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A Collapse Result in the Mereology of Properties

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ABSTRACT

I examine five principles about the metaphysics of properties, each of which has been defended in the literature: (1) the sum of properties is their corresponding conjunctive property, (2) the mereology of properties is classical, (3) properties are individuated by necessary co-instantiation, (4) sums of objects belonging to different categories do not belong to the category of any of their parts, and (5) there is at least a property necessarily instantiated by every individual. I prove that this package of views entails that there is exactly one property. Since this conclusion is highly implausible, I will discuss some ways of modifying the package in order to avoid it.

1 | Some Principles About Properties

I will present a set of principles, most of which concern the metaphysics of properties, which may seem individually plausible and have been variously defended in the literature. I will show that together they lead to collapse: they entail that there is exactly one property. This is a highly implausible view, and therefore some principle (or principles) of the package will have to be rejected.

I will use the term "property" in a way that is meant to be neutral with respect to different metaphysical theories that employ this and related notions (such as universals or tropes). It is likely that some principles are more plausible on certain theories of properties than on others. Thus many theories will not be directly refuted by the fact that the set of principles entails an unacceptable conclusion. This result can, however, provide the grounds for important theoretical decisions even for theories not threatened by the conclusion. In the following sense: if a theorist accepts some principles, say P1, P2, P3, of an untenable package {P1, ..., Pn} and is neutral with respect to P4, ..., Pn, then the untenability of the package gives a reason for the theorist to accept (¬P4 ∨ ... ∨ ¬Pn), and this can serve as a guide in the search for further principles for her theory by precisely delimiting a set of choices. The set of principles I will be discussing is the following:

Sum: The mereological sum of properties P and Q is the conjunctive property $P \wedge Q$.[1]

Classicism: The mereological sum of properties satisfies the laws of classical mereology.

Individuation: Properties P and Q are identical just in case, necessarily, for any individual x, x instantiates P iff x instantiates Q.

Mixed Sums: The mereological sum of entities belonging to different categories does not belong to any of those categories.

Necessity: There is at least one property that necessarily every individual instantiates.

Before presenting the derivation of the collapse result, I will briefly discuss each of the principles separately in order to illustrate how they have been regarded as plausible:

Sum: The mereological sum of properties P and Q is the conjunctive property $P \wedge Q$.

If one believes that mereology is unrestricted, that is, that it applies across ontological categories, it is natural to raise the question of what the sum of two properties is. The principle of Sum provides one possible answer to that question which has seemed plausible to some. For example, Lewis (1986b) puts it forward in the context of criticizing the postulation of "structural universals" as composed of their constituents in a non-mereological way:

> [...] it's no good thinking that a structural universal is composed of simpler universals which are literally parts of it. [Footnote:] There is a different place for mereology in a theory of universals. Suppose we have two monadic universals F and G; and we want a conjunctive universal F&G that is instantiated by just those things that instantiate both F and G. Then it would be quite natural to take F&G as the mereological sum of F and G. (Lewis 1986b, 40, 41)

Sum was also accepted at one time by Armstrong (see Armstrong 1978, 30). Others have not explicitly endorsed the principle, but have floated an idea that entails it, namely that the conjuncts of conjunctive properties are literally their parts (Paolini Paoletti 2020, 425; Him Kwok and Lin 2023, 206–207). Hawley (2010) addresses Lewis's challenge for theories of structural universals by offering the groundwork of a mereology of structural universals, thus casting a shadow on the principle of Sum (for in some cases the sum of two universals would not be simply their conjunction, but probably a more complex construction). However, see Azzano (2021) for a criticism of this attempt.

Classicism: The mereological sum of properties satisfies the laws of classical mereology.

Classical Mereology is an axiomatic theory that captures certain formal features of the part-whole relation and other interdefinable notions such as *overlap* or *sum*. Although it is not without competitors (see Varzi and Cotnoir 2021 for a comprehensive study), some have considered it the one true theory of composition, to the extent of not recognizing a mode of composition as genuine if it doesn't abide by the laws of classical mereology (Lewis 1986b, 1991, 38–41; van Inwagen 2001, 95–96; Bailey 2012, 32; Lando 2017). This attitude can be traced back to Husserl, who didn't use the axioms of classical mereology, but claimed in the 3rd of his *Logical Investigations* that the part-whole relation holds between objects of any kind and hence should be governed by some set of universal laws (Husserl 1976, 435).

At first sight, it seems that the combination of Sum and Classicism can yield very intuitive results. For the operation of mereological sum is idempotent, commutative and associative. And one may very well suspect that, if P, Q, and R are properties, then $P \wedge P = P$, $P \wedge Q = Q \wedge P$, and $P \wedge (Q \wedge R) = (P \wedge Q) \wedge R$. This, however, is not conclusive: for the disjunction of properties may very well satisfy these laws as well. We will later explore the option of taking the sum of properties to be their disjunction. In any case, it is hard to make sense of the idempotency, commutativity and associativity of conjunction without an account of when some properties are identical. And this is what the next principle of the package provides.

Individuation: Properties P and Q are identical just in case, necessarily, for any individual x, x instantiates P iff x instantiates Q.

The identity conditions for properties are a notoriously debated issue among theorists of properties. When the modality involved in the Individuation principle is understood to be of the broadest kind (i.e., logical or metaphysical modality), then Individuation is essentially Bealer's "conception 1" of properties, relations and propositions (Bealer 1982, 2; Bealer and Mönnich 2003, 230); it is also a consequence of Lewis's identification of properties with sets of possibilia (Lewis 1986a, 50–51) and of Williamson's conception of properties (Williamson 2014, 224–225).

Many have thought, however, that this kind of identity condition is not appropriate for the kind of sparse properties which are needed in scientific explanation, and there is a long tradition of trying to individuate properties taking into account their nomological or causal aspects (Causey 1972; Achinstein 1974; Putnam 1975; Kistler 2002). As Orilia and Paolini Paoletti (2025) suggest, a way of capturing this intuition is by restricting the modality in Individuation to something like physical or nomological modality. However, we don't have to settle the issue between the metaphysical/logical reading of Individuation and the physical/nomological one since, as we will see, the argument below goes through as long as the necessity involved in the principle is normal (i.e., as strong as that of modal logic K).

Mixed Sums: The mereological sum of entities belonging to different categories does not belong to any of those categories.

A *mixed* or *transcategorial* mereological sum is a sum whose parts belong to different ontological categories. Their existence is a logical consequence of accepting Classical Mereology together with the idea that the quantifiers in its axioms are absolutely unrestricted. For if our domain contains, say, Ayers' Rock, number 7, and the property *being spherical*, then it will also contain the mereological sum of these three entities. The principle of Mixed Sums says that this entity is neither a concrete object, nor a number, nor a property. Indeed, this seems right, for it would seem arbitrary to classify in any of these categories. See Lewis (1991, 7), Varzi (2006, 109), and Smid (2015, 3264) for various ways of motivating the principle, and Varzi and Cotnoir (2021, 219–220) for a general discussion of transcategorial mereological sums.

Necessity: There is at least one property that necessarily every individual instantiates.

This principle asserts the existence of what Marshall and Weatherson (2023) call *indiscriminately necessary properties* of individuals. Examples may vary from theory to theory. For example, Sider (2006, 9) mentions, but doesn't accept, the monadic universal *being an individual*, which would be indiscriminately necessary. The Necessity principle is true in any theory that combines modality and a sufficiently unrestricted comprehension principle for properties (e.g., Williamson 2014, 227). Bacon (1986, 159) also accepts it by admitting "logically necessary universals" such as *self-identity* and *non-contradiction*.

I have been referring to this set of principles as a "package." However, I do not intend to suggest that they should be necessarily accepted together. In fact, the principles are logically independent: any single one of them may be rejected while accepting the others, without logical contradiction (in Section 4, I will discuss the prospects of rejecting each of the principles while keeping the others). So, in talking about a "package" of principles, I do not mean to imply that these principles should be bought *as a package*, but rather to warn that, if taken together, they form a rather *explosive* package which it is advisable *not* to buy. And, to the extent that some have accepted ingredients of the package, the results I will prove serve as a warning not to accept the others.

2 | Collapse

I will now proceed to show that the package of principles presented in the previous section logically entails that there is only one property. The proof relies on some elementary lemmas. I will use "+" for the binary operation of mereological sum, and "≤" for the binary relation "is part of". The following definition of parthood is standard in classical mereology (Varzi and Cotnoir 2021, 34):

Definition 1 (Parthood). $x \leq y = \mathrm{df}\; x + y = y$.

There is a debate among mereologists as to whether parthood or composition should be taken as primitive (see e.g., Fine 2010, 565–569). Definition 1 seems to commit ourselves to regarding composition as more fundamental than parthood. In fact, however, all we are going to need in the proofs is the biconditional underlying Definition 1, which states a correspondence between parthood and the composition operation. If Classicism is true, this correspondence should be valid when the variables range over properties[2]:

Correspondence: $x \leq y \leftrightarrow x + y = y$.

In presence of Sum and Individuation, Correspondence predicts a very intuitive result, our first lemma:

Lemma 1 (Parts). *For any properties P and Q, $P \leq Q$ iff it is necessary that for every x, if x instantiates Q then it also instantiates P.*

Proof: By Correspondence, $P \leq Q$ iff $P + Q = Q$, which, by Sum, holds just in case $P \wedge Q = Q$. And by Individuation, $P \wedge Q = Q$ if and only if it is necessary that for every x, x instantiates $P \wedge Q$ iff x instantiates P. Since we are assuming that the background modal logic is normal, this is equivalent to: necessarily, for any x, if x instantiates Q then x instantiates P.

According to Parts, and assuming for the sake of argument that *human* and *animal* are properties, then the property *animal* is part of the property *human* since, necessarily, every human is an animal. This sounds right, for indeed we say that *part of what it is to be human is to be an animal*. The Parts lemma tells us that this is no metaphorical way of speaking, but the literal truth. In fact, there's some precedent in medieval logic for this way of looking at the mereology of some universals. According to Boethius: "If in the definition I say, 'Man is a mortal rational animal', those three join together to make the single thing that is [the species] *man*. For that reason both the genus and the differentia are ascertained to be part of [the species] *man* itself" (Boethius 1988, 31). And Aquinas: "[In a fourth sense of 'part'], parts mean those things which are placed in the definition of anything, and these are parts if its intelligible structure [*partes rationis*]; for example, animal and two-footed are parts of man" (Aquinas 1995, bk. V, §1096). And lastly, John of St Thomas (John Poinsot): "the genus and the difference jointly compose the species, and therefore designate parts of it" (Poinsot 1632, 180).

To the extent that one is willing to apply mereology to properties, one may ask: what are properties composed of? What sort of objects can a property have as parts? These questions may sound strange if we are used to applying mereological language only to concrete individuals, for it is probably absurd to imagine a property being made of or composed of any kind of stuff. However, we have just seen that a property can be said to be composed of other properties. That this is the only kind of parthood applicable to properties is a direct consequence of Mixed Sums:

Lemma 2 (Downward Closure). *If P is a property and $x \leq P$, then x is a property.*

Proof: Let P be a property and let $x \leq P$. By Correspondence $x + P = P$. If x were not a property, then P would be a sum of a property and an object of a different category. But since P is a property, that would contravene Mixed Sums.

Definition 2 (Overlap). Properties P and Q *overlap* = df there is some R such that $R \leq P$ and $R \leq Q$.

Notice that by Downward Closure, properties can only overlap by having a property which is part of both. In fact, by the following lemma, this happens always:

Lemma 3 (Universal Overlap). *If P and Q are properties, P and Q overlap.*

Proof: Let P and Q be properties. By Necessity, there is a property that, necessarily, every individual instantiates. Call it N. Hence necessarily, whatever instantiates P also instantiates N, and necessarily whatever instantiates Q also instantiates N. So, by Parts, $N \leq P$ and $N \leq Q$, that is, P and Q overlap.

Lemma 4 (Antisymmetry). *For any properties P and Q, if $P \leq Q$ and $Q \leq P$, then $P = Q$.*

Proof: Suppose $P \leq Q$ and $Q \leq P$, that is, by Correspondence, $P + Q = Q$ and $Q + P = P$. By Classicism, + is commutative (see Varzi and Cotnoir 2021, 51), so $P + Q = Q + P$ and hence $P = Q$.

Lemma 5 (Strong Supplementation). *For any properties P and Q, if $\neg(P \leq Q)$ then for some H, $H \leq P$ and H does not overlap Q.*

Proof: This is one of the theorems of Classical Mereology (Varzi and Cotnoir 2021, 108), so by Classicism it must hold for properties.

These lemmas suffice to derive the collapse result:

Theorem 1 (Property Monism). *There is exactly one property.*

Proof: By Necessity, there is at least one property. Suppose for reductio that there is more than one property, that is, that are properties P and Q such that $P \neq Q$. Then, by Antisymmetry, either $\neg (P \leq Q)$ or $\neg (Q \leq P)$. In the first case, by Strong Supplementation, there is some H such that $H \leq P$ and H doesn't overlap Q. By Downward Closure, H must be a property, and hence by Universal Overlap, H and Q must overlap. Contradiction (the other case is parallel). Hence, there is at most one property.[3]

3 | Further Consequences: Existence Monism

The claim that there is only one property is already quite implausible in itself. It is very difficult to see how any of the theoretical benefits offered by properties could be attained if only one property existed.

In fact, Property Monism is bound to generate even more problematic consequences under certain assumptions about how properties interact with other ontological categories. In this section, I will tentatively discuss one such consequence, namely that Property Monism could lead to a similar collapse for individuals. Consider the principle of the Identity of Indiscernibles:

Identity of Indiscernibles: If x and y instantiate the same properties, then $x = y$.

This principle is well-known, and hardly requires clarification (see Bender 2019; Hawley 2009 for an overview). See Della Rocca (2005) for a contemporary defense, and Hacking (1975), O'Leary-Hawthorne (1995), and Hawley (2009) for critical assessments of putative counterexamples.

Assuming this principle, and given two further lemmas which are derivable from our initial set of principles, it is easy to show that Property Monism leads to monism for individuals as well:

Lemma 6 (No Bare Individuals). *For every individual x there is some property P that x instantiates.*

Proof: This follows directly from Necessity.

It is worth pointing out that No Bare Individuals is a principle that has been widely accepted in the literature (see Sellars 1952; Anscombe 1964, 69–71; Armstrong 1989, 43; Simons 1994, 565–567; Hoffman and Rosenkrantz 1994, 46–52; Lowe 2006, 86; Bailey 2012; Giberman 2012).

Lemma 7 (Non-vacuity). *There is at least one individual.*[4]

Proof: This follows from the principle of Necessity assuming the underlying logic to be classical and not free. Since some property is instantiated by *every* individual, then there is some individual that instantiates it.

Theorem 2 (Existence Monism). [5] *There is exactly one individual.*

Proof: By Lemma 7, there is at least one individual. Suppose for reductio that there are a and b such that $a \neq b$. Then, by the Identity of Indiscernibles, there is some property that a instantiates and b doesn't, or some property that b instantiates and a doesn't. Without loss of generality, suppose that a instantiates a property P and b does not instantiate P. By Theorem 1, there is at most one property, therefore b doesn't instantiate any properties, which by Lemma 6 is impossible. Therefore, there is at most one individual.

This proof relies on the Identity of Indiscernibles (PII), a principle which is admittedly controversial. However, even if the PII is open to question, rejecting it to avoid monism seems wrongheaded in this context. For notice that usual alleged refutations of PII rely on some particular conceivable case of distinctness without discernibility (i.e., indiscernibility without identity). Not in this case. The kind of counterexample to PII that would be yielded by accepting all the package minus PII would be not at all like typical counterexamples to PII, like Black's two spheres (Black 1952). The denier of PII, in this context, would be forced to admit that *all* individuals (whatever their number) are indiscernible. Even people who reject PII would likely admit that this is crazy.[6]

Moreover, there is an alternative route from Property Monism to Existence Monism that doesn't rely on PII but rather replaces it with the following two assumptions:

Haecceities: for any individual x, there is the property *being identical to x*.[7]

Modal axiom T: $\Box p \rightarrow p$.

Under these assumptions, Existence Monism is derivable from the rest of our initial principles:

Theorem 2 (Existence Monism). *There is exactly one individual.*

Proof (alternative): Let a and b be arbitrary individuals. Then (by Haecceities) there are the properties *being identical to a* and *being identical to b*. By e1 (Property Monism) these are identical, so by Individuation, necessarily, for any x, x is identical to a iff x is identical to b. By modal axiom T this entails that for any x, x is identical to a iff x is identical to b, that is, $a = b$.

4 | Ways Out?

I will now consider some possible ways of avoiding the collapse of properties. In order to undercut the derivation of Property Monism, we have to reject some principle or other of the initial package (Classicism, Sum, Individuation, Necessity, Mixed Sums). Even if a property theorist does not feel a prior need to endorse the whole set of principles, the fact that they entail problematic results would still be relevant for her insofar as it provides grounds for theoretical decisions. For example, suppose a property theorist accepts Individuation, Mixed Sums, and Necessity. Then, the result established in Section 2 seems to force the theorist to make a choice between Sum and Classicism: either the sum of properties is not their conjunction, or their sum does not abide by Classical Mereology. Of course, she could reject both Sum and Classicism, but could not accept both, on pain of collapse.

In this section, I will consider some possible ways of avoiding collapse. These will be conservative solutions, in the sense that they each reject only one principle of the package; more radical strategies would reject more or even all the principles. I will begin by considering an unadvisable fix, and then I will move on to more viable strategies.

First, what I consider to be an unadvisable solution is to deny the principle of Mixed Sums. Bear in mind that merely denying Mixed Sums would not be enough; one would have to reject also its immediate corollary, the Downward Closure lemma (Lemma 2), for otherwise the proof of Theorem 1 goes through unaffected. Hence one would have to affirm that some properties have non-properties as parts. This would be a curious ontological commitment indeed. For consider a property P, and let x be the sum of its non-property parts. The remainder $P-x$ is a sum of properties, and therefore (by Sum) a property. Now compare P and $P-x$: how can they differ? Are they instantiated by different objects? Even if they aren't, by Individuation it must be possible for them to be instantiated by different objects, and in any possible world where they do, somehow x must account for the difference; in any case, something has to be said to explain how this works. Maybe there's an interesting metaphysical story to be told here, but it seems wrongheaded to bear the burden of telling it *only* to be able to reject Downward Closure in order to avoid Property and Existence Monism.

Having set aside this strategy, I will now give a brief overview of the prospects of rejecting other principles of the package. There are four options that deserve attention, and which are not as implausible as the one just considered. They are not perfect solutions, and the choice among them isn't obvious.

4.1 | Rejecting Necessity

The existence of a property that is necessarily had by every individual is a crucial part of the derivation of Property Monism. For in the presence of Individuation, Sum, and Classicism, Necessity entails not only that there is a necessary property, but that this is the *only* property there is. You may have thought, perhaps, that herein lies the root of the problem.

However, it is instructive to see that there is an alternative version of the argument of Section 2 that doesn't rely on Necessity. We can run the proof simply by replacing Necessity with the following principle:

Disjunction Closure: For any properties P, Q, there is the disjunctive property $P \vee Q$.

This principle is admittedly controversial: it is of course part of many theories of abundant properties (Williamson 2014, 227; Bealer 1982; Kim 1984, 172), but then again so is Necessity, so one cannot simply rely on any abundant conception of properties to motivate it. However, note that some less permissive property theorists have accepted Disjunction. For example, Armstrong, though not initially sympathetic to disjunctive properties, ultimately accepts them as "second-rate" properties, involving "no ontological cost" (Armstrong 1989, 114; 1997, 43–46). In the presence of Disjunction Closure, Universal Overlap follows easily:

Lemma 3 (Universal Overlap). *If P and Q are properties, P and Q overlap.*

Proof (alternative 1): Let P and Q be properties. By Disjunction Closure, there is the property $P \vee Q$. Necessarily, whatever instantiates P also instantiates $P \vee Q$; and whatever instantiates Q also instantiates $P \vee Q$. Therefore, by Parts, $P \vee Q \leq P$ and $P \vee Q \leq Q$, that is, P and Q overlap.

The proof of Theorem 1 goes through as before. This means that the denier of Necessity would have to deny Disjunction Closure. I do not intend to rely on Disjunction Closure in order to refute the strategy of rejecting Necessity, but to show that this strategy would require a further argument against Disjunction Closure in order to work.

4.2 | Rejecting Individuation

The principle of Individuation tells us that properties are identical when they are necessarily co-instantiated. Perhaps you think that this principle is too coarse-grained for reasons independent of the argument in Section 2. For example, it is sometimes argued that Individuation would render properties useless for the task of accounting for the meanings of predicates: one may reasonably say that "being red" and "being red and either blue or not blue" have different meanings, but by Individuation the properties *being red* and *being red and either blue or not blue*, for they are necessarily co-instantiated (see Orilia and Paolini Paoletti 2025, sec. 3.1 for discussion). Hence you may be inclined towards a hyperintensional account of the individuation of properties, that is, one that requires more than necessary coextensiveness, and thus discriminates between properties like *being red* and *being red and either blue or not blue*.

However, it is worth noting that a hyperintensional individuation of properties is not guaranteed to avoid collapse. For example, one may obtain hyperintensional identity conditions for properties as follows. Let us regiment our property talk in a first order language, where predicates stand for properties (in keeping with the foregoing discussion, and for simplicity, let us restrict ourselves to monadic properties). A model is a pair $\langle W, D \rangle$, where W is a non-empty set of worlds, and D a non-empty set of individuals that is constant across worlds. At each world $w \in W$, each predicate P is assigned an extension $v_w^+(P) \subseteq D$ and an anti-extension $v_w^-(P) \subseteq D$. Informally, $v_w^+(P)$ is the set of individuals that instantiate P at w, and $v_w^-(P)$ the set of individuals that fail to instantiate P at w. *Classically possible worlds* are those where for every property P, $v_w^+(P) \cap v_w^-(P) = \emptyset$, and $v_w^+(P) \cup v_w^-(P) = D$ (i.e., worlds where every individual either instantiates P or fails to do so, and not both). Worlds where either of these conditions fail will be *impossible* in the sense of either involving inconsistency or incompleteness. I will omit technical details about the semantics of the connectives, which can be set up along the lines of Priest (2008, 142–162) Next, let us replace Individuation by:

Individuation*: Properties P and Q are identical just in case, in every model and every world w, $v_w^+(P) = v_w^+(Q)$.

To see that this yields an elementary form of hyperintensionality, let us consider properties P and $P \wedge (Q \vee \neg Q)$. In the semantic for connectives described in Priest (2008, 142–162), this last property is instantiated by an object x at a world w just in case $x \in v_w^+(P) \cap \left(v_w^+(Q) \cup v_w^-(Q)\right)$. But it is easy to construct a model where there is a world w such that $v_w^+(P) \neq v_w^+(P) \cap \left(v_w^+(Q) \cup v_w^-(Q)\right)$; it suffices for $v_w^+(Q) \cup v_w^-(Q)$ to be empty. This framework allows, then, for a finer grained individuation of properties. Furthermore, there is a sense in which this approach can appear to be well suited to avoid Property Monism. To see why, notice that the following is derivable from the package with Individuation* instead of Individuation:

Lemma 8. *For any properties P and Q, $P \leq Q$ iff, for every model and every world in that model, $v_w^+(Q) \subseteq v_w^+(P)$.*

Proof: By Sum, $P \leq Q$ just in case $P + Q = Q$, which by Sum means that $P \wedge Q = Q$. By Individuation*, this means that, in every model, $v_w^+(P) \cap v_w^+(Q) = v_w^+(Q)$, which is equivalent to $v_w^+(Q) \subseteq v_w^+(P)$.

Next, consider the following reading of Necessity:

(Classical) Necessity: There is a property that, at every *classically possible world*, is instantiated by every individual.

Examples of properties of this kind are tautological properties like $P \vee \neg P$ (incidentally, notice that Individuation*, unlike Individuation, allows for more than one necessary property). As long as there is no property that is instantiated by every individual at *every* world, we will not be able to get to something like Lemma 2 (Universal Overlap) by a line of reasoning similar to the one that established it in Section 2. For Lemma 8 (our new version of parts) will not allow us to establish that there is a property that is part of every property. The reason is that, since we can always construct a model with a world where, for example, the extension of the property $P \vee \neg P$ is empty, it will not be the case that the extension of every property is a subset of the extension of $P \vee \neg P$ at that world. We seem to have, then, at least a bare sketch of an approach to the individuation of properties that is both (a) based on the by the kind of general considerations that motivate hyperintensionality about properties, and (b) prima facie capable of avoiding collapse.

But this hyperintensional approach is only apparently successful. It doesn't really avoid Universal Overlap unless some restrictions are imposed on property formation. For as long as there are disjunctive properties, Universal Overlap follows easily much like in the alternative proof of Lemma 3 in Section 4.1. This is because it is easy to show that, under Individuation*, for any properties P and Q, $P \vee Q \leq P$ and $P \vee Q \leq Q$. In sum, although going hyperintensional may be a promising strategy, it is not guaranteed to undermine the proof of Property Monism.

4.3 | Rejecting Sum

You may have thought that the root of the problem lies in identifying the sum of properties with their conjunction, which is what the principle of Sum asserts. We may reject the principle of Sum, but then we may still want to know what the mereological sum of properties is. The nice thing about Sum is that it answers this question by appealing to a mode of combination of properties that was previously familiar, namely conjunction. You may think, however, that it got things the other way around since, from an algebraic point of view, the operation of mereological sum resembles disjunction more than conjunction (McDaniel 2017, 207 makes this point). However, this is not guaranteed to avoid collapse. For suppose one accepted the following alternative to Sum:

Sum*: The mereological sum of properties P and Q is the disjunctive property $P \vee Q$.

Then the following analogue of Lemma 1 is easily derivable:

Lemma 1*. *For any properties P and Q, $P \leq Q$ iff it is necessary that for every x, if x instantiates P then it also instantiates Q.*

Proof: By Correspondence, $P \leq Q$ iff $P + Q = Q$, which, by Sum*, holds just in case $P \vee Q = Q$. And by Individuation, $P \vee Q = Q$ if and only if it is necessary that for every x, x instantiates $P \vee Q$ iff x instantiates P. Since we are assuming that the background modal logic is normal, this is equivalent to: necessarily, for any x, if x instantiates P then x instantiates Q.

The proofs of Lemmas 2, 4, and 5 are unchanged. To get Lemma 3 it would suffice to assume either of the following two principles:

Impossibility: There is at least one property that necessarily no individual instantiates.[8]

Conjunction Closure: For any properties P, Q, there is the conjunctive property $P \wedge Q$.[9]

Either way, Lemma 3 is easily established:

Lemma 3 (Universal Overlap). *If P and Q are properties, P and Q overlap.*

Proof (alternative 2): Let P and Q be properties. By the Impossibility principle, there is a property that, necessarily, no individual instantiates. Call it I. Hence necessarily, whatever instantiates I vacuously also instantiates both P and Q. So, by Lemma 1*, $I \leq P$ and $I \leq Q$, that is, P and Q overlap.

Proof (alternative 3): Let P and Q be properties. By Conjunction Closure, there is the property $P \wedge Q$. Necessarily, whatever instantiates $P \wedge Q$ also instantiates both P and Q. Therefore, by Lemma 1*, $P \wedge Q \leq P$ and $P \wedge Q \leq Q$, that is, P and Q overlap.

With these lemmas at hand, the proof of Theorem 1 is exactly as before. Therefore, replacing Sum with Sum* will not be enough, unless one can give an argument to the effect that the principles of Impossibility and Conjunction Closure are both false.

4.4 | Rejecting Classicism

The last solution I want to consider consists in rejecting the assumption that the mereology of properties is classical (Classicism). This rejection need not be ad hoc. Perhaps Classical Mereology is the true theory of parthood for the category of concrete individuals, while properties have their own non-classical mereology (and perhaps other categories have their own mereologies too). This would amount to embracing what McDaniel (2009) calls "compositional pluralism": the view that there is more than one fundamental notion of composition and, plausibly, different sets of axioms governing each of them. I will now show how one can develop this idea while departing minimally from Classical Mereology. The general idea is inspired by Varzi and Cotnoir (2021, 135–142).

Notice that the cause of the collapse of properties into one unique property (Theorem 1) is the fact that there is one property that is part of every property (which directly implies Lemma 2). This is bound to lead to collapse in the context of Classical Mereology, since it is well known that the only models of Classical Mereology where something is part of everything (i.e., what is often called a *null object*) are the trivial one-element models (Varzi and Cotnoir 2021, 135). The combination of Necessity and Lemma 1 basically means that the necessary property postulated by the principle of Necessity behaves like a null object in the category of properties by virtue of being part of every property. Fortunately, there is a very slight modification of Classical Mereology that can accommodate a null object non-trivially. Varzi and Cotnoir (2021, 141) describe such an axiomatization in detail; for our purposes, it suffices to indicate that their axiomatization does not entail Strong Supplementation (our Lemma 5 above) but rather the following weaker principle:

Solid Strong Supplementation: For any properties P and Q, if $\neg (P \leq Q)$ then for some H, $H \leq P$, and if N is part of both H and Q, then N is part of every property.

This principle, unlike Strong Supplementation, cannot be used in the proof of Theorem 1. For suppose P and Q are properties such that $P \neq Q$. Then, by Antisymmetry,[10] either $\neg (P \leq Q)$ or $\neg (Q \leq P)$. If one takes for example, the first case, Strong Supplementation entails that P has a part that doesn't overlap Q; but that is impossible by Lemma 3. Now, however, in presence of Strong Supplementation, what $\neg (P \leq Q)$ entails is weaker, namely that P has a part H that overlaps Q *precisely* if their common part is that property which is part of every property (whose existence is asserted by Necessity).

Hence we have a mereology of properties that represents a minimal departure from Classical Mereology and also allows for there to be a property that is part of every property without collapse. However, just like the strategies of rejecting Necessity and Individuation surveyed above, this strategy also requires the denial of Disjunction Closure. For even accepting the modified mereology just described, Universal Overlap is provable if properties are closed under disjunction.

In sum, the four strategies just explored, although viable in principle, are all insufficient by themselves. The tension within the package of principles I described at the beginning thus calls for careful consideration of which combinations of principles to embrace when theorizing about properties, their mereology, their individuation, and their relation to individuals.

5 | Conclusion

I have presented a set of five principles that concern different aspects of the metaphysics of properties. Sum gives us a natural answer to the question about the nature of mereological sums of properties by identifying their sums with conjunctive properties. Classicism brings properties under the purview of the familiar system of Classical Mereology. The principle of Individuation provides relatively popular and well-understood identity conditions for properties. The principle of Mixed Sums (when applied to properties and individuals) makes the very natural sounding claim that a sum of a property and an individual is neither property nor individual. Lastly, Necessity asserts the existence of a necessary property. These principles may be plausible individually, and, as we have seen, all of them individually as well as some of their immediate consequences have been accepted by various theorists. However, this package of principles turns out to entail that there is exactly one property (and this, under the assumption either of the PII or of Haecceities + modal axiom T, leads to the thesis that there is only one individual). To the extent that this conclusion is implausible, I have tried to give an overview of some possible solutions that reject or modify some principle of the package. As I have argued, none of these solutions is ideal, but both the derivation of the collapse result and the examination of some of the solutions may provide grounds for further research into the principles that govern properties.[11]

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Conflicts of Interest

The author declares no conflicts of interest.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

Endnotes

[1] I will apply Boolean operators to properties in a liberal way that can be easily made precise. For instance, the property $P \wedge Q$ is that property that is instantiated by an individual x just in case x instantiates P and x instantiates Q. And similarly for other connectives.

[2] In saying this I am assuming that it is acceptable to use first-order quantification over properties. See Azzano (2021, S4305-06) for a comment about this issue in a similar context.

[3] A similar proof that relies on analogous principles can be run for facts, yielding a mereological "slingshot argument" (see Di Rienzo 2025).

[4] It might be an understatement to say that this principle is widely accepted. To the extent that there is a debate around it, it mostly concerns its modal status and not its truth value (see e.g., Lowe 2002b; Efird and Stoneham 2005).

[5] The label comes from Schaffer (2010).

[6] Notice, however, that joint acceptance of Individuation and the principle of the Identity of Indiscernibles could give rise to a potential circularity. The principle of Individuation provides identity conditions for properties in terms of their instantiation by individuals; contrariwise, the principle of the Identity of Indiscernibles provides identity conditions for individuals in terms of which properties they instantiate. A question then arises: is the identity of individuals explained by the identity of properties, or the other way around? This circularity need not be damaging if the two principles are just admitted as true, without pretending that they provide metaphysical explanations of the identities of the relevant entities. I'm grateful to an anonymous referee for bringing my attention to this issue.

[7] These properties are sometimes called "haecceities" (see Rosenkrantz 1993, 2; Lowe 2002a, 102).

[8] This principle is in a sense the dual of Necessity. It will be very likely part of any theory of abundant properties (e.g., Williamson 2014, 227), but will be denied by any theory in which only instantiated properties exist (e.g., Armstrong 1978).

[9] Armstrong (1978, 30).

[10] This still holds, since in the alternative mereology described by Varzi and Cotnoir the operation of sum is also commutative, so the proof of Antisymmetry remains valid.

[11] The main idea of this paper originated in discussions with Daniel García Saavedra in York during the Spring of 2024, where he suggested generalizing the "mereological slingshot" argument I was working on at the time. I have also benefitted greatly from discussions on monism with Leyre Celada Marcén since Fall 2025; she has helped me better understand the implications and relevance of the argument. Portions of the paper were presented at the Mind and Reason seminar in the University of York in May 2024, and at the 11th Conference of the Spanish Society for Analytic Philosophy in Sevilla, October 2025. I'm grateful to the audiences there for feedback, and in particular to Javier Arias, Turad Miguel Turad Lorenzo, and Violeta Conde. I wish to thank also an anonymous referee for Ratio for their useful suggestions and comments.

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