Sparseness, Immanence, and Naturalness*

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In the past fifteen years or so there has been a lot of attention paid to theories of "sparse" universals, particularly because of the work of D. M. Armstrong. These theories are of particular interest to those of us concerned with the distinction between natural and non-natural properties, since, as David Lewis has observed, it seems possible to analyze naturalness in terms of sparse universals. Moreover, Armstrong claims that we should conceive of universals as being "immanent" as opposed to "transcendent", and if universals are immanent then, as we will see, there is pressure to admit they are sparse as well. But I will argue that neither of these alleged reasons to accept a sparse conception of universals succeeds: the outlook for a fully general analysis of naturalness in terms of universals is not good, and the apparent advantages of immanence over transcendence are illusory.

1. Sparse Universals and Naturalness

We'll need a specific conception of the claim that universals are abundant. It will be convenient to speak David-Lewis-style, of merely possible objects, each of which inhabits exactly one possible world. (I assume this talk must be ultimately reduced in some way; moreover, the assumption of world-bound individuals plays no role in my arguments and is made purely for convenience.) An *L-property* is defined as a class of possible objects, and an n-place *L-relation* is defined as a class of n-tuples of possible objects. Let us say that universal U and L-property (n-place L-relation) P *correspond* just when P is the class of (n-tuples of) U's instances; we may then take the claim that universals are abundant to mean that every L-property or L-relation has a corresponding universal.

In contrast, on a "sparse" view of universals, only a select minority of the L-properties have corresponding universals. At the heart of Armstrong's *Universals and Scientific Realism* is his rejection of the idea that there is a universal for

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every meaningful predicate.[1] While there are universals of *8 grams mass* and *roundness*, there are no universals expressed by 'is not round' or 'is either round or has five grams mass'. For Armstrong, the sparseness of universals is based on a notion of "objective" or "genuine" similarity: we admit a universal only when it would insure (genuine) similarity between its instances. Since disjunctions and negations of L-properties that insure similarity will not themselves insure similarity, they have no corresponding universals.[2]

The question of this section is whether a sparse theory of universals can be used to analyze the concept of naturalness as applied to L-properties and L-relations. (My remarks apply, *mutatis mutandis*, to the question of whether sparse *tropes* can be used in the analysis.) The conception of naturalness I want to consider is that of "fundamentalness", a notion whose intelligibility and usefulness has recently been defended by Lewis in *On the Plurality of Worlds* (pp. 59–63), "New Work for a Theory of Universals", and "Putnam's Paradox".[3] Lewis conceives of perfectly natural L-properties and L-relations as "fundamental furniture" of the universe which "carve the world at the joints"; in his words, "there are only just enough of them to characterise things completely and without redundancy…".[4] The most fundamental of actually instantiated L-properties are the subatomic properties of particle physics; L-properties of molecules are less natural, color L-properties of macro-objects still less natural, etc. The notion of naturalness, moreover, is supposed to be "objective", and not definitionally linked to the perceptual or scientific capabilities of persons. The theoretical importance of this notion of naturalness would make its analysis a great gain.

Lewis suggests that we might pick out the perfectly natural properties as those which correspond to universals.[5] On this view, if we follow Armstrong in admitting "structural" or "conjunctive" universals, then the corresponding L-properties turn out perfectly natural. (Conjunctive universals are those that are conjunctions of other, distinct, universals. Structural universals are those

[1] This idea runs throughout Armstrong (1978*a*,*b*). See, for example, Armstrong (1978*b*, 9–12).

[2] Armstrong (1978*b*, 19–29). According to Armstrong, what genuine similarities there are is an a posteriori matter, to be established by "total science". This idea is implicit in much of Armstrong (1978*a*,*b*). See, for example, the introduction to Armstrong (1978*a*) and Armstrong (1978*b*, 7–9).

[3] In my (1994), I distinguish this conception of naturalness from the conception of naturalness as the source of objective intrinsic similarity.

[4] Lewis (1986*b*, 60).

[5] See Lewis (1986*b*, 64–66).

that are instantiated by a particular when that particular's parts instantiate certain other universals, the structural universal's "constituents". *Being H_2O* is a structural universal with *being hydrogen*, *being oxygen*, and a certain bonding relation as immediate constituents.[6]) Lewis is neutral on whether this is a correct consequence[7], but it seems to me that admitting conjunctions and structural combinations of perfectly natural L-properties as being themselves perfectly natural doesn't square well with the conception of naturalness as fundamentalness. The L-property of *being an H_2O molecule* is a structural combination of certain perfectly natural L-properties and L-relations: those instantiated by the smallest subatomic parts of any water molecule. The latter L-properties and L-relations seem perfectly natural; they would need to be invoked in any "complete description of reality". But including their structural combinations would be redundant. Once we have described how things fare with the most fundamental L-properties, it is thereby determined what things are water molecules. Thus, we should use only the non-structural, non-conjunctive universals to pick out the perfectly natural L-properties.

Regardless of this issue, however, it appears that universals can be used to analyze perfect naturalness. The main point I want to make in this section, however, is that analyzing *perfect* naturalness is not enough. Naturalness is a relative matter. *Being H_2O* is less natural than, less fundamental than, *having unit negative charge*, but is more natural than *redness*. A complete analysis of naturalness must include an analysis of the *more natural than* relation, and, prima facie, universals will be unhelpful here. The idea behind using universals to analyze naturalness was to allow naturalness whenever a corresponding universal exists, and existence is all-or-nothing.

We might think to base a strategy for analyzing relative naturalness on the claim that conjunctions are less natural than their conjuncts, and structural L-properties are less natural than their constituents. I grant the claim, but I doubt that it can be taken as a complete analysis (*viz.*, "one L-property is more natural than another iff the universal corresponding to the first is a conjunct or constituent of the universal corresponding to the second"), because there are

[6]Armstrong restricts conjunctive universals with his "principle of instantiation", which bans uninstantiated universals (Armstrong, 1978*a*, 113). See Armstrong (1978*b*, 30) on conjunctions, and Armstrong (1978*b*, 68–71) on structural universals. P is a conjunct of Q iff there is some R such that i) Q is identical to neither P nor R, and ii) Q is a conjunction of R and P. A monadic universal, U, is a conjunction of universals P and Q, presumably, iff of necessity it is instantiated when and only when both P and Q are instantiated.

[7]See Lewis (1986*b*, 62).

cases in which one L-property seems more natural than another, but in which the former is not a conjunct or constituent of the latter. Suppose we have a structural property, P, "built up" from various quark properties $Q_1 \ldots Q_n$ and spatiotemporal relations. The current suggestion has the correct consequence that $Q_1 \ldots Q_n$ are more natural than P. But it also seems intuitive that a quark property other than $Q_1 \ldots Q_n$ would be more natural than P, despite the fact that this other quark property is neither a conjunct nor a constituent of P. After all, it seems "on the same level as" $Q_1 \ldots Q_n$, each of which is more natural than P.

By way of response, we could say that P is "directly" more natural than Q iff P has a corresponding universal that is a conjunct or constituent of a universal corresponding to Q, and then use this notion in the following account of relative naturalness:

(RN1) For any L-properties (L-relations) P and Q that correspond to universals, P is more natural than Q iff there are L-properties (L-relations) P' and Q' that correspond to universals and are such that i) P and P' are equally natural, ii) Q and Q' are equally natural, and iii) P' is directly more natural than Q'

Provided the various quark properties are equally natural, (RN1) gives the intuitively correct answer. But if our goal is a complete analysis of naturalness, (RN1) won't do on its own since it appeals to the notion of universals being equally natural. Moreover, it is far from clear how this latter notion could be analyzed. A sufficient condition for two L-properties being equally natural would arguably be that each corresponds to some non-structural, non-conjunctive universal or other, but this condition doesn't seem necessary—two L-properties that aren't perfectly natural might be equally natural.

There is another, independent difficulty with the project of defining 'more natural than' along these lines. The proposals so far have been too narrow, since they have only concerned L-properties that correspond to universals, whereas L-properties that fail the similarity test, and thus have no corresponding universals, can stand in significant relations of naturalness. An example: the L-property of *being red or green* seems more natural than *being grue or being identical to George Bush or being five feet away from a man with 6 coins in his pocket*, and yet (RN1) has no consequences with respect to these L-properties.

We might think to base an alternate method on the following idea of

Lewis's:[8]

> Some few properties are perfectly natural. Others, even though they may be somewhat disjunctive or extrinsic, are at least somewhat natural in a derivative way, to the extent that they can be reached by not-too complicated chains of definability from the perfectly natural properties.

In this quotation Lewis is not attempting an analysis of naturalness, but his idea can be used to define relative naturalness in a way that will have consequences for L-properties that don't correspond to universals. We begin by characterizing perfectly natural properties as those that correspond to non-conjunctive non-structural universals; then we use an additional notion to characterize relative naturalness, one of logical "distance" from a set.[9] L-properties and L-relations are more or less close to a set, S, of L-properties and L-relations depending on how "complicated" their definitions must be, where we allow no non-logical vocabulary in the definitions other than predicates expressing members of S. The proposal for defining relative naturalness, then, is:

(RN2) P is more natural than Q iff P closer to N than Q is

where N is the set of perfectly natural L-properties and L-relations.

The first worry about this method is that it won't achieve the goal of analyzing naturalness purely in terms of universals, for it seems likely that the notion of logical distance will need to be a primitive. Whatever motivation sparse universals derive from their value in the analysis of naturalness will be mitigated if they cannot do the work on their own.[10] And if we need both

[8]Lewis (1986*b*, 61).

[9]I discuss this notion further in my (1994); Phillip Bricker suggested the terminology of "distance".

[10]In Lewis (1983, 1986*b*, 63 ff.), it is perhaps not completely clear that Lewis meant to be suggesting a completely general analysis of naturalness solely in terms of universals. He says (Lewis, 1986*b*, 63–64):

> I would willingly accept the distinction [of naturalness] as primitive, if that were the only way to gain the use of it elsewhere in our analyses. The contribution to unity and economy of theory would be well worth the cost. But I think there are two attractive alternatives: theories which, for some price both in ontology and in primitives, give us resources to analyse the distinction without forgoing any of its applications.

He then goes on to discuss universals and tropes. Regardless of what Lewis meant to claim, my concern is to show that there is no completely general analysis of naturalness solely in terms of universals.

sparse universals and logical distance to analyze naturalness, then alternative accounts of naturalness begin to look better on grounds of simplicity. (For example, there is Lewis's proposal in the works cited above to take naturalness as a primitive. A single primitive relation, *is more natural than*, would suffice, since perfect naturalness may be defined as unexceeded naturalness.)

The reason for thinking that logical distance must be a primitive is that there are various obstacles to reductively defining it. To define logical distance, we would have to measure the lengths of formulas in some chosen language. But we will want to make distinctions of relative naturalness for properties that aren't finitely definable from N, but rather merely supervene on N. Even given that such properties may be definable in a suitable infinitary language, the definitions will presumably all have the same infinite length.

Further, in choosing the language we must choose logical apparatus. On one choice of logical apparatus, a certain property may be fairly directly definable from N, whereas the definition may be much longer under another choice of logical apparatus. How could we settle on the correct choice? A related worry is whether the notion of distance should consider just the length of defining formulas, or whether some formulas should count as "more complicated" and hence make for more distance than other formulas of the same length. In particular, it may be that disjunction should count for more complication, on the grounds that disjunctive properties "carve the world at the joints" poorly. But if we do take an inegalitarian attitude toward disjunction, we must settle how disjunctiveness and length play off each other in determining the "complication" of a definition. Again, it is hard to see how we could make this choice.

It may be objected that taking logical distance as a primitive wouldn't solve these problems of choosing how to calculate distance, for in settling on a primitive we would be making the choices arbitrarily, or would be adopting an ill-understood primitive. I disagree. In selecting a primitive notion of distance, we would be in effect postulating that a single notion *both* has the intuitive features we "directly" ascribe to it (in the present case, the notion must count intuitively as one of "logical distance"), and also is fit to play the theoretical role we want the notion to play (in the present case, the role involves the proposed applications for naturalness). Thus, we would never need to know how, e.g., disjunctiveness and length together determine distance; we'd simply postulate that on *some* way of answering this question, the resulting notion does the work we want.

I acknowledge, however, that this argument that logical distance must be a primitive is less than conclusive for a different reason: I have not shown (and do not know how to show) that various applications of naturalness actually depend on these choices for defining logical distance. If the applications don't depend on these choices, perhaps we could tolerate some ambiguity in our notion of relative naturalness. But there is an independent reason for rejecting (RN2), which is based on an example of Armstrong's. Consider a possible world "Onion", of "endless complexity". At Onion, there are no non-structural monadic universals; instead, every monadic universal is a structural combination of spatiotemporal relations and other monadic universals (which are themselves structural . . .). Thus, given the present proposal to use non-structural, non-conjunctive universals to pick out the perfectly natural L-properties, there are no perfectly natural L-properties at Onion. At any stage in the development of science there would be a limit to how much complexity scientists had discovered, but nevertheless there would be no upper limit to naturalness, since the "objective" notion of naturalness that is at issue here is not tied to human discovery. But if there are no perfectly natural L-properties at Onion, then most L-properties instantiated at Onion will not be definable from N at all, not even infinitarily definable. (The only exceptions will be L-properties that supervene on the spatiotemporal relations alone.) So (RN2) would entail that any two such L-properties are equally natural—an unacceptable result. What should be the case instead is that these L-properties come in an infinite sequence of increasing naturalness.

Is Onion metaphysically possible? We seem to be able to conceive of what such a world would be like in some detail—imagine scientists engaged in a futile quest to discover a "bottom" to the complexity. While conceivability does not, of course, imply possibility, in the present case it certainly seems to create a prima facie case—surely this shifts the burden of proof on those who would make the strong claim that endless complexity is metaphysically *impossible*. Moreover, it seems unlikely that the notion of complexity contains a hidden contradiction of the sort contained in, say, the unrestricted comprehension principle of naive set theory. Finally, endless complexity seems like an open possibility even for the actual world. Once, we thought that the smallest bits of matter were particles of Hydrogen, Helium, etc., so we called them "atoms". Then we learned that these "atoms" have proper parts (protons, neutrons, and electrons), the properties of which determine the properties of atoms. Still later we learned that protons and neutrons have still more basic parts (quarks). Perhaps this will go on forever. It would be overly bold for a metaphysician to deny the metaphysical possibility of this legitimate scientific conjecture.[11]

[11]What about Kripke's claim that if the scientific hypothesis that water is not H_2O is true,

D. H. Mellor rejects my premise. He grants the possibility of *infinite* complexity, but denies the (metaphysical) possibility of *endless* complexity.[12] A merely infinitely complex universal would be like a line segment which is infinitely divisible while still having "atomic parts" (the points); it would have infinitely many simple constituents. I follow Armstrong and Alex Oliver in replying that infinite complexity is a possibility, but that endless complexity is a distinct and genuine possibility.[13] An analog for endless, as opposed to merely infinite, complexity, is the line segment from the point of view of one who rejects points. (Such a person will construe point talk in terms of limits of sequences of segments.) From this point of view, *every* part of the line segment

then it is necessarily so (Kripke, 1972, Lecture 3)? The legitimately scientific part of the conjecture was that the clear liquid we drink has some other atomic structure; the conjecture that *water* might have such a structure is philosophy.

[12] See Mellor (1991, 179–180), and Mellor (1992, 100–103).

[13] Oliver (1992, 95), Armstrong (1993, 117–118).

will have smaller parts; there are no ultimate parts whatsoever.[14]

Armstrong has recently softened his claim of possibility for the endless-complexity-hypothesis to mere epistemic possibility, on the grounds that if a universal is *in fact* composed of simple (non-structural, non-conjunctive) universals, then it is essentially so composed.[15] Granted, even if actual universals are composed of simples, this claim about the essential properties of universals does not itself rule out the metaphysical possibility of endless complexity: endless complexity would simply require the possible existence of universals that are neither actually instantiated, nor are composed of actually instantiated universals. However, because of his views in *A Combinatorial Theory of Possibility*, Armstrong would in fact reject the possibility of such "alien" universals, on the grounds that all possibilities are rearrangements of items in the actual world.

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[14]Mellor has argued that there are *no* conjunctive universals whatsoever (I assume that he would reject structural universals as well); to critics who object on the grounds of the possibility of endless complexity, Mellor has replied that asserting:

(EC) endless (as opposed to infinite) complexity is (metaphysically) possible

"begs the question" (Mellor, 1991, 179). Since I am not arguing against Mellor, this criticism doesn't apply to me.

As a matter of fact, I think Mellor is wrong to think that his critics beg the question. (Indeed, I don't think that asserting (EC) would beg any of the important questions about universals.) His thought, I suppose, is that the precise version of what his critics assert is:

(EC′) $\Diamond$(every universal is conjunctive, and there are some universals)

Since (EC′) is obviously inconsistent with Mellor's theory, it might be thought to be an inappropriate premise to use against him. But Mellor's critics have a *reason* to assert (EC′), and the reason has some independent plausibility; hence assertion of (EC′) is in no way dialectically improper. Let us construct a description, D, of a world of endless complexity, in a way that is not phrased in terms of universals. D would mention endless complexity of laws, endless complexity of the particulars at the world, endless variation in the similarities between the parts of those particulars, lack of a possible end to scientific endeavor, etc. Mellor's critics may then argue as follows. It is compelling that D is possibly true. But if so, then (EC′) must be true. Granted, in certain cases, *some* complexity may be explained without reference to conjunctive universals. For example, if particulars x and y are alike in sharing universals P and Q, we need not explain this by saying that they share a conjunctive universal P&Q; rather, as Mellor points out in Mellor (1991, 179), it is enough to say that they share universals P and Q. But in the case of D, because of the lack of an end to the complexity, there seems to be no way to explain the possible truth of D without appealing to (EC′). Thus, we have reason to accept (EC′), and the reason is not question-begging because D was stated in neutral terms (terms not mentioning universals).

[15]Armstrong (1989*a*, 67–68), and Armstrong (1993, 117).

Thus, unless endless complexity is actual, it is metaphysically impossible.

I am not impressed with this reason to doubt the metaphysical possibility of endless complexity because the appeal to Armstrong's combinatorialism is at a place where that theory is, I think, extremely implausible. If the universe had been much simpler, there would have been no such properties as charge and charm. So according to Armstrong's combinatorialism, in such a case the existence of charge and charm would be metaphysically impossible. Thus, on his view, despite the fact that charge and charm are actual, they might have been impossible! This result is, I think, unacceptable. Moreover, Armstrong's theory tells us that the actual world is the "richest" possible world, in the sense that no universal alien to the actual world (i.e. not composed of actual universals) is metaphysically possible. Armstrong is, in his words, an "actual-world chauvinist". I think that the implausibility of actual-world chauvinism is sufficient ground to reject Armstrong's combinatorialism.[16] (One possible confusion should be addressed. In his discussion of alien universals Armstrong seems to suggest that the belief in the possibility of alien universals depends on acceptance of possibilism—the belief in merely possible entities—whereas an *actualist*, one who denies possibilia, will not find actual-world chauvinism so implausible.[17] But this is a mistake. Actualism does not lend credibility to the view that there are no possible worlds with universals that don't exist in the actual world; all actualism rules out is a world containing a universal that isn't actual *at that world*.)

Moreover, even if we follow Armstrong in accepting merely the epistemic possibility of endless complexity, it would seem that (RN2) would be an inadvisable *definition* of 'more natural than'—for all we know, the definition might be false!

I conclude, then, that a definition of 'more natural than' must be consistent with endless complexity, and therefore that (RN2) must be rejected. Since there are universals instantiated at Onion (all of which are structural), we might try

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[16] Compare Lewis's "alien natural properties" objection to "linguistic ersatzism", in Lewis (1986*b*, 158–165).

[17] In Armstrong (1989*a*, 56), Armstrong considers an argument for the possibility of alien universals. He replies:

> But this line of thought covertly depends on taking all possible worlds as equal. The Combinatorialist, however, is an actual-world chauvinist. The actual world, and it alone, is genuinely a world.

"Taking all possible worlds as equal" suggests possibilism; the final sentence suggests actualism.

defining relative naturalness as distance from the set, U, of *all* L-properties and L-relations that correspond to universals (whether structural or no). The problem here is that all the members of U will turn out equally natural, since an L-property is maximally close to a set of which it is a member. This consequence is incorrect: an L-property that corresponds to a structural universal should turn out less natural than one corresponding to one of the structural universal's constituents. A patch might be to restrict the claim to L-properties and L-relations that *don't* correspond to universals, and use (RN1) for those that do, except for the unfinished business of the *equally as natural as* relation that (RN1) presupposes. And even after the restriction, some modification would still be required. To take one example, a disjunction of two members of U that correspond to non-conjunctive non-structural universals should be more natural than a disjunction of two members of U that correspond to highly structural and conjunctive universals.

I conclude that a general analysis of naturalness in terms of sparse universals is unavailable, and even an impure analysis in terms of an additional primitive of logical distance is unlikely.

2. Sparse Universals and Immanence

I turn now to an alternate motivation for sparse universals, which is based on two claims. The first is that universals are best conceived as being immanent, as "wholly present" in their instances. The second is that if universals are immanent, then they must be sparse as well. I will first present the notion of immanence, and then attend to the rest of the argument.

Armstrong contrasts immanent universals with transcendent universals, which are supposed to be "separate" from their instances.[18] Let us call the view that universals are immanent "IU", and the view that universals are transcendent "TU". What exactly is the difference between these two claims? What is it for universals to be "wholly present in", or "separate from" their instances?

In *On the Plurality of Worlds*, Lewis presents the claim that universals are immanent as involving two components. One is mereological: universals are parts of their instances.[19] Thus, any two particulars that instantiate a given

[18] Armstrong (1978*a*, Chapter 7).

[19] Lewis (1986*b*, 64). It might be thought that we must add that the *whole* of the universal is a part of each instance, i.e. that every part of the universal is a part of the instance. But in view of the transitivity of parthood, this extra claim would be redundant.

universal literally overlap, by sharing that universal as a common part. "Separate" too may be taken mereologically: universals are (mereologically) disjoint from their instances. The other component is spatiotemporal: universals are *located* exactly where their instances are located. The entire universal shares in the total spatiotemporal location of each of its instances. Thus, universals are "recurrent", or "multiply located".[20] The spatiotemporal component of TU is the opposite claim: no universal spatially coincides with any particular. In fact, let us take this to follow from the familiar Platonic doctrine that universals are spatiotemporally unlocated.

The mereological component alone does not suffice to explicate the intuition I believe Armstrong and other defenders of IU share. Consider a certain electron, *e*, and let P be the class of monadic universals *e* instantiates. We can distinguish two objects: the mereological sum of *e* and the members of P, and the mereological difference between *e* and the members of P. Adapting terminology from Armstrong, we may call the first object a thick particular and the second object a thin particular.[21] Now, imagine a philosopher who believes that universals are spatiotemporally unlocated. She might still accept the mereological component of IU, if she identifies particulars with *thick* particulars. She would think that the universals *e* instantiates are unlocated, off in Plato's heaven, and are nevertheless part of *e* since *e*, like every particular, is the fusion of a corresponding thin particular together with its universals. She accepts the mereological component of IU, and yet clearly does not share the intuitive picture of universals that Armstrong defends.

In fact, if the spatiotemporal component of IU is correct, then dispute over the mereological component looks pointless. Suppose that universals share spatiotemporal locations with their instances; could there possibly be a real issue of whether our terms like 'Ted', 'that chair', 'that electron' refer to thick or thin particulars? I think not. Thick and thin particulars would have identical locations, and anything we want to say about particulars can be said just as easily whether they are thick or thin. For example, we can speak of the relation of "thin instantiation" which holds between thin particulars and universals; but we can speak just as easily about the relation of "thick instantiation", which holds between a thick particular and the universals the corresponding thin particular

[20] Armstrong appeared to hold this view in Armstrong (1978*a*,*b*), but seems to have given it up in Armstrong (1989*b*, 98–99).

[21] Armstrong (1989*a*, p. 52). Armstrong doesn't actually identify a thick particular with the *mereological* sum of a particular and its monadic universals, but rather with another kind of sum that involves "constituency" rather than parthood. I discuss this view in the text, p. .

thinly instantiates. Surely, our talk of electrons, people, etc. would simply be indeterminate between talk of thick particulars and talk of thin ones, and so there would be no sense in arguing over whether *particulars* are thick or thin.[22]

Thus, 'immanent', 'wholly present', 'separate from' and the like have both spatiotemporal and mereological components, but the spatiotemporal components seem to be the crucial ones.

Suppose we were convinced that we had to accept immanent universals. There would then be pressure to accept sparseness as well, because of the apparent absurdity of abundant immanent universals. Lewis mocks abundant immanent universals in Lewis (1986*b*, 67):

> …it is just absurd to think that a thing has (recurring or non-recurring) non-spatiotemporal parts for all its countless abundant properties.

Abundant immanent universals are perhaps absurd, but not quite for the reason Lewis suggests. The idea that a particular contains each of its abundant universals as parts isn't in itself absurd, for anyone who believes in abundant universals and arbitrary fusions of things she believes in is *committed* to thick particulars that contain their abundant universals as parts. What Lewis finds absurd, I suspect, is the idea that for each L-property a given particular instantiates, there is a corresponding universal that is co-located with that particular—this would make spacetime be altogether too populated. So I am willing to grant the conditional: "if universals are immanent, then they are sparse", but only under the spatio-temporal construal of immanence. Arguments that universals are co-located with their instances, then, provide motivation for sparse universals.

Armstrong's arguments for immanent universals are therefore relevant to the question of sparseness. They take the form of presenting problems for transcendent universals to which immanent universals are invulnerable. But I believe that those arguments, one and all, lack force. Rebutting the arguments not only alleviates the pressure to conceive of universals sparsely, but also

[22] Phillip Bricker wondered if dispute over whether universals are located might be equally meaningless, since in an extended sense of 'location' transcendent universals would be located wherever their instances were located. I disagree; it seems plausible to me that our talk of spatiotemporal relations is determinate, and thus dispute over whether universals are located is meaningful. The issues here are complex, but in brief, the asymmetry between the two cases is due to the fact that the original relation of location is a perfectly natural L-relation, whereas the extended "location" L-relation is not; in contrast, if universals are located in their instances, thick and thin particulars would seem to be "equally natural objects"—that is, instantiate equally natural L-properties and L-relations.

is welcome in its own right, for it must be admitted that the spatiotemporal component of immanence is prima facie implausible. That an entity could be multiply located—all of it being here and also there—is a notion that, other things being equal, we should reject.

3. Against Armstrong's Objections to Transcendent Universals

3.1 The Duplication Argument

Two of Armstrong's main arguments have, I believe, already been answered by Lewis in "New Work for a Theory of Universals" pp. 352–355. I have in mind the "Relation Regress" and the "Restricted Third Man".[23] I turn, then, to the argument contained in the following passage:[24]

> Suppose that *a* and *b* have quite different properties. According to the theory of transcendent Forms they are in themselves exactly the same. Their only differences lie in their relational properties: their relations to a different set of Forms. But may there not be a difference of nature in *a* and *b*, beyond mere numerical difference? Yet this difference the theory of Forms could not account for.

To fail to be exactly alike, objects must differ intrinsically in some way; a mere relational difference is not enough. But if TU is true, every difference between objects looks relational. After all, an object is white, say, because of its relation to a wholly separate entity: the transcendent universal *whiteness*. In contrast, it might be thought, differences in instantiated immanent universals would be in a sense non-relational, for those universals would be co-located with their instances.

As initially appealing as this argument may be, there is a response. Let us distinguish two senses in which objects differ intrinsically. TU is incompatible with difference in a sense that requires co-location of universals. But we can make out another sense of intrinsic difference. How it should be characterized precisely is open for debate, but Lewis has proposed a promising method that

[23] Armstrong Armstrong (1978*a*, 70, 72–73).
[24] Armstrong (1978*a*, 69).

appeals to perfect naturalness.[25] Let us here apply perfect naturalness to universals rather than L-properties and L-relations; we may then define *duplicates* as objects whose parts have the same perfectly natural monadic universals and stand in the same perfectly natural polyadic universals. Objects differ in this latter sense iff they are not duplicates.

The TU-ist will claim, correctly in my opinion, that enough homage is paid to intuition by saying that objects sometimes differ in Lewis's sense; rejecting differences in the other sense is no great price to pay. The crux of the response here is that universals being transcendent need not preclude a distinction between natural and non-natural universals, and thus need not preclude the notion of duplication.

3.2 The Argument From Causal Powers

A related argument is the following:[26]

It is natural to say both that the causal powers of a particular are determined by its properties, and that these powers are determined by the particular's own self and not by anything beyond it. But if the theory of transcendent universals is accepted, a thing's properties are not determined by its own self, but rather by the relations it has to Forms beyond itself.

Armstrong's claim here is that TU is inconsistent with the truth of:

> (CP) The causal powers of an object are not determined by objects beyond it

The response here is like the response of the previous section. (CP) has a reading with which TU is inconsistent: that the causal powers of an object can only be determined by objects co-located with that object. But a defender of TU can reject this sense of (CP), and still preserve the intuition behind such talk as:[27]

> My causal powers are not determined by objects "beyond" me. For example, my ability to lift this barbell is independent of the outcome of the Olympic weightlifting championship.

[25] See Lewis (1986*b*, 61–62). I object to this proposal in matters of detail in Sider (1994, section 3.2).

[26] Armstrong (1978*a*, 75).

[27] Of course, the outcome of the Olympics might *cause* changes in my causal powers; I might become depressed upon learning of the outcome, and thereby weaken.

Following Lewis, say that a universal or L-property is *intrinsic* iff it can never differ between any two possible duplicates.[28] The more important sense of (CP) is the following:

> (CP′) The causal powers of an object are completely determined by what intrinsic universals (L-properties) that thing instantiates, together with the laws of nature.

Since I have my intrinsic universals (L-properties) just in virtue of the way I am in myself, and not in virtue of my relations to the competitors in the Olympic championship, this seems to capture the intuition in question.

3.3 Explanation of Resemblance

In this section I want to address a thought that I think is common to the last two arguments. In each case Armstrong claimed that some fact could not be explained by TU. In the Duplication argument, the fact was that objects can differ intrinsically. In the causal powers argument, the fact was that the causal powers of an object are in some sense independent of objects external to that object. In each case, I argued that TU can account for these facts by appealing to perfectly natural universals. I argued, for example, that two objects can fail to be exactly alike because of differences in the perfectly natural universals instantiated by their parts. However, we can imagine Armstrong responding as follows.

> In name, you can account for these facts. But your explanation of the facts is inferior because your universals are transcendent. Consider an electron, *a* and a positron *b*. You explain the fact that *a* and *b* are not exactly alike by saying that they are not duplicates—that *a* instantiates some perfectly natural universal that *b* fails to instantiate. But this universal is not *wholly present* in, co-located with, *a*, on your view, whereas it is on my view. Therefore, my account is the more satisfying one.

But it is not at all clear that co-location provides a superior explanation of facts of resemblance. The electron and the positron differ intrinsically in virtue of instantiating different perfectly natural universals; why would the universal of

[28] Lewis (1986*b*, 62).

unit negative charge being co-located with the electron explain this difference better? Would it be easier for the universal to "do its thing" if it were spatially closer to the electron? I don't see why. A universal is not a bright light that illuminates its instance from within, causing the instance to take on its own properties. If the instantiation relation were some sort of causal relation, then perhaps traditional worries about "action at a distance" might support the claim that co-location represents an explanatory advantage,[29] but defenders of universals tend to reject a causal interpretation of instantiation, and for good reason. First, causal relations are typically contingent, in the following sense: if x causes y, it is at least metaphysically possible for x and y to exist with the same intrinsic natures without x causing y. However, instantiation cannot be contingent in this sense, for if x instantiates the universal of *roundness*, then x must instantiate *roundness* in any world where x has its actual intrinsic nature. Secondly, causal relations are typically thought to hold in virtue of the qualitative properties (both intrinsic and relational) of its *relata*, whereas the holding of the instantiation relation is supposed to explain the having of such qualitative properties. So I reject the idea that (L) represents explanatory superiority for immanent universals.

Moreover, if we grant the possibility of objects that exist outside of space, we can make a further objection. Perhaps disembodied souls or unlocated gods are possible; or perhaps there are very simple possible worlds whose spacetime structures are far simpler than ours, containing merely temporal dimensions. But facts of intrinsic difference and intrinsic similarity between a pair of spatially unlocated objects with identical total temporal locations could not be explained by appeal to spatiotemporal coincidence or lack thereof between universals and instances, for such a pair would have identical total spatiotemporal locations. So, in this possible case, co-location represents no explanatory advantage; but if it did in fact represent explanatory advantage, then this would presumably be due to the very nature of resemblance and instantiation, and hence would hold of necessity.

It may be objected that I have ignored a more promising construal of immanence, on which immanent universals have superior explanatory power: universals are *constituents* of their instances. Armstrong's theory was originally presented in *Universals and Scientific Realism*, and was vague and inexplicit on the question of immanence; Lewis's interpretation in terms of the mereological and spatiotemporal components seemed justified. Since then, Armstrong has been

[29]Here I am indebted to an anonymous referee.

more explicit; in his book *A Combinatorial Theory of Possibility* Armstrong gives a new account of immanence, according to which (thick) particulars contain their universals as "constituents". Constituency is *not* parthood, although it is presumably a sort of "being in" or "containment"; otherwise universals wouldn't seem to be "wholly present" in their instances.[30] I find these new doctrines unhelpful, because I find constituency obscure. We are never given a positive account of what constituency amounts to, and until we are, we cannot evaluate whether it would represent superior explanatory power.

Armstrong might give 'constituency' an Aristotelian reading, and claim that while universals are not parts of their instances, they are "in" them in a sense of ontological dependence: were there no instances, the universal would not exist.[31] (Armstrong does indeed reject uninstantiated universals; see note 6.) We need not bicker over whether this is legitimately called a kind of "containment" or "being in", because the Aristotelian reading doesn't help Armstrong's cause here, for three reasons. First, it isn't clear how ontological dependence of universals on particulars would help the explanation of resemblance. At best, the ontological dependence might point to the existence of an especially intimate relationship between universals and particulars, which would then help explain resemblance. But we'd need a positive account of this other relation, and why it would explain resemblance; the claim of ontological dependence doesn't do on its own. Secondly, and relatedly: the universal of *unit negative charge*, for example, doesn't ontologically depend on any particular electron; for it to exist, there must merely be some instance or other. But how can this general relation of ontological dependence explain particular cases of resemblance? Only if it is taken as evidence for some other special, intimate relationship that holds between a universal and every particular that instantiates it, and as before, we'd need an account of this relation. Finally, even if we granted Aristotelian immanence, it wouldn't play the role that immanence is supposed to play in this paper. In section 2, I granted the conditional that *if* universals are immanent in a spatiotemporal sense, then they must be sparse as well, on the grounds that it would be absurd for all of a given particular's abundant universals to be co-located with that particular. But the conditional has no plausibility under the Aristotelian reading of immanence, for there isn't anything absurd about all of a given particular's abundant universals ontologically depending on their

[30]See Armstrong (1989*a*, 40–43, 52).

[31]I am indebted to suggestions by Phillip Bricker and an anonymous referee here. See Aristotle's *Categories*, book 5.

instances.

3.4 The Argument from Causal Impotence

Finally, we have the following argument:[32]

A spatio-temporal realm of particulars certainly exists (it includes our bodies.) Whether anything else exists is controversial. If any entities outside this realm are postulated, but it is stipulated further that they have no manner of causal action upon the particulars in this realm, then there is no compelling reason to postulate them. Occam's razor then enjoins us not to postulate them.

This argument does not merely apply to transcendent universals, but I will only consider this application of the argument: transcendent universals would be causally inert entities; since we have no reason to postulate causally inert entities, we have no reason to postulate transcendent universals.

This is a familiar argument against postulating "abstract" entities of all kinds. An equally familiar response is that the theoretical benefits of postulating causally inert entities overrides any presumption against them. A common analogy: we can best understand the truth of mathematics by postulating a realm of sets.[33] As it is legitimate to postulate sets to make sense of mathematics, so (the response goes) it is legitimate to postulate propositions, properties, transcendent universals, possible worlds, etc. to make sense of various data.[34] Abstract objects are postulated for their non-causal explanatory value.

I have nothing new to add to this part of the debate; I suppose I throw my lot in with those who appeal to the precedent of sets. But that response is only necessary once we have found a version of the argument that isn't subject to other difficulties. This, it will be seen, is not a trivial matter.

The difficulty arises when we ask what it is for an object to be causally inert.[35] We might think that an object is causally inert iff it is incapable of

[32] Armstrong (1978*a*, 130). All of chapter 12 is relevant.

[33] See Putnam (1971), especially chapters 5, 7, and 8.

[34] SeeArmstrong (1978*a*, 128–132); Lewis (1986*b*, 3–5); Lewis (1991, 57–59); Armstrong (1989*a*, 7–13).

[35] Armstrong doesn't explicitly formulate a notion of causal inertness, and it is difficult to infer an implicit notion from his arguments that transcendent universals would be causally inert. Those arguments are, in fact, perplexing. In one he claims that transcendent universals cannot change, so they cannot enter into causal relations (Armstrong, 1978*a*, 128). In another he argues that traditionally, the notion of a God, or a Cartesian soul, acting on Nature has been problematical. If so, then the notion of transcendent universals entering into causal relations must be more problematical (Armstrong, 1978*a*, 129–130). Neither seems convincing, and at

entering into causal relations. But philosophers often hold that causal relations hold fundamentally between events. Granted, if a billiard ball's striking another billiard ball causes it to move, we might say that "the billiard ball caused the motion". But this is usually interpreted as meaning that the event of the billiard ball's striking the other ball caused the event of the motion of the other ball to occur. We might call the former sort of causation, based on taking such talk seriously, "common sense" causation. But just as particulars enter into common sense causal relations, so would transcendent universals. We say that heat caused the rash, that greed causes much of the suffering in the world, or that negative charge sometimes causes electromagnetic repulsion. So let us consider only the philosopher's causal relation, which holds only between events.

If only events stand in causal relations, then we cannot say that an object is causally inert iff it is incapable of standing in causal relations, for on this definition, billiard balls would turn out causally inert! For myself, I feel compelled to postulate the existence of billiard balls, so let us instead assume the following definition:

(CI) x is *causally inert* $=_{\mathrm{df}}$ It would be impossible for there to be an event E that "involves" x and enters into a causal relation with some other event

This leaves us the problem of saying what it is for a event to involve an object, and this will depend on exactly how we construe events.

On Jaegwon Kim's conception of events, to an event *x's having P* there corresponds an ordered pair ⟨x,P⟩—x the event's "constituent object", and P the "constituent attribute" (universal).[36] Kim's conception is no help to the argument: the items involved in an event would naturally be taken to be its constituent objects and attributes, and this would make universals just as causally potent as particulars.

Events are sometimes alternatively conceived as regions of spacetime.[37] This view of events gives us a neat spatiotemporal definition of 'involves':[38]

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least the first argument would apply just as well to immanent universals.

[36]We may ignore the time of the event's occurrence, which Kim includes. See Kim (1973, 222–226).

[37]See, for example, Lemmon (1967, 98–99), and Lewis (1986*a*, note 4) for more references on this Davidsonian conception of events. Points analogous to those I make in the text would apply to Lewis's (1986*a*) theory of events as properties of regions of spacetime.

[38]Phillip Bricker suggested defining 'involves' in terms of spatiotemporal location.

(I1) event E *involves* x $=_{df}$ x is (wholly) located in E during the duration of E

On this definition, we get the result Armstrong needs: transcendent universals cannot be involved in events, whereas immanent universals can be involved in events. But I have a nagging doubt. The argument seems to stack the deck unfairly against TU by its definition of 'involves'. Why not define the term as follows?:

(I2) event E *involves* x $=_{df}$ x is wholly located in E or x is instantiated by something wholly located in E

If an event, construed as a region of spacetime, causes something, it seems that the universals instantiated by the objects contained therein are no less "involved" than the objects themselves. After all, the causal powers of such an event depend on what universals are instantiated in it. I see no reason to prefer (I1) to (I2), other than a prejudice against transcendent universals. The intuition behind the argument was that we have no reason to postulate entities that don't "do anything", and what is emerging is that there is a perfectly natural sense in which universals *do* "do things": a ball drops, for example, partly because it instantiates a certain universal of mass.

I conclude, then, that there is no interesting sense of 'causally inert' in which universals are causally inert but particulars are not. Until we have found such a sense the argument is a non-starter, and there is no need for the appeal to the precedent of sets.[39]

4. Conclusion

I have argued that i) the analysis of naturalness in terms of sparse universals that was suggested by David Lewis is unlikely to succeed, if that analysis is to include the notion of relative naturalness, and ii) that Armstrong's arguments against transcendent universals are unsuccessful. Together, my arguments serve to weaken the case for sparse universals. For if sparse universals could deliver an analysis of naturalness, this would provide a motive to postulate them, and if transcendent universals were implausible, immanent universals would be our

[39] I offer this diagnosis only in the present case of the argument applied to all transcendent universals. The notion of causal impotence may be important when the argument is offered with respect to possible worlds, numbers, and even perhaps uninstantiated properties.

remaining option, which are only plausible if they are sparse. Of course, there are other arguments for sparse universals that I haven't considered. If we had no need to postulate any "property-like" things at all beyond sparse universals, then Occam's razor would exhort us to keep our universals sparse. But the question of whether we need abundant properties and relations, or whether we can get by with sparse universals alone, is a question for another time.[40]

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[40] Lewis discusses this topic in Lewis (1983, 348–351).

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