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Extended simples

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Abstract I argue that extended simples are possible. The argument given here parallels an argument given elsewhere for the claim that the shape properties of material objects are extrinsic, not intrinsic as is commonly supposed. In the final section of the paper, I show that if the shape properties of material objects are extrinsic, the most popular argument against extended simples fails.

Extended simples

An extended material simple is a material object extended in space (or spacetime) that nonetheless lacks proper parts. I shall do the following: in Section I, I will argue that the claim that extended simple are metaphysically possible should be taken seriously; in Section II, I will present a direct argument for the claim that extended simples are metaphysically possible; in Section III, I undercut the standard argument against extended simples.

Why worry about the possibility of extended simples? First, speculation about the possibility of extended simples is not confined to philosophy. In a recent article, Scala (2002) presents some evidence that Isaac Newton believed that the fundamental objects of this world are extended simples. And, more recently, in a popular book on string theory, the physicist Greene (1999) seriously entertain this hypothesis as well:

> What are strings made of? There are two possible answers to this question. First, strings are truly fundamental – they are ‘‘atoms,’’ uncuttable constituents, in the truest sense of the ancient Greeks. As the absolute smallest constituents of everything, they represent the end of the line.... From this perspective, even though strings have spatial extent, the question of their composition is without any content. Were strings to be made of something smaller, they would not be fundamental. [141]

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Extended simples seem to be conceivable—they have been conceived—and may even play a role in fundamental physics.

Second, certain philosophical theories about the nature of simples imply the possibility of extended simples, and other theories about the nature of simples at least do not eliminate this possibility. An example of the first kind of theory is the Maximally Continuous View of Simples (MaxCon), according to which an object is a simple if and only if it fills a continuous region of space that is not a proper sub-region of a larger continuous matter-filled region of space.[1] MaxCon implies that extended simples are possible, since continuous matter-filled regions of space (that are not sub-regions of some larger continuous matter-filled region of space) are clearly possible. An example of the second kind of theory is the Brutal View of Simples, according to which there is no non-mereological criterion for being a simple.[2] The Brutal View does not entail that extended simples are possible, but it does not eliminate this possibility either.

These are reasons to take the possibility of extended material simples seriously. I will now present a direct argument for the possibility of extended material simples. This argument extends on an argument made elsewhere for the thesis that the shape of a material object is an extrinsic property. It turns out that if this argument is sound, we can construct a parallel argument for the possibility of extended material simples. I'll now turn to the details.

The shapes of simple things

I assume a duality of thing and location: there are material objects and regions of spacetime wherein the objects reside. I also assume that the fundamental parthood relation defined on material objects and material objects is a two-place relation: *x is a part of y*.

Although regions of spacetime and material objects belong to different ontological categories, they are united by a fundamental relation: *occupation*.[3] A region occupied by a material object is where that object is located in spacetime. I take the facts of occupation to be primitive; that a particular thing occupies a particular region is a rock-bottom fact, capable of no further analysis. The occupation relation is the most basic relation that ties things to their places. It is a *perfectly natural relation* in the sense explicated by Lewis (1986): occupation carves reality at the joints, and belongs to the fundamental supervenience base of the world.

The following facts should help the reader grasp the relevant relation. First, if an object *x* occupies a region of spacetime *r*, then, typically, every part of *x* occupies some part of *r*. Example: I occupy a particular region of spacetime and my hand occupies a sub-region of this region. Second, if *x* occupies a region of spacetime *r*, it does *not* follow that *x* occupies a proper sub-region of *r*. In fact, this typically will not be the case; instead, in the typical case, a proper part of *x* occupies a proper sub-region of *r*. Consider an instantaneous desk-shaped object *D*. *D* occupies an extended three-dimensional region of spacetime; suppose that *D* has point-sized proper parts. *D* does not occupy the point-sized sub-regions occupied by its point-sized parts. Third, if an object occupies two disjoint regions, it does not follow

[1] See Markosian (1998) for a defense of MaxCon; see McDaniel (2003b) for arguments against MaxCon.

[2] See McDaniel (forthcoming) for a defense of the Brutal View of Simples.

[3] A relation is *external* just in case it does not supervene on the intrinsic properties of its relata, but does supervene on the intrinsic properties of the fusion of its relata. See Lewis (1986, pp. 60–61).

that the object occupies the fusion of these regions. (When an object occupies two disjoint regions, I say that the object enjoys *multi-location.*) Example: suppose that an immanent universal is instantiated by an object at R1 and a different object at R2. Suppose the universal is *not* instantiated by the fusion of these objects. (This can happen; suppose something is composed of two electrons, each with a charge of negative –1. It doesn't follow that the fusion of these electrons has a charge of –1!) A universal is located wherever it is instantiated and at no other place. So the universal occupies R1 and R2 but does *not* occupy R1 ∪ R2.

Other interesting location-concepts can be defined in terms of occupation. I mention them in order to distinguish these notions from the concept of occupation.[4]

> *x fills* region R = df. Either (i) there is some R′ such that R is a part of R′ and *x* occupies R′ or (ii) there is a region R′ and there are regions, the *rs*, such that R′ is the fusion of the *rs*, *x* occupies each of the *rs*, and R is a part of R′.

Informally, objects fill the regions they occupy, the proper parts of the regions they occupy, the sums of the regions they occupy, and the sums of proper parts of regions they occupy.

> *x lies within* R = df. There is some region R′ such that R′ is a part of R and *x* occupies R′.

Informally, an object lies within a region just in case it occupies a part of that region.

> R is *empty* = df. There is no *x* such that *x* fills R and there is no *x* such that *x* lies within R.

The notion of an empty region provided here captures our intuitive notion of what it is for a region of spacetime to be empty.

> *x partially fills* R = df. There are regions R′ and R″ such that (i) R = R′ ∪ R″, (ii) *x* fills R′, and (iii) *x* does not fill R″.

Intuitively, an object partially fills a region just in case some of the object is in the region and some of the region is empty of the object. (Note, however, that this definition allows that an object can partially fill a region without having a proper part that occupies any proper part of that region.)

> *x uniquely occupies* R = df. *x* occupies R and no region other than R.

> *x* is *multi-located* = df. There are regions R and R′ such that (i) R is not identical with R′ and (ii) *x* occupies R and *x* occupies R′.[5]

> *x covers* region R = df. R is the union of the regions occupied by *x*.[6]

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[4] These definitions draw on the work of Gilmore (2004); similar ideas were independently developed in Sattig (forthcoming). Parsons (forthcoming) defends a competing system, which is weaker in the sense that it does not recognize the relation I call occupation.

[5] Putative examples of multi-located objects include immanent universals and material objects that persist by enduring. A material object persisting through time by perduring is *not* multi-located; instead, it uniquely occupies a temporally extended spatiotemporal region, and has proper parts uniquely occupying sub-regions of that region. A hybrid view has recently been defended by Hudson (2001), according to which material objects are multi-located at extended four-dimensional regions.

[6] To use the terminology of Gilmore (forthcoming), when *x* covers *R*, *R* is the *path* of *x*. Interestingly, as Gilmore points out, both the endurantist and perdurantist will agree on which objects cover which regions, although they will disagree on which objects occupy which regions.

Once we have these definitions, we can see that there are at least two viable conceptions of extended simples. First, there is the conception of extended simples as *multi-located* objects; this seems to be the conception of extended simples defended in Parsons (2000).[7] Call these simples *multi-locaters*. According to this conception, an extended simple bears the occupation relation to continuum many spacetime points, the fusion of which is an extended spatiotemporal region. A multi-locater is multi-located; it is extended in virtue of covering an extended region.

Second, there is the conception of extended simples as *spanners*; this is one of the conceptions of extended simples defended in Gilmore (2004) and Lewis. Lewis (1991) entertains—but does not endorse—the hypothesis that *singleton sets* are this sort of extended simple. He writes:

> Perhaps, indeed, every singleton is just where its member is. Since members of singletons occupy extended spatiotemporal regions, and singletons are atoms, that would have to mean that something can occupy an extended spatiotemporal region otherwise than by having parts that occupy different parts of the region, and that would certainly be peculiar. But not more peculiar, I think, than being nowhere at all.... [32]

And later in the same book, Lewis writes:

> Finally, if something occupies a region, mereology *per se* does not demand that each part of the occupied region must be occupied by some part – proper or improper – of the occupying thing. If not, that's a second way for a singleton atom to be where its extended member is. [76]

According to this conception, an extended simple bears the occupation relation to exactly one extended spatiotemporal region, without bearing the location relation to any proper part of that extended region. Spanners are not multi-located; they uniquely occupy a single extended region of spacetime.[8] Elsewhere, Sider (forthcoming) and Parsons (2000) have argued that multi-locaters are possible, so I will concentrate on the possibility of spanners.

Recently, recognition of the duality of thing and location has led several philosophers to endorse the view that I call the *extrinsic theory*. According to the extrinsic theory, the shape of a material object is not an *intrinsic* property of that object, as is sometimes supposed.[9] Instead, the shape of a material object is an *extrinsic* property; specifically, the shape of a material object is an extrinsic property had by that object

[7] Dean Zimmerman seems to hold this conception of extended simples as well; see Zimmerman (2002, p. 402). See also Hawley (2001, p. 28 and 49).

[8] Given the various location concepts we have, we could introduce the concept of a *multi-located spanner*, which is the concept of an object that occupies multiple, disjoint, extended regions of spacetime without having proper parts. (A multi-located material simple in a gunky spacetime would have to be a multi-located spanner.) I will ignore whether these strange beasts are also possible in what follows.

[9] Some philosophers have claimed that it is obvious that the shape of a material object is intrinsic. For example, Lewis (1986) writes, "If we know what shape is, we know it is a property, not a relation" [204]. It is clear from the context that Lewis holds that we know that shapes are intrinsic properties. But it is not clear to me that we know this: it is a Moorean fact that material objects have shape properties, but it is not a Moorean fact that these properties are intrinsic.

in virtue of its occupying a region of space (or spacetime) which has that shape intrinsically.[10] We can think of the shape of an object as the sum of those features of an object that are determined by its geometrical features, i.e., its topological structure, affine structure, metrical structure, etc.[11] Each structure is exemplified by a material object only if it occupies a region that exemplifies that structure. The fact that a material object has a shape is *constituted* by the fact that it bears a relation to a region of space that has that shape.[12]

One interesting argument for the extrinsic theory is a Humean argument.[13] In general, it is a necessary truth that the shape of a material object corresponds to the shape of the region it occupies, i.e., necessarily, if *o* occupies *r*, then *o* has the same shape as *r*. Suppose, contrary to the extrinsic theory, that the shapes of both material objects and regions of space (or spacetime) are intrinsic. Then there is a necessary connection between the *intrinsic* properties of distinct existences, since, for example, necessarily, nothing that is a cubical material object occupies a spherical region of space. Moreover, this necessary connection is a connection between the *accidental* intrinsic properties of distinct existences, where an *accidental property* is a property such that it is possible that something instantiate it that could have failed to instantiate it.[14] But this sort of necessary connection between the intrinsic properties of distinct existences—a connection that implies that objects with certain intrinsic accidental properties *cannot* bear a fundamental to each other—is an anathema to good Humeans. That is, if we are good Humeans, we will accept something like the following claim:

> (NNC): Let F and G be accidental, intrinsic properties; let R be a fundamental relation; let *x* and *y* be contingently existing non-overlapping entities. Then it is not the case that, necessarily, R*xy* only if (F*x* if and only if G*y*).[15]

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10 I've argued for the extrinsic theory in McDaniel (2004, chapter three); part of the extrinsic theory is used to defend endurantism in McDaniel (2003a) and McDaniel (unpublished); Brad Skow (unpublished) also defends the extrinsic theory in tremendous detail in Skow (unpublished). Parsons (forthcoming) takes the view seriously enough to argue against it.

11 Accordingly, the *size* of an object is a part of its shape. Given this admittedly somewhat non-standard definition of "shape," two cubical regions of Euclidean space that differ only with respect to their volumes have different shapes. However, given this definition of "shape," *incongruent counterparts*, such as perfectly symmetrical left and right hands, have the same shape. Whether an object is a left or right hand is not determined solely by the topological, geometrical, or metrical properties of that object, but is rather determined by those properties *and* the relations it bears to other things. Accordingly, I count myself as an advocate of *extrinsicism* about handedness, to use the terminology of James van Cleve. See van Cleve (1987) for an interesting discussion of philosophical problems concerning incongruent counterparts.

12 This means that we shouldn't think that the way in which a region bestows shape on an object is similar to the way a container bestows shape on the liquid poured into it. In a case like this, the shape of the liquid is *causally* dependent on the shape of the container. But the liquid's shape is not *metaphysically* dependent on the shape of the container. The liquid has this shape *intrinsically* if and only if the container does. I thank David Robb for this helpful example.

13 This argument is stated and defended in McDaniel (2004) and Skow (unpublished).

14 In symbols: property P is *accidental* = df. $\Diamond(\exists x\ x$ instantiates P and $\Diamond$ (x does not instantiate P)).

15 I thank Andrew Cortens and Hud Hudson for helpful discussion about how best to formulate this principle. The Humean argument for the extrinsicality of shape is similar in certain respects to the argument made by David Lewis against magical ersatzism in Lewis (1986, pp. 174–182); van Inwagen (1986) is a response to Lewis's argument.

The extrinsic theory provides an obvious out for the Humean: if a material object has a shape only in virtue of occupying a region of space with that shape, then there is a no necessary connection between the accidental intrinsic properties of distinct entities. There is a necessary connection between an extrinsic property of one object and an intrinsic property of another, but obviously this sort of connection is unproblematic for the Humean.

This argument for the extrinsic theory is appealing. I'll now argue that, if you accept this argument for the extrinsic theory, then you should believe that extended simples are possible. I anticipate that some philosophers will take this fact to show that the argument for the extrinsic theory is unsound; the most likely target is NNC.[16] Since the extrinsic theory has been defended elsewhere, I will concentrate on defending the conditional claim here.

So suppose that the argument given above for the extrinsic theory is sound. We accept the Humean premise that there are no necessary connections between the intrinsic properties of regions and the intrinsic properties of material objects. I claim that the possibility of extended simples follows from this Humean premise as well. To see this, it will be helpful to first introduce the notion of *sameness of mereological structure*: two entities have the same mereological structure just in case there is a one–one correspondence between their parts that preserves parthood. Trivially, every mereological atom has the same mereological structure as every other mereological atom. Moreover, given standard mereology, any two objects composed of the same number of mereological atoms will have the same mereological structure. (In a non-standard mereology in which universal summation is not assumed, this might not be the case.) We can then think of the mereological structure of an object as the property that determines whether that object has the same mereological structure as another object.

If an object occupies a region of space, must it have the same mereological structure as that region of space? Given the Humean premise, if an object must have the same mereological structure as the region of space it occupies, then either the mereological structure of the object is not intrinsic, or the mereological structure of the region of space is not intrinsic, or the mereological structure is not accidental. Note that this argument so far is perfectly parallel to the argument given earlier for the extrinsic theory of shape.

In general, we think that an object's mereological structure is an accidental property in the sense defined earlier. Consider a material object with a complex mereological structure. Unless you a mereological essentialist, like Chisholm (1976), you hold that this object could have had one fewer proper part. But then you hold that mereological structure is accidental. Elsewhere, Markosian (1998, p. 221) has defended the possibility that being a simple is an accidental property as well. I'll presuppose this in what follows. (See also McDaniel (forthcoming) for further discussion of whether being a simple is accidental.)

However, now we run into a glaring dissimilarity: for although the extrinsic theory of shape is a live contender, the corresponding extrinsic theory of mereological structure is demonstrably false.

[16] One could also deny that the claim that the occupation relation is external, or the assumption that spacetime is substantival. This latter course of action is discussed in Skow (unpublished). Parsons (forthcoming) suggests that we hold that material objects and regions of spacetime overlap—material objects, on this view, have regions as proper parts—and so the Humean principle employed here does not apply.

Intrinsic properties are properties that never differ between duplicates. Duplicates are objects such that there is a 1–1 correspondence between their proper parts that preserves perfectly natural properties and relations.[17] Suppose that *x* and *y* are duplicates and that *x* has mereological structure *S*. Since *x* and *y* are duplicates, there is a 1–1 correspondence between their parts that preserves perfectly natural properties and relations. But, then there is a 1–1 correspondence between their parts that preserves parthood. So *S* is preserved by duplication. So, in general, mereological structure is intrinsic.

It's easier to see why *simplicity* must be intrinsic: suppose that *S* is a simple; then any duplicate of *S*, *S′*, will also be a simple, since there will be a 1–1 correspondence between the sole part of *S*—which is *S*—and the parts of *S′*, which, accordingly, must simply consist in S′. So any duplicate of a simple is a simple.

So *if* we accept the Humean premise that there are no necessary connections between the accidental, intrinsic properties of regions of space and the accidental, intrinsic properties of material objects, then we should hold that there are no necessary connections between the mereological structure of a material object and the mereological structure of the region it occupies. Specifically, it is not true that, necessarily, a material object is a simple if and only if it occupies a simple (read: point-sized) region of spacetime. It follows that extended material simples are possible.

Extension and parthood

Although I am moved by the considerations of the previous section, I am aware that many philosophers will not be. If the Humean argument for the extrinsic theory of shape is unsound, the parallel argument for extended simples is presumably unsound as well. However, the extrinsic theory of shape may nonetheless be true even if the argument for it presented in the previous section is unsound.[18] And there is a second interesting connection between the extrinsic theory of shape and the possibility of extended simples: if the extrinsic theory of shape is true, then the most popular argument *against* the possibility of extended simples is unsound.

The history of philosophy has not always been kind to extended simples. It is this argument, or something very similar to it, that has led many philosophers to reject the possibility of extended simples:

(1) If there were an extended simple, then it would have two halves.

(2) If it had two halves, then the simple would have proper parts.

∴ Hence, there can't be any extended simples.[19]

[17] Natural properties ground *objective similarity*: when two things instantiate the same natural property, they are objectively similar in some respect. Natural properties and relations are fundamental in this sense: the pattern of instantiation of the perfectly natural properties and relations determines the pattern of instantiation of every other qualitative property and relation. On this notion of naturalness, see Lewis (1986, pp. 60–61).

[18] The extrinsic theory is motivated by considerations that are completely independent of the Humean argument discussed in Sect. II. See Skow (unpublished) for a full defense of the extrinsic theory. Additionally, ancestors of the extrinsic theory are defended in McDaniel (2003a), Nerlich (1994, pp. 19–43), and Sider (2001, p. 81).

[19] Descartes discusses this argument in Descartes (1985, chapter II, section 20, p. 231). Markosian discusses it in Markosian (1998, pp. 223–224).

Let us understand (2) so that it is analytically true. That is, let us understand talk about halves in such a way that a half of an object is literally a part of that object. If we understand (2) in this fashion, the main premise in the argument is (1). What can be said in its defense?

Let us note that (1) is *not* analytic. Moreover, (1) is neither an axiom nor theorem of any pure mereology, since it makes use of a concept—spatial extension—that is not a mereological concept. So a defense of (1) must appeal to principles that go beyond the province of pure mereology. One way of arguing for (1) is via an appeal to a more general principle that entails (1). One such principle is the Doctrine of Arbitrary Undetached Parts (DAUP), which can be stated as follows:

> (DAUP): Necessarily, for every material object M, if R is the region of space occupied by M, and if sub-R is any occupiable sub-region of R whatever, there exists a material object that occupies the region sub-R and which is a part of M.[20]

But simply appealing to DAUP will not settle the issue. For the defender of the possibility of extended simples will simply reject DAUP. And then we will have reached an argumentative stalemate. In order to prevent this from happening, it is important to first determine what can be said in defense of DAUP. The next step, in order to prevent argumentative deadlock, is to figure out if the advocate of extended simples can reasonably reject some part of the case for DAUP without begging the question. So what can be said to motivate DAUP?

I think an interesting argument for DAUP can be made. The argument for DAUP has two premises. The first premise is a general principle that I call the *Principle of Qualitative Variation* (PQV), which can be stated as follows:

> (PQV): For any object *x*, regions R+, R1, and R2, and intrinsic properties F1 and F2, if (i) *x* occupies R+, (ii) R1 and R2 are non-overlapping proper sub-regions of R+, (iii) F1 is not identical to F2, (iv) *x* instantiates F1 at R1 but does not instantiate F2 at R1, and (v) *x* instantiates F2 at R2 but does not instantiate F1 at R2, then there are two objects *x1* and *x2* such that (a) *x1* is not identical to *x2*, (b) *x1* and *x2* are non-overlapping proper parts of *x*, and (c) *x1* instantiates F1 and *x2* instantiates F2.[21]

Informally, PQV states that, whenever an object has intrinsic properties distributed within the region it occupies, it has parts corresponding to the locations where its qualities are distributed. PQV implies that, in cases in which F is a genuine intrinsic property, propositions of the form *x* is F at location R entail propositions of the form *y* is F. Given PQV, the fundamental instantiation relation that links objects to their properties is a two-place relation.

It is important to distinguish the following kinds of situations: (1) a situation in which *x* has-relative-to-region-R the property Fness and (2) a situation in which *x* has Gness, where Gness is an extrinsic property that *x* has in virtue of bearing a

[20] DAUP is discussed in van Inwagen (1981). (My statement of DAUP is slightly different from his.) I assume here that all regions of space—including point-sized regions—are possibly occupied by a material object.

[21] By "properties" I mean only one-place properties, whether intrinsic or extrinsic. (In some circumstances, it is convenient to think of relations as 2+-place properties. This is not one of those circumstances.) I thank an anonymous referee for helpful discussion about how best to formulate PQV.

relation to a region of space. In the first situation, *x* has a property relative to a region. In the second situation, *x* just plain instantiates Gness; *x* does not instantiate Gness relative to any region of space. Here is a concrete example of the second sort of situation: suppose *x* is five feet from a region of space R. Then *x* has the extrinsic property being five feet from R. But *x* does not have this property relative to any region of space; *x* just plain has the property. In this case, PQV does not imply that *x* has a property at R.

PQV is very plausible. This is not to say that it cannot be contested. One could reject PQV and instead accept *spatial adverbalism*, according to which the instantiation relation that links objects to their properties is really a three-place relation between an object, a property, and a region of space. The strategy is analogous to adopting temporal adverbalism in order to avoid the problem of intrinsic change over time. For a discussion of the adverbalist strategy in general and spatial adverbalism in particular, see respectively Johnston (1987) and McDaniel (2003b).

A second way of rejecting PQV has been advocated by Markosian (1998, 2004). This way of rejecting PQV involves an appeal to *stuff* or *matter*. According to Markosian, the material world bifurcates into a world of things, which are referred to by count nouns, and a world of stuffs, which are referred to by mass nouns. According to Markosian, whenever a material object occupies an extended region of space, that region is also occupied by some stuff. Even if the object in question is an extended simple that fails to have proper parts that occupy sub-regions of regions it occupies, each of those sub-regions is occupied by stuff or matter. Both objects and matter can instantiate intrinsic properties. Markosian claims that, in a case in which an extended simple instantiates intrinsic properties relative to a region, although no *thing* just plain instantiates these properties *simpliciter*, some *stuff* does.

I've been convinced by an argument by Gilmore (2004) that postulating stuff or matter does not help the friend of extended simples. Furthermore, if we abandon PQV, then it is very hard to see why we should believe that any object has parts. And even the advocate of extended simples believes that some objects have proper parts. (On this issue, see Sider, 2001, pp. 87–92.) Accordingly, I will press on.[22]

As I mentioned earlier, PQV is very plausible. However, PQV does not by itself imply DAUP. We can see this if we consider that the conjunction of PQV and the extrinsic theory is consistent with the denial of DAUP. (More on this in a moment.) However, the conjunction of PQV and the claim that the shape properties of material objects are intrinsic entails DAUP. Suppose that a material object *o* occupies a cubical volume of space R. Then the property of being hemi-cubical will be instantiated by *o* at the bottom half of R (call this region *Bottom*) and at the top half of R (call this region *Top*). If shape properties are intrinsic properties, then being hemi-cubical is an intrinsic property. And so, given PQV, there is a part of *o* that occupies Bottom and a part of *o* that occupies Top.

Suppose space contains point-sized parts. On this supposition, being point-sized is instantiated by *o* at every point of space in R. And so, given PQV, *o* has infinitely many point-sized parts. (And so forth for the other sub-regions.) If the shape of a material object is intrinsic and PQV is true, then DAUP is true.

[22] Another interesting strategy for dealing with the phenomenon of spatial intrinsics has been discussed by Parsons (2000). Briefly, the strategy holds that *distributional properties*, such as being red here while being blue there, can be ontologically fundamental and intrinsic. Although this strategy is intriguing, I lack the space to discuss it here.

Another example may be helpful. Suppose you are in a room with an open door. Suppose that workers are moving a large statue through the door. Because of your perceptual experience, you are inclined to say to that you see something shaped like a human arm. (Because of the angle from which you are viewing the statue and the wall between you and the hallway, you can't see the statue in its entirety.) Let us call the region of space that the statue currently occupies R. R overlaps the region occupied by the room you are in; R also overlaps the region occupied by the hallway. R is shaped like a statue. R is a region of space, and it does have an arm-shaped sub-region R-. Let us call the shape of this sub-region being arm-shaped. The statue is arm-shaped at R-. If shape properties are intrinsic, then being arm-shaped is an intrinsic property. But, then, given PQV, the statue has an arm-shaped part that occupies the arm-shaped region.

It makes sense to talk about the properties that an object has at a particular place. But, given PQV, this sort of claim must be analyzable in terms of talk of ''just plain instantiation,'' parthood, and occupation: if an object has an intrinsic property at a place, then that object has a proper part that occupies that place and just plain has the property.[23]

However, if the extrinsic theory is true, then the shapes of material objects are really derivative features. Talk about shapes had by an object at a region is analyzable in terms of shapes had by the region itself and the occupation relation. It is natural to identify the shape of an object with the shape of the region it occupies.[24] Similarly for ''shapes had at regions:'' we can say that an object *o* is S-shaped at R just in case *o* fills R (in the sense defined in the previous section) and R is S-shaped. It follows from this account of being shaped at a region that any extended object will bear a plurality of shape-had-at-a-region relations to a plurality of sub-regions of the region occupied by the extended object. This is exactly the right result.

Given the extrinsic theory, when we say that an object is S-shaped at a region, we do not ascribe a particular quality to that object. Instead, we say something about the region that the object fills. This is why the conjunction of PQV and the extrinsic theory does not imply DAUP, even though the conjunction of PQV and the claim that the shape properties of material objects are intrinsic does imply DAUP.

No one should be tempted by the following principle: if *o* bears a *relation* F to *r*1 and a different *relation* G to *r*2, then *o* has a proper part located at *r*1 and a proper part located at *r*2. If this principle were true, then extended simples would be impossible. Given the extrinsic theory, having a shape at a region consists in bearing a relation to a region with that shape. Accordingly, extended simples would have parts corresponding to the regions of space that they fill. But this principle is far too strong: it also implies that a point-sized simple that is four feet away from a region r1 and five feet away from a region *r*2 has parts at *r*1 and *r*2. The moral we should draw is this: the mere fact that an object bears different relations to different regions of space is not a reason for holding that the object has proper parts that are located at those regions of space. And, if the extrinsic theory is true, having a shape at a region simply consists in bearing a relation to a region. So the fact that an object has a shape at a region should not be taken to entail that it has a part located at that region.

23 See Hinchliff (1996, pp. 121–122).

24 On this way of identifying shape, multi-located objects have many shapes. Alternatively, we could identify the shape of an object with the shape of the region it covers.

The extrinsic theory provides the resources to undermine the argument for DAUP. If the shape of an extended simple is not intrinsic, then the pressure to split up an extended simple simply because it is extended is entirely eliminated. We are justified in positing parts in accordance with PQV, but if the shape properties of material objects are not intrinsic, PQV simply does not apply. Since the advocate of extended simples can justifiably endorse the extrinsic theory, the argumentative stalemate is broken. The advocate of extended simples can reject DAUP without begging the question.[25]

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