

The Problem of Free Mass: Must Properties Cluster?

JONATHAN SCHAFFER

University of Massachusetts—Amherst

Give me your... huddled masses yearning to breathe free.
—Emma Lazarus

Properties come in clusters. It seems impossible, for instance, that a mass could float free, unattached to any other property. David Armstrong takes this as a reductio of the bundle theory and an argument for substrata, while Peter Simons and Arda Denkel reply by supplementing the bundle theory with accounts of property interdependencies. I argue against both views. Virtually all plausible ontologies turn out to be committed to the existence of free masses. I develop and defend the view that the clustering of properties is a mere contingent truth, on grounds that properties can be subtracted one-by-one. This opens the door not just to the (unsupplemented) bundle theory, but also to any plausible account of the relation between objects and properties.

Properties come in clusters. Everything that has mass also has shape, color, and a full array of other properties. Why? Why can't the mass of this page break free, and wander off by itself, leaving its whiteness and smoothness behind? What ontological principle, if any, binds properties together?

I argue that lone properties such as free masses are metaphysically possible—the clustering of properties is merely a contingent fact. Not only do virtually all plausible ontologies countenance free masses, but a positive case can be made for their possibility via principles of property subtraction.

By arguing for the possibility of free masses, I undermine an argument that has led David Armstrong (1989, 1997) to advocate substrata, and has led Peter Simons (1994) and Arda Denkel (1997) to supplement the bundle theory of objects with property interdependencies. What is at stake, ultimately, is the relation between the categories *object* and *property*, as well as the principles internal to *property*.

1. Property Primitivism: Background

The problem of free mass has entered the literature as an objection to *property primitivism*. According to property primitivism, properties are primitive and objects are derivative therefrom. The classic version of property primitivism

is the *bundle theory*, according to which objects reduce to collections of compresent properties. The property primitivist views properties (be they universals or tropes) as “the independent, primitive elements which in combination constitute the variegated and somewhat intelligible world in which we find ourselves.” (Keith Campbell 1981, p. 127) Properties, on this view, are what D. C. Williams called “the alphabet of being”.

Property primitivism, together with a principle of recombination according to which all combinations of independent primitives are possible, entails that a mass may exist free, not compresent with any other property. This argument, taken as a *reductio* of property primitivism, appears full-blown in David Armstrong:

[P]roperties and relations, whether universals or particulars, seem not suited to be the ultimate constituents of reality. If they are the ultimate constituents, then, it appears, completely different (non-overlapping) properties and relations will be ‘distinct existences’ in Hume’s sense of the phrase: entities logically capable of independent existence. But are properties and relations logically capable of independent existence?

Can a certain determinate mass, for instance, whether the universal of that mass or the trope mass of this particular body, exist in logical independence of anything else? It hardly seems so. (1997, p. 99; see also his 1989, pp. 73-4 and p. 115.)

(Similar lines of argument can also be found in C. B. Martin 1980, Michael LaBossiere 1994, Peter Simons 1995, Arda Denkel 1997, and Cynthia Macdonald 1998.)

One can parse this argument as starting from:

- (1) Property primitivism: Properties like mass are the basic independent units of being, and
- (2) Recombination: All combination of the basic independent units of being are possible.

From which it follows:

- (3) Free Mass: It is possible that there is a mass combined with nothing else.

To which it is generally added:

- (4) No Free Masses: It is not possible that there is a mass combined with nothing else.

Theses (1)-(4) constitute the *problem of free mass*, for the property primitivist. I regard the recombination principle (2) as beyond reproach here, and consider (1) and (2) to entail (3) (I defend this entailment against a certain

type of response in §4). So I think the only real options are to deny (1) or (4).

Now (4), I admit, is *prima facie* plausible. Thus Armstrong *et al* take the argument as a *reductio* on (1). I think, however, that the problem of free mass is much broader than generally acknowledged, and that the best overall approach is to deny (4). This opens space not just for (1) but for any plausible account of the relation between the categories of *object* and *property*.

2. Object-Property Dualism: Substrata are no Solution

The free mass objection to property primitivism is typically used to argue for a version of *object-property dualism*. According to the object-property dualist, objects and properties are co-primitives in the constitution of being. There are, in addition to properties, irreducibly nonqualitative entities that serve as the pincushions in which properties stick.¹ The classic versions of object-property dualism are the Aristotelian doctrine of the hylomorphism of matter and form,² and the Lockean doctrine of a *substratum*, a “something we know not what”, that serves as the ground of properties.

How is the introduction of such irreducibly nonqualitative entities as substrata supposed to resolve the problem of free mass? C. B. Martin, in arguing for Lockean substrata over a bundle-theoretic approach, says:

An object is not collectable out of its properties or qualities as a crowd is out of its members. For each and every property of an object need to be had by that object to exist at all. The members of a crowd do not need to be had by that crowd in order to exist at all. (1980, p. 8)

Here Martin is saying, in effect, that introducing substrata involves a denial of (1) above (that properties are independent units of being, like members of a crowd). Since properties are dependent on substrata, the application of the recombination principle (2) is blocked. And Armstrong (who cites Martin’s argument with approval) concludes his presentation of the free mass objection to the bundle theory by noting that, “If one thinks of properties as *ways* things are... one has a particularly strong motive for denying the possibility of such independent existence.” (1997, p. 99)

The object-property dualist may be taken as replacing (1) with (1’)

(1’) Object-Property Dualism: object-property combinations are the basic independent units of being.

¹ These irreducibly nonqualitative entities may also be recruited to serve as subjects of predication, as individuators, and/or as survivors of change. These issues are independent of those discussed in the main text.

² Whether Aristotle ultimately accepted prime matter is a subject of dispute. I do not mean to take sides here.

But, *pace* Martin and Armstrong, the replacement of (1) by (1') (even if justified for other reasons) does not touch the problem of free mass. For (1') does not in any way ensure that every object that has a mass also has a shape, color, and whatnot (LaBossiere 1994, p. 366; Denkel 1996, p. 40). (1') just invites the question: why are there no objects in which only mass inheres? If one thinks of properties as ways the question just becomes: why can't there be an object whose only way of being is 'massively'?³

I find it hard to understand how anyone who finds the possibility of a free mass repugnant could find the possibility of a substratum possessing only a mass (no shape, no color, no anything else...) any more amenable. A philosopher who would reject free masses but accept a substratum possessing only a mass is obviously not worried about why properties cluster, but only concerned with the more traditional question of whether properties require a substratum. For such a philosopher the problem of free mass is a red herring. Such a philosopher would have just the same objection to a full complement of properties without a substratum.

Here one should distinguish two theses about property dependence. There is (i) the thesis that properties need irreducible nonqualitative objects, and (ii) the thesis that properties (whether inhering in a substratum or not) need other properties. These theses are orthogonal. The object-property dualist theorist affirms (i), but the problem of free mass only concerns (ii).

Now one could infer the property-property dependence in (ii) from the object-property dependence in (i), by adding additional premises about the objects:

(5) Object Slottedness: objects have a full array of slots, and

(6) Object-Plug Dependence: objects cannot exist without having all their slots plugged.

This is a way of thinking of objects as the ontic medium through which property-property dependence arises.

³ Armstrong (personal communication) says that he does not have any objection to the possibility of a substratum possessing only a mass. Indeed, the possibility of a substratum possessing only a mass actually follows from Armstrong's own combinatorial analysis of modality. Armstrong defines a *Wittgenstein world* as a conjunction *w* of possible states of affairs involving only simple individuals and universals, in which (i) every simple individual and universal is a constituent of *w*, and (ii) for every simple individual *a*, there is some property *F* such that the state of affairs *Fa* is a constituent of *w*. So, letting '*F*' denote mass, there is a Wittgenstein world with *Fa* as a conjunct and no other conjunct involving *a*. (The *Armstrong worlds* are then generalized from the Wittgenstein worlds so as to allow contraction and expansion.) As Armstrong says: "[A]ll combinations of simple particulars, properties and relations that respect the form of atomic states of affairs constitute the possibilities for first-order states of affairs." (1997, p. 160)

But (6), far from solving the problem of free mass, just raise the problem anew. The question now becomes, what is it in the nature of being an object that precludes partially-plugged objects? *Why* is there 'object-plug' dependence? (This view also leads into the embarrassing question, to be discussed in §5, of exactly *which* slots there are to be plugged.)

And worse, (5) conflicts with the nonqualitative nature of the objects. On (5) objects are qualitatively characterized in terms of slottedness. I suspect that, beneath it all, the attempt to use substrata to solve the problem of free mass stems from taking the metaphors of pincushion and pegboard too seriously.

3. Object Primitivism: The Antirealist Nominalist Solution

So far it seems that property primitivism and object-property dualism lead straight into the problem of free mass. Now there is a third view of the relation between the categories of *object* and *property*, which is that objects are primitive and properties are derivative therefrom.⁴ The classic versions of object primitivism are *predicate*, *set-theoretic*, and *resemblance nominalisms*. The predicate nominalist, for instance, begins with concrete, irreducible objects, and analyzes properties via our dispositions to apply predicates to objects.

Can object primitivism help with the problem of free mass? The object primitivist may be taken as replacing (1) with (1")

(1") Object Primitivism: objects are the basic independent units of being.

But with (1") the question for the predicate nominalist is: why are there no objects to which only "mass" is applicable? In general, the question for the object primitivist is: why are there no objects for which the derivation of properties yields an incomplete list?

Here it is important to distinguish between *realist* and *antirealist* versions of object primitivism. According to realist versions of object primitivism, the derivation of properties is in some sense independent of our pursuits and practices. It is hard to see how realist versions of object primitivism can guarantee that the world out there is such that the derivation of properties for each object must be complete.

The antirealist object primitivist, however, may answer that there are no objects for which the derivation of properties yields an incomplete list,

⁴ Property primitivism, object-property dualism, and object primitivism are not logically exhaustive. There is room for a range of views according to which objects and/or properties reduce to the entities of some further category(s). But given how fundamental *object* and *property* are, it is hard to imagine what further more basic category(s) there might be. *Event* is perhaps the most plausible candidate, though I suspect event-based ontologies will have analogous problems with "free events".

because of us: we are determined to classify objects through a complete range of properties. The antirealist predicate nominalist, for instance, may answer that our linguistic dispositions are such that we will not apply “mass” unless we will also apply “shape” and “color”. Our linguistic dispositions cluster. On this view, we are too stubborn for free masses to exist.

At last we have an explanation, but with two substantial costs: (i) commitment to some version of the nominalistic reduction of properties, a reduction of which many (myself included) are deeply skeptical; and (ii) commitment to antirealism about properties, which (since properties are involved in laws, causes, and explanations) entails antirealism about virtually everything else. I, for one, would sooner accept the possibility of free masses than pay such a price.

4. Property Interdependence: Trivial?

An acceptable explanation for why properties cluster remains elusive. On all the main views of the relation between *object* and *property* (save for the antirealist nominalist approach which I consider independently objectionable) properties such as mass may indeed occur unaccompanied by shape, color, or any other properties.

Perhaps it was all along a mistake to think that the explanation for why properties cluster is to be found in the relation between *object* and *property*. Since the dependence required is property-property, perhaps the explanation for why properties cluster is to be found solely inside the category of *property*, and need not be mediated by objects at all.

Here it might be maintained that properties themselves are by their own natures *interdependent*. There are two forms of the interdependence thesis. First, one might hold that property interdependence is trivial, on the grounds that not having a property just is another way of having a property, namely having quantity zero of the property. Second, one might hold that property interdependence expresses a substantive metaphysical truth about the natures of properties.

Starting with the first form of the interdependence thesis according to which interdependence is trivial, the inference from (1) and (2) to (3) in the problem of free mass fails. For if not having a property ($\sim P$) just is having zero of a property (P_0), then our alleged mass without shape, color, charge, and whatnot would trivially (analytically?) have a shape (extension zero), a color (transparent), a charge (neutral), etc. A free mass could never arise.

But there are compelling grounds for distinguishing P_0 from $\sim P$. The former is a positive having, the latter a negative lack. This difference emerges (i) at the level of *truthmakers*, (ii) with certain *functional laws*, and (iii) where the zero-point of the property is *arbitrary*.

First, at the level of truthmakers, the truthmaker for P_0 is possession of a single first-order property of quantity zero, while the truthmaker for $\sim P$ is the conjunction of first-order properties none of which contain P , plus the second-order totality fact that the conjunction is complete (here I am drawing on Armstrong's treatment of negative properties; see his 1978, esp. ch. 14). These truthmakers are not just different (which itself would suffice to distinguish P_0 from $\sim P$), but actually they are incompatible.

Second, there might be functional laws relating the quantity of the property in question to some further quantity, which would render having zero of a property a positive and causally relevant feature of an object. Suppose a wide range of experimental evidence favors a functional charge law according to which $F_C = |c_1 - c_2|$. Suppose we then discover objects that exhibit no charge interactions at all, either with positively or negatively charged objects. These objects should be regarded as not having a charge at all (even of 0), for here P_0 and $\sim P$ are causally different. In the presence of an object with, say, -20 charge, having C_0 entails $F_C = 20$, while $\sim C$ entails no charge interaction at all.

Finally, there are cases where the zero point along the parameterization of the property is arbitrary, perhaps because the relevant features of the property are purely differential. The above charge case has this feature—if you shift the zero point the charge force stays constant:

$$|(c_1+n)-(c_2+n)| = |c_1 - c_2| \text{ for all } n.$$

Here no point along the positive parameterization of the property is the natural analogue of the negative lack of the property. There is no *joint* P_n in the parameterization to identify with $\sim P$.

5. Property Interdependence: Metaphysical?

A second form of the interdependence thesis holds that it is a substantive metaphysical truth that properties are interdependent. On this view it is internal to the nature of *mass*, for instance, that it coexist with some positive shape, color, and whatnot. This is a way of denying premise (1) of the problem of free mass, and rendering properties not fully recombinable, but only recombinable in cluster-preserving ways. A version of property primitivism may (or may not) still be maintained, according to which properties are still regarded as prior to, and in that sense independent of, the entities of any other category, but they are now regarded as dependent on each other. This interdependence idea has been forwarded by Peter Simons and Arda Denkel (Simons calls these “founding relations”, and Denkel calls these “saturation relations”),

as a way to have property primitivism without free masses. This idea represents the state of the art of the current literature.⁵

I object that (i) metaphysical interdependence involves occult brute necessities, (ii) there is no plausible way to specify exactly *which* interdependencies hold, and (iii) it seems possible to have respectable property-clusters in ways that preclude interdependence.

First, metaphysical interdependence involves occult brute necessities. Suppose the mass of this page (and its associated substratum, if you like) were moved. Then either the remaining smoothness and whiteness must (by metaphysical necessity) spontaneously implode and new ones must spontaneously erupt, or else the old smoothness and whiteness must get dragged, willy-nilly, along with the mass. Either way the mechanism of interdependence is mysterious. It looks like an occult connection.

Second, the metaphysical interdependence thesis invites an embarrassing question: on exactly *which* properties does mass, or any other given property, depend? Is color required? Of course no one wants to be committed to taking color properties too seriously. How about charge? Well this hardly seems necessary. Indeed physicists contemplate massive but uncharged particles, and even particles with neither mass nor charge. While interdependency may be plausible enough as a general principle, no specific interdependency seems plausible in itself.

One exception: it seems plausible that properties like mass, charge, and color are dependent on shape (where by shape I mean occupation of a spatio-temporal region, even if point-sized). Nothing could have a mass, for instance, without occupying a region.⁶ But shape in turn does not seem to depend on mass, charge, or color. Something can occupy a region without, for instance, having a mass. This exception is, of course, way too meager for Simons and Denkel. In fact the philosopher who regards shape as a necessary component of any bundle may perhaps be said not to think of shape as a property at all, but rather as a precondition of being: on this view, to be is to be extended (Campbell 1981, pp. 136-7).

Both Simons and Denkel are, in fact, careful not to specify any interdependencies. Denkel actually suggests that the specification should be *a posteriori* (1997, p. 604; see also Simons 1995, p. 569). This is puzzling: How could *a posteriori* evidence establish metaphysical interdependence? The usual model of discovering essential constituent structure (as in water-H₂O) is no help here—it is not as if we are discovering the ‘internal composition’ of

⁵ Actually the interdependence idea harkens back to Bertrand Russell 1948, who identifies objects with *complete* complexes of compresence. But Russell's construction fails to explain why there are no incomplete complexes of compresence—it only refuses the name “object” to them. Call such an incomplete complex an *abject*. The question for Russell is, why are there no abjects? Simons and Denkel are answering this question.

⁶ Unless there could be massive Cartesian egos.

massiveness. Moreover, if the issue is *a posteriori*, is there an *a posteriori* result that actually eliminates free mass? Which is it? Finally, there will presumably be worlds where a qualitatively mass-like property can exist free, even if that property is not mass but rather “schmass” (just like there may be water-like stuff not made of H₂O). Does re-labeling the entity a “free schmass” help with its plausibility?

Finally, metaphysical interdependence rules out the seeming possibility that there could be, say, six fundamental determinables (ABCDEF), instantiated in packets of five: ABCDE, ABCDF, ABCEF, ABDEF, ACDEF, and BCDEF. This scenario is consistent with the intuition that properties occur in clusters (indeed this scenario is consistent with Russell’s notion of complete complexes of compresence). Perhaps the *a posteriori* evidence will even suggest that something like this scenario is actually the case. But on such a possible scenario there are no specific interdependencies, since for any two properties there is an instantiation pattern with the first but not the second. I submit that the intuition that such is possible is at least as plausible as the intuition that there are no free masses.

6. Contingency: Campbell’s Line

An explanation for why properties cluster remains elusive. All attempts to explain the impossibility of free masses, whether in terms of the relation between *object* and *property*, or in terms of principles internal to *property*, look to fail. Perhaps it was all along a mistake to think of free masses as impossible. On this thought, thesis (4) of the problem of free mass is to be regarded as, while *prima facie* plausible, ultimately to be rejected for theoretical considerations.

The one philosopher who has explicitly embraced free masses is Keith Campbell. Campbell concedes only that “tropes tend to come in clusters”, and that this “is the normal minimum which we do in fact encounter” (1981, p. 128). He rejects the intuition that there could not be free masses as a “long-standing and deeply ingrained prejudice” (1981, p. 127), and argues:

[S]ome aspects of experience encourage the view that abstract particulars are capable of independent existence. Consider the sky; it is, to appearance at least, an instance of color quite lacking the complexity of a concrete particular. The color bands in a rainbow seem to be tropes disassociated from any concrete particular. (1981, p. 128)

And he adds: “The way concrete particularity dissolves in the subatomic world, and in the case of black holes, suggests that disassociated tropes are not just possibilities but are actually to be encountered at our world.” (1981, p. 128)

While I am sympathetic with Campbell’s position in the end, I find Campbell’s examples of free properties unconvincing. In the case of the sky and the rainbow, while it is true that these are, to appearances, colored, it is

also true that these are, to appearances, substantial, shaped objects (and it is also true that what is really there, in the case of the rainbow for example, is water droplets refracting light). In the case of subatomic phenomena and black holes, it is simply false that these phenomena (as scientifically understood) involve free properties. Subatomic quarks, for instance, are all characterized by a range of properties: spin, color, flavor, charm, etc. There is no suggestion that, e.g., a particular strangeness could break free and wander off.

Indeed Campbell does not even explain what he does concede, namely why the properties we encounter are at least typically clustered. Thus Denkel objects that, if free properties are possible, it seems an unlikely accident that our world has none (or at least very few) of them:

[I]f [properties] could exist independently, why should they, in actuality, exist in compresences everywhere? If such a possibility were granted, the fact that the world is inhabited by objects rather than scatterings and conglomerates of properties would need quite a bit of explaining. (1996, pp. 31-2)

Here I think the defender of contingency should (*pace* Campbell) grant that there are no free properties, and (to answer Denkel) explain this fact of our world as contingent upon *the laws of nature*. Perhaps the initial conditions of our world involved no free properties because our world began as a singularity, and perhaps the subsequent conditions of our world involve no free properties because the laws of temporal evolution keep groups of properties together. On this view all properties were born in the same beehive, and by nature swarm.

Quarks provide a nice model for the contingency theorist (E. J. Lowe 1998), since the failure to detect free quarks (initially viewed as a serious embarrassment for the quark theory) is now explained nomologically, by the color force. The color force is such that (1) it acts like a rubber band, pulling stronger with greater distance, thus binding groups of quarks together, and (2) energy sufficient to overcome the color attraction (/snap the rubber band) is energy sufficient to create enough additional quarks for there to be binding partners for any quarks that might otherwise have been freed. Perhaps the clustering of properties can be thought of analogously.

7. Contingency: The Unimaginability Objection

The contingency theorist is liable to meet with a blank stare. I admit that the no free mass thesis (4) is *prima facie* plausible. But why? Can we find any more articulate rationale to support this intuition?

I suspect that the reason behind the blank stare, or at least often the cause of it, is the *unimaginability* of a free mass. One cannot form an image of

something that has no shape or color. The blank stare effectively registers the puzzlement of one who tries to imagine the alleged possibility at issue.⁷

Here it is tempting to reply, dismissively, that being unimaginable does not entail being impossible. It is easy to imagine the impossible, as in the case of trisecting the angle, and (more to the point here) easy to fail to imagine the possible, as is the case in the construction of a seventeen-sided regular polygon with ruler and compass.

But I think such a dismissal would be too quick. These decouplings of the imaginable and the possible all involve complex situations. One can imagine the impossible by eliding over details, for example by not considering exactly how ruler and compass reach the appropriate position for trisection, and one can fail to imagine the possible by losing track of an intricate sequence of ruler and compass maneuvers. In short, these decouplings of imagination and possibility all look to be failures of *performance* rather than *competence*. But the case of free mass is not at all like this. A free mass is utterly simple and still unimaginable. So the contingency solution appears to involve a considerable cost, namely granting that there are perfectly simple yet utterly unimaginable possibilities.

The opponent of free mass might further this objection by maintaining that, if our faculty of imagination is not even competent to judge what is possible (even correcting for performance failures), what access to modal knowledge would remain?

Here I reply that recombability (which the free mass objection actually relies on) gives us epistemology enough for modality.⁸ Why should our faculty of imagination furnish any sort of guide to the realm of possibility at all? I suggest (here I follow David Lewis 1986, p. 90; also p. 114) that imaginability is a guide to possibility, albeit an imperfect one, because imaginability is a guide to recombability: imagination just allows recombination of visual aspect. This suggests that imaginability is a secondary modal principle, always trumped by considerations of combinability, where such can be independently ascertained.

Thus the contingency theorist can adopt a consistent combinatorial approach to modal epistemology that explains the importance of imaginability, while allowing even for simple unimaginations, like free masses.⁹

⁷ A second argument: "You've made a category mistake, in treating a property like mass (a dependent entity) as if it were an object (an independent entity)." But this one is question-begging. The point of the problem of free mass was precisely to *establish* the claim that properties cannot be treated as independent entities.

⁸ Actually a full-fledged modal epistemology will need a range of further principles. But the point remains that imaginability is not the fundamental principle of modal epistemology.

⁹ A combinatorial approach to modal epistemology does not entail a combinatorial analysis of modality itself. Even the modal realist may embrace combinatorial reasoning as epistemically insightful (see Lewis 1986, esp. pp. 86-92 and pp. 113-4).

The primitives of an ontology (be they properties of some sort, or object-property combinations, or whatnot) earn their keep through overall theoretical considerations. Imagination is a visually-driven faculty. From this perspective, one should not be too surprised if one's theoretical primitives are an imperfect fit for one's imagination. Thus the blank stare may be met by the sympathetic shrug.

8. The Case for Contingency: The Subtraction Argument

So far I have argued that we do best to deny premise (4) of the problem of free mass, and accept the possibility of free masses. The argument, essentially, is that any plausible ontological approach allows free masses. The *prima facie* implausibility of denying (4) is overridden by theoretical considerations.

This argument is essentially negative, however, and may well leave the reader thinking, not that free masses really are possible, but rather that a more plausible ontological approach needs developing (not that I would be upset if the above considerations inspired the development of such!). So I should like to conclude with a positive argument in favor of the possibility of free mass: *the subtraction argument*.

The subtraction argument is inspired by an objection that Armstrong makes to Russell's bundle-theoretic reduction of objects. Armstrong argues that "Being a complete complex of compresence is not necessary for being a particular" from the intuition that there can be subtracted (hence incomplete) near duplicates:

Consider a particular and let it have a near twin, another particular that exactly resembles the first particular except that the near twin lacks one or more properties that the first particular has. Perhaps the first particular is colored, whereas the near twin is totally transparent. (1989, p. 72)

Here the near twin is a *subduplicate* of the original particular (the original particular minus its color). Now consider this near twin, and consider a further subduplicate of it, perhaps by subtracting its charge. It seems clear to me that we still have a particular. Generalizing Armstrong's point, it seems that for any *n*-propertied object, it is possible for there to be an *n*-1 propertied subduplicate. Call this *the generalized subtraction premise*.

Further support for the generalized subtraction premise comes from the consideration (discussed in §5) that no one specific property seems necessary for being an object. Since neither color, nor charge, nor fragrance, nor temperature, nor whatnot seems necessary, it seems that each is in turn subtractable. And now one is merely iterations away from a free mass.

Here one might object that the generalized subtraction premise yields the absurd consequence of zero-propertied objects ("just subtract once more from your alleged free mass"). Now perhaps an object with zero properties should

be stipulated to be a nonentity, a “no-thing”.¹⁰ Actually here the bundle theorist may have an advantage in that the impossibility of zero-property objects falls out of bundle theory, without additional stipulation, since in that case the compresence relation would have no relata (a one-property object is still possible since *compresence* is reflexive.) So there are reasons, or at least stipulations, in place for limiting the subtraction premise to the case of $n \geq 2$, but that still allows free masses.

One might also object (following the discussion of shape-dependence in §5) that the subtraction premise yields the absurd consequence of shapeless objects. But I think if one accepts the possibility of massive egos and their ilk then one accepts this very consequence, whereas if one accepts shape-dependence then one is viewing shape not as a property but a precondition. So perhaps every object is at least a shaped-something: one property-at-a-region at minimum. But in either case masses with no accompanying properties remain with us.

One might finally object that the subtraction argument is a fallacious *sorites-style* argument. Just as starting with a heap of sand grains and subtracting one still (intuitively) leaves a heap, so starting with an object as a heap of properties and subtracting one still (intuitively) leaves an object. But of course once one has reached a single grain of sand it is clear that one no longer has a heap, and so one might hold analogously that once one reaches a single property such as mass it is clear that one no longer has an object. One might further add that it is not even necessary to know *why* sorites-style reasoning is fallacious, to see that (somehow!) it must be.

Here I reply that the source of the sorites is *vagueness*, and the only plausible source for vagueness is *semantic indecision*.¹¹ We simply have not bothered to make up our minds exactly where the cut-off lies between “heap” and “non-heap”. But there is no way to think of the subtraction argument as turning on semantic indecision (at least if one aspires to any sort of realism in ontology). Whether or not there can be a free mass is not ours to decide.

So while the subtraction premise of the sorites is *superfalse*, meaning false on every way of being semantically decisive (since every way of being semantically decisive sets a cut-off point n at which $n-1$ grains is not a heap), the subtraction premise of the argument for free mass may still be *supertrue*, since semantic decisiveness does not touch it.¹²

¹⁰ Armstrong in effect stipulates “no bare objects” in his combinatorialism by stipulating that every simple individual a instantiates at least one property F (condition (ii) mentioned in note 4).

¹¹ The claim that vagueness is due to semantic indecision is of course contentious. See Timothy Williamson 1994 for an alternative epistemic diagnosis of vagueness.

¹² Even the epistemicist about vagueness, who believes in a real albeit unknowable cut-off between heaps and nonheaps, should reject any parallel with the subtraction argument for free mass. The sophisticated epistemicist explains our cognitive blindness to the cut-off in terms of the unreliability of our discriminations around the cut-off: we can't

And so I conclude from subtraction that a free mass is possible. This is a good thing, for any plausible ontology demands it.¹³

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reliably discriminate nearly bald from barely bald (see Williamson 1994, esp. ch. 8). But no analogue explanation seems in the offing for constructive ontology.

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