approx y \supset Fa)]$$

which is a theorem of modal predicate logic. The problem with (IPD‴) is the same as the problem with (IPD′)—almost no properties turn out intrinsic. Consider, for example, the instance of (IPD‴) when we let ϕy be 'Ry', with 'R' interpreted as meaning "is round":

$$\forall x \forall y [Ry \supset (x \approx y \Rightarrow Rx)]$$

This sentence turns out false for essentially the same reasons that (2) turned out false above. Even if y is in fact round, x's being a duplicate of y does not entail that x is round, since x could be a duplicate of y in a world in which y is not round.

Dunn's interpretation of Lewis along the lines of (IPD) using strict conditionals is a mistake—all possibilities for what Dunn could have had in mind are in trouble for reasons that Dunn never considers. The source of this mistake is, I think that Dunn has missed the fact that by the phrase "any duplicate" Lewis means "any *possible* duplicate", as I have made clear in my formulation of (I).

[19] I assume a total accessibility relation.

The import of this is to allow comparisons of duplicates from different possible worlds, not merely pairs of duplicates in the same possible world. Allowing pairs of duplicates from different worlds solves the **being such that Socrates is wise** problem, for this property will differ between a pair of duplicates, only one of which lives in a world where Socrates is wise.[20] It is perhaps not entirely Dunn's fault that he interpreted Lewis in this way, for as I said, Dunn obtains his interpretation, the schematic (IPD), from a quotation from Lewis's short paper "Extrinsic Properties", and in that paper Lewis isn't clear that the quantifier "any duplicate" is possibilist.[21] This issue is much clearer in the more thorough treatment in *On the Plurality of Worlds*, which Dunn did not consider.

(I), rather than any of Dunn's interpretations, is a theory worth defending. Fortunately, Dunn's major objections carry over to (I); let us see how they fare.

2.2 Dunn's First Objection

As quoted above, Dunn says: "Even if one employs strict implication, [**being such that Socrates is wise or not wise**] ends up as an intrinsic property of Reagan".[22] Dunn was thinking of an interpretation of (IPD) with strict conditionals, but the point applies to (I) just as well. In general, if N is a necessary truth, then **being such that N** will be an intrinsic property, according to (I). Still more generally, (I) entails the following:

> (L) Every necessary or impossible property is intrinsic, and if P and Q are necessarily coextensive properties, then either both or neither are intrinsic.

But I do not find (L) objectionable, at least for the notion of intrinsicality with which I am concerned. I grant that there may be other notions of intrinsicality, and maybe (L) would be objectionable for those notions. For example, some syntactic notions of intrinsicality might count **being such that Socrates is either wise or not wise** as intrinsic because of the presence of 'Socrates' in

[20] Lewis would say "a world where a counterpart of Socrates is wise". In the example in the text I assumed that '**being such that Socrates is wise**' is to be interpreted in terms of counterparts. If not, then it refers to a property had by every possible object (since Socrates is in fact wise), and hence turns out intrinsic according to (I). But this consequence is acceptable—see section 2.3.

[21] Dunn quotes this on p. 184 of Dunn (1990); the quotation is from Lewis (1983, 197).

[22] Dunn (1990, 185).

this name for the property. But I do not grant that there is but one single notion of intrinsicality that we all have before our minds, of which (L) is false.

As I argued above, 'intrinsic' is partially a term of art. Everyday use and the notion's intended theoretical application provide some non-negotiable constraints on how any notion deserving the name must behave. On any construal of intrinsicality, shape properties like **being a perfect sphere** should turn out intrinsic; on any construal, properties like **being within 10 feet of a perfect sphere** should not turn out intrinsic. On any construal, when a thing gains or loses intrinsic properties, this should, intuitively, count as a *change* in the thing. (I) meets these and other constraints. And while (I) entails (L), this doesn't seem to stand in the way of any of the standard applications of the notion of intrinsicality, nor does it commit us to any violation of a non-negotiable intuitive constraint.

While there is some intuitive resistance to admitting that **being such that Socrates is either wise or not wise** is intrinsic, I don't think everyday use is univocal here. Whether an object, x, has this property does not depend in any natural sense on what other objects are like, since this property is necessarily had by every object. The main objection seems to be that the name of the property in question includes reference to a particular individual, Socrates. But this reference to Socrates doesn't imply any dependence on Socrates, since the property is, of necessity, universally instantiated.[23] Moreover, one might reply that properties are individuated by necessary coextension and thus that **being such that Socrates is wise or not wise** is identical to **being either round or not round**; since the latter seems intrinsic, the former is as well. A more cautious version of this reply would defend the legitimacy of *a* notion of properties individuated by necessary coextension, without ruling out other notions of properties. The reply, I think, should be tempered with an admission of the possibility of other notions of intrinsicality based on other notions of properties. (An example: a notion of structured properties on which a property has the structure of its linguistic expression and has constituents corresponding to the referents of terms contained in its expression. On this view, we could say that a property is automatically non-qualitative if it contains a particular object as a constituent. And even on this view there is the need to sort the structurally simple properties into intrinsic and extrinsic; (I) might serve this purpose.)

[23] Some might argue that this property doesn't exist, and therefore isn't instantiated, in worlds where Socrates does not exist. But on this view, the property doesn't turn out intrinsic, for it will differ between objects in our world and duplicates in worlds that don't contain Socrates.

2.3 Dunn's Second Objection

After dismissing the strict conditional interpretation of (IPD), Dunn suggests interpreting the arrows in (IPD) as being those of relevant implication. This blocks both of the problem cases from Dunn that we discussed: neither **being such that Socrates is wise** nor **being such that Socrates is either wise or not wise** turns out intrinsic. This is because of special features of relevance logic that Dunn discusses informally as follows:[24]

> First, the antecedent of a relevant implication is supposed to be a really sufficient condition; it, all by itself, is supposed to be sufficient for the consequent. There should not be the slightest hint of background or ceteris paribus conditions for a true relevant conditional, unlike the case with the Lewis-Stalnaker analysis of the so-called "counterfactual conditional". There should be no suppression of "premisses" merely because they are true…
>
> Second, the consequent of a relevant implication is supposed to depend on the antecedent in a somewhat technical sense, but one that intuitively means that the antecedent can be used in deriving the consequent.

But Dunn has an objection even for this final construal of Lewis's view. Let b be some actual black marble; according to Dunn, the property of **being a perfect duplicate of *b*** turns out intrinsic, for this property corresponds to the formula '$x \approx b$', and the following formula is derivable in relevance logic from the uncontroversial assumption that duplication is an equivalence relation:

(3) $y \approx b \rightarrow (x \approx y \rightarrow x \approx b)$

Dunn finds this consequence objectionable, because the answer to the question of whether a given object a has this property "Clearly…does not depend on a alone, but equally depends on b and its intrinsic properties."[25]

This argument appears to apply equally well to (I). The property **being a perfect duplicate of *b*** can never differ between perfect duplicates, for if a and c are duplicates of each other and one is a duplicate of b, then the other must be a duplicate of b since duplication is an equivalence relation. So I will discuss the argument as an argument against (I). Fortunately, defenders of (I) have nothing to fear from the argument, for the argument equivocates on the term

[24] Dunn (1990, 180–181).
[25] Dunn (1990, 185).

'**being a perfect duplicate of *b***'. This phrase purports to pick out a property, P, by specifying the conditions under which it is instantiated:

(*) Necessarily, for all x, x has P iff x is a perfect duplicate of b

Now here we have a name, 'b', inside the scope of 'Necessarily'—*de re* modal predication. Since Lewis assumes the thesis of worldbound individuals, according to which an object such as b exists in only one possible world, he would evaluate such a statement by looking to the counterparts of b. Thus, we might expect (*) to mean that an object at a world, w, has P iff it is a duplicate of b's counterpart at w. However, there is another possible reading of '**being a perfect duplicate of *b***' that we must attend to; this reading corresponds to (*), but read in such a way that we do not consult whether an object, x, in possible world w, is a duplicate of b's counterpart at w, but rather whether it is a duplicate of b itself, back in the actual world. Thus, the phrase '**being a perfect duplicate of *b***' might be taken to refer to either of the following properties:

P1: the property had by a possible object x iff x and the counterpart of b in x's world are duplicates

P2: the property had by a possible object x iff x and b itself, in the actual world, are duplicates

P1 is probably the most natural interpretation since most English property-denoting terms that contain proper names are naturally interpreted in terms of counterparts (assuming with Lewis, as I am at the moment, that objects are worldbound). What would have happened if Perot had won the election? This is a question about what happens in worlds where counterparts of Perot win. And if we discuss the property of **losing an election to Perot**, we will attribute that property to whoever "Perot beats" in such worlds, despite the fact that it isn't Perot himself that does the beating.

In everyday English, we do not mention the counterparts of Perot. Rather, we discuss what happens to Perot himself in counterfactual situations. We say: Perot might have won. In this counterfactual situation, Perot did win. The counterpart theorist does not deny the truth of these claims, but he does give an analysis of them on which their truth is consistent with Perot himself being present in only one world. This analysis is not given in English, but rather in a language that, we might say, is more literal. In this language, we

mention Perot's counterparts. In this language, it is false to say that Perot himself wins in other possible worlds—rather, only his counterparts do. Let's call this language the "possibilist" language. In the possibilist language, in contrast to English, '**being a duplicate of *b***' refers to P2, since we do not give counterpart-theoretic analyses of phrases in this possibilist language.

Whether '**being a duplicate of *b***' refers to P1 or P2 depends on whether this phrase is taken as a phrase of English, or as a phrase in the possibilist language. Fortunately, we do not have to decide which reading Dunn intended, for the argument is unsound either way. The argument was that (I) has the mistaken consequence that **being a duplicate of *b*** is intrinsic. But (I) does not imply that P1 is intrinsic. Object *b*, recall, is a black marble in the actual world. Consider a world *w* that contains a marble, *c*, that is a duplicate of *b* (that is, *b* itself back in the actual world), and also a white marble, *b'*, that is a counterpart of *b*. First note that *b* has P1, for *b* is a duplicate and counterpart of itself.[26] But *c* does not have P1, for *b*'s counterpart at w, *b'*, is white whereas *c* is black. Thus, P1 differs between duplicates (*b* and *c*) and hence is not intrinsic according to (I).

P2 does turn out intrinsic according to (I). Duplication is symmetric and transitive, so if *a* and c are duplicates of *b*, then they are duplicates of each other. But I see no reason to deny this consequence of (I). The intuition that **being a duplicate of *b*** is intrinsic is due to thinking of this phrase as denoting P1, for it is under this reading that there is something special about *b* that makes a given object have the property. In support of the idea that **being a duplicate of *b*** is extrinsic Dunn says:[27]

> Consider the question of whether a given object *a* is a "perfect duplicate" of an object *b*... Clearly the answer to this question does not depend on *a* alone, but equally depends on *b* and its intrinsic properties.

Dunn does not say what sense of 'depend' he intends here, but if we read it in a natural way, what he says is true only if the property in question is P1 rather than P2. Suppose that *a* and *b* exist in the actual world, and are duplicates. Object *a* has the property **being a perfect duplicate of *b*** regardless of whether we read this phrase as denoting P1 or P2. But now let us ask whether (4) is true:

[26] We may stipulate that *b* has no other counterparts in the actual world.

[27] Dunn 1990 p. 185.

(4) if b were to change color but a remained unchanged, a would no longer have the property **being a perfect duplicate of *b***

(4) expresses the claim that a's having the property **being a perfect duplicate of *b*** counterfactually depends on the color of b—varying the color of b would affect whether a would have this property. In fact, (4) is true if the property in question is P1, but false if the property in question is P2. So if Dunn has in mind counterfactual dependence when he says 'depends', his rejection of the intrinsicality of **being a duplicate of *b*** rests on reading this phrase as denoting P1. I join him in this rejection, but as I have already argued this is consistent with (I). Notice also that an object can have P2 at a world where b has no counterpart; thus, one could say truly (in English, not the possibilist language): "even if b didn't exist, a could still have P2'. This gives us another natural sense in which whether or not a has P2 does not "depend on b and its intrinsic properties".

I have been arguing that the intuition that **being a perfect duplicate of *b*** is extrinsic is due to reading this phrase as denoting P1; thus this intuition does not stand in the way of accepting the consequence of (I) that P2 is intrinsic. I will now go further and argue directly that P2 is intrinsic. Let P be the conjunction of all of b's intrinsic properties (an infinitary conjunction, if b has infinitely many intrinsic properties). Given two principles that I take to be undeniable, it follows that: i) P is intrinsic, and ii) P is necessarily coextensive with P2. (L) then implies that P2 is intrinsic. So, any objection to this reasoning would need to be an objection to (L), and we have already considered (L) in the previous section. The principles are:[28]

(a) The class of intrinsic properties is closed under negation and infinitary conjunction

(b) Two objects are duplicates iff they have exactly the same intrinsic properties

(As a matter of fact, it can be shown that (I) follows from (a), (b), and (L).[29])

[28](a) implies directly that P is intrinsic. Here is a proof that P and P2 are necessarily coextensive; I continue to use the framework of worldbound individuals. First suppose that a possible object, x, has P. By (a), it follows that x and b have exactly the same intrinsic properties (since for every intrinsic property, Q, either Q or Q's negation is a conjunct of P). By (b), x has P2. Conversely, suppose x has P2; x, then, is a duplicate of b. By (b), x has exactly the same intrinsic properties as does b, and so it follows that x has P.

[29]Sider (1993, chapter 4 section 4.1).

So Dunn's argument fails on either reading of '**being a duplicate of *b***'. (I) does not imply that P1 is intrinsic, and while it does imply that P2 is intrinsic, this consequence is correct. It should not be thought that this defense is dependent on the controversial metaphysics of counterpart theory. It was necessary to appeal to this framework only because Lewis presupposes it in offering (I) as his definition. If our framework is a more traditional one, in which objects inhabit more than one world, we would need to restate (I) in terms of property instantiation *at* worlds, and we would need to utilize a four-place world-relative duplication relation "x in w is a duplicate of x' in w'":

> (I′) P is intrinsic iff for any worlds w and w', and any objects x and x', from w and w', respectively: if x in w is a duplicate of x' in w', then x has P in w iff x' has P in w'

The analogs of P1 and P2, in this framework, may be expressed as follows:

> P1′: the property had by object x in world w iff x in w is a duplicate of b in w
>
> P2′: the property had by object x in world w iff x in w is a duplicate of b in @, the actual world

The argument then proceeds as before: (I′) doesn't imply that P1′ is intrinsic; and while it does imply that P2′ is intrinsic, this consequence may be defended along the lines I indicated above. Similar restatements of (I) are possible, which do away with the assumption of temporal parts, and even the quantification over possible individuals and worlds.[30]

3. Quasi-Logical analyses

We have seen that Lewis's definition of 'intrinsic' in terms of 'duplicate' can be defended. But what of 'duplicate'? I would defend the propriety of either taking 'duplicate' as a primitive, or of following Lewis and defining it in terms

[30]To do away with the need for temporal parts, the duplication relation will need to be relativized to times, *viz.* "x at world w at time t is a duplicate of x' at world w' at time t'". The quantification over possibles may be eliminated by using a language whose quantifiers are actualist, but which contains modal and "actuality" operators. To account for the cross-world relation of duplication, the actuality operators must be able to associate occurrences of names or variables with occurrences of modal operators. See Forbes (1985, 90–93) for details.

of naturalness. It would be nice to have some way of defining all three of these notions—naturalness, intrinsicality, and duplication—in purely "quasi-logical" terms: that is, in terms of modal concepts, property exemplification, the part-whole relation, spatiotemporal concepts, etc.[31] But it seems to me that the three notions form an autonomous group, in that no such reductive analysis is possible. My goal for the rest of this paper is to support this assertion by rejecting some attempted definitions. I will first discuss Dunn's definition of 'intrinsic' which utilizes relevance logic, and then turn to a definition due to Roderick Chisholm and Jaegwon Kim. Finally, I will argue that the prospects for giving a reductive definition of Lewis's notion of a perfectly natural property are not good.

3.1 Dunn's Theory of Intrinsicality

Dunn offers the following definition:[32]

> ϕ is *of a kind to determine relevant properties* $=_{\text{df}} \forall x \forall y [\phi y \rightarrow (x = y \rightarrow \phi x)]$

where the "arrows" are those of relevant implication. Say that property P is a *relevant property* iff every (some?) formula that determines that property is of a kind to determine relevant properties. Dunn's theory of intrinsicality seems to be that a property is intrinsic iff it is relevant.

One of the consequences of Dunn's analysis that he favors is that identity properties are intrinsic.[33] This is a consequence because of his use of the identity sign rather than '$\approx$' in the definition. As I mentioned in section 1, I take this as a sign that Dunn is interested in a non-qualitative notion of intrinsicality. But regardless of what sense of 'intrinsic' Dunn is after, there is a worrisome feature of his definition: it is of no help to the metaphysician who seeks an analysis of

[31] By "analyses" I have in mind analyses that are "neutral" in that they don't depend on special assumptions about the nature of properties. In the presence of such assumptions, "purely logical" analysis of intrinsicality may indeed be possible. For example, not everyone accepts the existence of any properties other than intrinsic properties. On such a view, it would be easy to give an at least extensionally correct analysis: *all* properties are intrinsic. Given other assumptions about the nature of properties, perhaps the following analysis might be acceptable: a property is intrinsic iff it has no proper parts (constituents).

[32] Dunn (1990, p.185 formula (II)). As before, I substitute a universally quantified variable instead of the name '*a*' that appears in Dunn's paper. See also Dunn (1987, 363) and Dunn (1990, 183).

[33] Dunn (1990, 186).

intrinsicality! His definitions are stated for a formal language; the definitions involve formulas of that language. But we need to choose primitive predicates of that language. If the primitive predicates express extrinsic properties, then the definition will yield the result that these are relevant properties. So his definitions are of no help in distinguishing the intrinsic properties unless we can already draw the distinction. Dunn knows this; he says:

> These observations seem finally to constitute a definition of intrinsic property, at least for an ideal language where complex relational ideas are not expressed deceptively by monadic predicates.[34]
>
> But it is not the business of logic, but rather of metaphysics (or perhaps of whatever field whose subject matter is being formalized, e.g., physics) to determine what formulas "really" determine properties…logic should tell us only that if certain formulas are postulated to "really" determine properties, then it follows that certain other formulas "really" determine properties".[35]

But Lewis's project in offering (I), the project with which I am concerned here, is one of metaphysics, not mere logic; Dunn's proposal is simply irrelevant here. (And it is therefore odd that he portrays his account as a competitor to Lewis's.) I turn next to philosophers who address the metaphysical, as opposed to purely logical, issue.

3.2 Lewis against Kim's Definition

Kim attempted to analyze something like the notion of intrinsicality, based on a suggestion from Chisholm.[36] In discussing Kim's definitions we may be brief, since they have already been adequately discussed by David Lewis (1983). Where x and y are said to be *wholly distinct* iff they have no parts in common, we have the following definitions:

> D1: G *is rooted outside times at which it is had* $=_{\text{df}}$ Necessarily, for any object x and for any time t, x has the property G at t only if x exists at some time before or after t

[34] Dunn (1990, 202).
[35] Dunn (1987, 355).
[36] See Kim (1982, 59–60) and Chisholm (1976, 127).

D2: G is *rooted outside the objects that have it* $=_{df}$ Necessarily, any object x has G only if some contingent object wholly distinct from x exists

D3: G is *internal* (i.e. intrinsic) $=_{df}$ G is neither rooted outside times at which it is had nor outside the objects that have it

David Lewis, in "Extrinsic Properties", notes that Kim's analysis is unsuccessful. The property of **loneliness**, had by x at t iff at t there exists no contingent object that is wholly distinct from x, satisfies D3. But **loneliness** is clearly not intrinsic, and (I) indeed has this consequence. Imagine two possible worlds containing duplicate black balls; in one world the ball is entirely isolated, whereas in the other the ball has plenty of company. Only the first ball is lonely, so **loneliness** can differ between perfect duplicates. Lewis also points out that the disjunction of **loneliness** and **coexisting with exactly six pigs (wholly distinct from oneself)** also satisfies the definition.

Another class of counterexamples to Kim's definitions comes from Nelson Goodman's new riddle of induction.[37] An object is *grue* at time t iff t is before 2000 A.D. and the object is green at t, or t is at or after 2000 A.D. and the object is blue at t. Grue satisfies D3, but is clearly not intrinsic—at the year 2000 green things cease to be grue, but clearly needn't thereby change intrinsically.

In fact, I consider this counterexample more fundamental than Lewis's, for there are ways to partially circumvent Lewis's counterexamples that don't solve the grue problem. Michael Slote, in chapter 8 of his book *Metaphysics and Essence*, attempted to analyze a concept similar to intrinsicality, which he called "alteration" —an object alters iff it changes its intrinsic properties. Consider the following analysis of alteration (which isn't Slote's, although it is based on his attempted analyses):

(A) x alters between t_1 and t_2 iff there are properties P and Q such that

i) x has P at t_1, and Q at t_2

ii) P and Q are incompatible

iii) both P and Q are internal (in the sense of D3)

This of course is not an analysis of intrinsicality, nor is it clear that alteration can easily be used to analyze intrinsicality—see my (1993, chapter 8). But alteration

[37] See Goodman (1955, 74). I thank Phillip Bricker for helpful comments here.

is clearly in the same family as intrinsicality, and so it is interesting to see how (A) handles the problem of **loneliness**. Suppose an object, x, begins as the only (contingent) object, and then later other objects come into existence. Even though **loneliness** satisfies D3, any property incompatible with **loneliness** will be rooted outside the objects that have it and so won't satisfy D3, and hence if we assign **loneliness** to 'P', there will be no way of making an assignment to 'Q' that will satisfy (A). Similar remarks apply to **being lonely or coexisting with at least six pigs**, for any property inconsistent with this property will fail D2 and hence D3.[38] **Grue** and **bleen**, however, do satisfy (A) (x is bleen at t iff $t < 2000$ A.D. and x is blue at t, or $t \geq 2000$ A.D. and x is green at t), and so any green object will be said to alter during intervals including the year 2000.

3.3 Can We Analyze Naturalness?

Lewis conceives of the "perfectly natural" properties and relations in terms of two components: fundamentalness and similarity:[39]

> Sharing of [the perfectly natural properties] makes for qualitative similarity, they carve at the joints, they are intrinsic, they are highly specific, the sets of their instances are ipso facto not entirely miscellaneous, there are only just enough of them to characterise things completely and without redundancy…
>
> Physics has its short list of 'fundamental physical properties': the charges and masses of particles, also their so-called 'spins' and 'colours' and 'flavours', and maybe a few more that have yet to be discovered… What physics has undertaken…is an inventory of the [perfectly natural properties] of this-worldly things.

He then uses perfect naturalness to analyze duplication which is used to analyze intrinsicality, as I mentioned above. What I want to consider in this section is whether the idea that there are only enough perfectly natural properties to

[38] There are other counterexamples to (A). For example, a blue object that begins lonely and later is accompanied by other objects would count as altering based on the following assignments: $Px = x$ is lonely and blue; $Qx = x$ is either not lonely or not blue. But this problem can be circumvented by requiring that it be possible for an object to have P even though it is accompanied by other objects wholly distinct from it, and similarly for Q. See my (1993, chapter 8) for still other revisions that may be necessary. As I see it, the grue problem is the deepest for definitions along the lines of (A).

[39] Lewis (1986, 60).

"characterise things completely and without redundancy" can form the basis of a quasi-logical analysis of perfect naturalness.[40] (Lewis does not suggest this.) The idea would be to define N, the class of perfectly natural properties and relations, as some sort of "non-redundant" supervenience base.[41]

Problems arise when we ask what is supposed to supervene on N, for some properties and relations will not supervene on N. To see this, we need to get clearer about the relevant notion of supervenience—"global supervenience". Global supervenience, as a relation between sets of properties and relations, is best interpreted as follows: A globally supervenes on B iff for any possible worlds w and w', every one-one function that maps the domain of w onto the domain of w' and preserves the properties and relations in B also preserves the properties and relations in A ("every B-isomorphism is an A-isomorphism").[42]

On this definition it is clear that identity properties will not supervene on N. If a world, w, exhibits an appropriate sort of symmetry, there will be one-one maps from the domain of w onto itself other than the identity map that preserve perfectly natural properties and relations. Since such mappings do not preserve identity properties, it follows that identity properties don't supervene on N. A world with nothing other than two exactly similar objects (that stand in no perfectly natural relations that aren't symmetric) has the requisite symmetry. Other examples: a world of two-way eternal recurrence (simply map every object to its counterpart in the next epoch) or a world with a uniform infinite crystal lattice. Supervenience fails because the idea of perfectly natural properties and relations is a qualitative one: we can imagine distinct objects within a possible world that have all the same perfectly natural

[40] On p. 63 of Lewis (1986) David Lewis discusses attempts to define 'natural' in terms of "robust" notions such as laws of nature and resemblance. His objection is that naturalness should be used to analyze these robust notions, rather than the other way around. Another "robust" analysis discussed by Lewis in (1986, 63–69) would invoke sparse universals along the lines of Armstrong (1978*a*,*b*) (I express my doubts about this project in my Sider (1995).) My concern here is not with such robust analyses. Quinton discusses what he calls "formalistic" analyses of naturalness—those that do not appeal to any such robust notions—in Quinton (1958, 53–58). Since such formalistic theories would proceed in terms of quasi-logical vocabulary, his arguments supplement the present discussion.

[41] Because of the possibility of "endless complexity", supervenience on the perfectly natural properties and relations is actually a complex affair; see my (1994). I suppress these complications.

[42] For references on global supervenience see Paull (1994, Chapter 4 section A)). The sets A and B need not be closed under the Boolean operations (see Paull and Sider (1992, Appendix)). Paull calls this formulation of global supervenience "strong" global supervenience, and distinguishes it from other formulations. See Paull (1994, Chapter 4 section B).

properties and stand in the same pattern of perfectly natural relations to all other objects within that world.

The obvious response is to restrict the supervenience claim: only properties and relations of a certain sort supervene on N. What sort? The answer can only be: purely qualitative properties and relations—those properties and relations that, intuitively, involve no particular objects. But if we define N as a "non-redundant" (in some yet-to-be-specified sense) supervenience base for the set, Q, of qualitative properties and relations, we then need to define 'qualitative' in terms of "quasi-logical" vocabulary. But how might this be done? We should not define a qualitative property as one whose instantiation does not entail the existence of any particular (contingent) object, for **not being identical to *a*** seems non-qualitative, but its instantiation doesn't seem to entail the existence of any particular object. (Some might argue that this property couldn't exist without *a* existing; but since it can't be instantiated without existing, then its instantiation entails the existence of *a*. But the correctness of a *definition* of 'qualitative' should not depend on the controversial assumption that a property such as **not being identical to *a*** cannot exist without *a* existing.) We cannot say that a qualitative property is one that may be instantiated by any object, for perhaps electrons are essentially not positively charged; nevertheless the property **being positively charged** is qualitative. So I doubt that any definition of 'qualitative' will be forthcoming—'qualitative' is in the same boat as naturalness, intrinsicality, and duplication.

This point aside, there are other problems with defining N as a *non-redundant* supervenience base for Q. Lewis mentions "non-redundancy" because the perfectly natural properties are supposed to be the most fundamental properties, whereas Q has many supervenience bases that clearly do not contain only fundamental properties and relations. For example, Q supervenes on Q itself. Q also supervenes on any superset of itself, and so the set of all properties and relations whatsoever is a supervenience base for Q. Thus, we might think to define N as the smallest supervenience base for Q. More carefully, define a *minimal* supervenience base for A as a supervenience base for A that has no proper subsets that are supervenience bases for A. We might then define N as the intersection of all minimal supervenience bases for Q.

One problem here is the "problem of minimality" that I discussed in my (1994). The present definition would rule out the possibility that some members of N are definable from others, for in that case some members of N would be missing from some minimal supervenience bases for Q. But can we rule out this possibility? Mightn't there be multiple perfectly natural bases for Q, just as

there are multiple bases for defining the truth functions? A concrete example: the **earlier than** relation and its converse, the **later than** relation, both seem perfectly natural, and yet each is definable from the other.

A natural response would be to redefine N as the union of all minimal supervenience bases for Q. But new problems arise: a minimal supervenience base for Q needn't contain only perfectly natural properties and relations.[43] The reason is that if B is a minimal supervenience base for A, then there will be other minimal supervenience bases for A that contain truth-functional combinations of members of B. But truth-functional combinations of perfectly natural properties needn't be perfectly natural. To take a particular example, negations of perfectly natural properties do not seem perfectly natural, since they do not seem to fit the similarity requirement contained in the quotation above: "Sharing of [the perfectly natural properties] makes for qualitative similarity, they carve at the joints, they are intrinsic, they are highly specific, the sets of their instances are ipso facto not entirely miscellaneous". Moreover, negations of fundamental properties do not seem themselves to be fundamental. But the present definition has the consequence that N is closed under negation. For if P is a member of N, then P is a member of some minimal supervenience base for Q. But if we replace P by ∼P in this set, the result can be easily shown to be a minimal supervenience base for Q.[44] The trouble is caused by the fact that the negation of a property is, to put it colorfully, as good as the property itself as far as supervenience is concerned. We cannot block this example by banning "negations", for every property is (at least necessarily coextensive with) the negation of its negation.

While the negations example is trouble for the proposed analysis taken as an analysis of *Lewis's* notion of perfect naturalness, it does not show as much as

[43] Phillip Bricker made an important suggestion here.

[44] Proof: suppose P, but not $\sim P$, is a member of X, some minimal supervenience base for Q. Let X' be the result of replacing P by $\sim P$ in X. First note that:

> (*) for any sets A and B and property P, B supervenes on A$\cup\{$P$\}$ iff B supervenes on A$\cup\{\sim$P$\}$

which follows from the definition of supervenience and the fact that a function preserves a property iff it preserves its negation. Now, since Q supervenes on X, by (*) it also supervenes on X'. Moreover, X' is a minimal supervenience base for Q. For suppose $X'' \subset X'$ and Q supervenes on X". If $\sim P \notin X''$ then $X'' \subset X$, contradicting the fact that X was a minimal supervenience base for Q. On the other hand, if $\sim P \in X''$, then by (*), Q supervenes on $(X'' - \{\sim P\}) \cup \{P\}$. Since this latter set is a proper subset of X, we again have a violation of X's minimality.

we might like. A notion of naturalness on which the class of perfectly natural properties and relations is closed under negation would differ from Lewis's, but it might still do some of the work that Lewis's notion does. In particular, such a notion might be sufficient to analyze duplication, and this, after all, is the reason I have considered naturalness in this paper. Lewis defines duplicates (roughly) as objects whose parts have the same perfectly natural properties and stand in the same perfectly natural relations, but an equivalent definition would be that duplicates are objects whose parts have the same perfectly natural properties and the same negations of perfectly natural properties, and whose parts stand in the same perfectly natural relations and the same negations of perfectly natural relations.

But there are additional problems with the proposal of defining N as the union of all minimal supervenience bases for Q, which are based on the grue/bleen idea. Suppose for the sake of argument that **green**, **blue**, and the various spatiotemporal properties and relations are members of B, some minimal supervenience base for Q.[45] As has often been noted, just as we defined 'grue' and 'bleen' from 'green', 'blue', and temporal notions, we may reverse the direction of definition and give symmetrical definitions of 'green' and 'blue' from 'grue', 'bleen', and temporal notions (for example: x is green at t iff $t <$ 2000 A.D. and x is grue at t, or $t \geq$ 2000 A.D. and x is bleen at t). But if B is a minimal supervenience base for Q, then the result of substituting **grue** and **bleen** in B for **green** and **blue** should also be a minimal supervenience base for Q. Thus, on the present proposal, **grue** and **bleen** would turn out perfectly natural. But this would render Lewis's definition of 'duplicate' unacceptable—exactly alike objects from different times whose parts differed with respect to **grue** and **bleen** would thereby fail to be duplicates. I conclude that 'perfectly natural' cannot be acceptably defined purely in "quasi-logical" terms.[46]

[45] We could restate the argument with a more plausible example based on subatomic properties; I use **green** and **blue** because of the familiarity of **grue** and **bleen**.

[46] We might try to rule out **grue** and **bleen** by defining N as the union of all *qualitative* minimal supervenience bases for Q (since the definition of 'grue' named a particular time), but the grue/bleen strategy can be used to obtain qualitative properties. Where P and Q are qualitative properties, and R is some purely qualitative proposition, define P* as the property had by an object x at t iff either x has P at t and R is true at t, or x has Q at t and R is not true at t; define Q* analogously. P* and Q* are presumably qualitative, and provide as good a counterexample as **grue** and **bleen**.

4. Conclusion

It seems that no quasi-logical analysis of naturalness, intrinsicality, or duplication is possible; this at least in part lends credibility to the practice of taking one as a primitive. And I have argued that Lewis's analysis of intrinsicality is indeed successful, Dunn's objections notwithstanding. There are other important questions about Lewis's project that I have not answered. Is his analysis of duplication successful? Does the notion of naturalness make sense? Even if naturalness cannot be defined, can it be explained in an illuminating manner? Rather than taking one of the notions as primitive, should we analyze the notions in terms of some other "extra-logical" notion? Important questions, but questions for another time.

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