

The Bundle Theory, the Principle of Unity for Elementary Particulars, and Some Issues
concerning Identity

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Andrew Newman

andrewnewman@unomaha.edu

1. Modes of Composition

The bundle theory of particulars is a theory about ordinary or concrete particulars; it is not a theory about any of the other types of thing that some people regard as particulars, such as states of affairs and events. There is a difficulty in explaining what an ordinary concrete particular is, but it is enough for our purposes to say that they are things like stars, planets, rocks, molecules, atoms, subatomic particles, moveable artefacts, organisms, and persons.¹ All versions of the bundle theory agree on the basic thesis of the bundle theory, namely that the ultimate constituents of particulars are properties understood as universals.² In other words, there are no constituents that cannot be

¹ See for example, E. J. Lowe, *The Possibility of Metaphysics*, pp. 51-3, 210-220, and David Lewis, *The Plurality of Worlds* on the notion of concrete object.

² The properties that are constituents of a particular should be intrinsic properties, though it need not be assumed that all its intrinsic properties are constituents. The notion of intrinsic property is easier if a sparse view (as opposed to an abundant view) of properties is assumed. A sparse view requires a criterion for being a property, such as a causal principle (Shoemaker) or the related Eleatic principle (Armstrong). Intrinsic properties should be real properties. Such a criterion should rule out conjunctive properties, disjunctive properties, and negated properties. On the hand, it could be stipulated that these are not intrinsic properties. Those that believe in abundant properties should use the criterion to divide properties into two classes (natural and non-natural); intrinsic properties would then be located in the first class. Extrinsic properties are properties that an object possesses in virtue of other objects, their properties, and relations that involve them. If these other objects were to disappear all intrinsic properties would be unaffected. Intrinsic properties are non-relational in the sense that an object does not possess them in virtue of other objects, their properties, and relations between them. However, intrinsic properties can be relational when an object possesses a (monadic) property in virtue of relations between its parts. Paradigmatic intrinsic properties are the mass, charge, magnetic moment, and spin of the electron as normally understood.

construed as universals, such as substrata or bare particulars, which some other theories of particulars regard as constituents of all ordinary or concrete particulars. Where versions of the bundle theory differ is over the mode of composition, that is they differ over how the universals are put together to form particular. — in this paper I am not going to consider proper parts, so in effect I am only considering simple particulars.³

The bundle theory is a theory about immanent universals, where an immanent universal can be located at many particulars at the same time. The bundle theory faces problems that arise from the nature of immanent universals and which are not faced by neighbouring theories of universals such as trope theory or Platonism: trope theory locates properties at particulars but regards properties themselves as particulars, whereas Platonism does not locate properties at particulars, and these days is usually hazy about where they are located. Nevertheless, it will be instructive from time to time to compare immanent realism to trope theory and Platonism.

Two types of bundle theory are conceivable. There are what can be called *independent-of-instantiation* bundle theories, where the universals are combined

³ A particular may have other particulars as parts, but according to the bundle theory its ultimate constituents are confined to universals. Parts are different from constituents or components. A part is a type of constituent, but there are constituents that are not parts. Parts belong to the same general category as the whole: if a concrete particular has parts, those parts will themselves be concrete particulars. This is not always the case with constituents: the constituents of a fact do not have to be facts and the constituents (or members) of a set do not have to be sets. The relation of “being a part of” is also transitive, whereas the relation of “being a constituent of” is not always transitive. If a particular has parts, such as atoms, then its constituents include its intrinsic properties, its atoms, and the arrangement relation. If an atom has parts, such as subatomic particles, then the constituents of the atom include its properties, the subatomic particles, and the arrangement universal. If it is like this all the way down without any termination (no bedrock), then the bundle theory says that at each stage there are only universals and ordinary particulars with parts, in other words there are no bare particulars. This approach should also work if there were arbitrary undetached parts that are real entities. The alternative to no bedrock is metaphysical atomism. There are two ways that metaphysical atomism could be true in classical mechanics: (1) if the ultimate constituents of matter are point particles — perhaps electrons are point particles, (2) if matter is continuously divisible and arbitrary undetached parts are not real entities or real parts. But it would be rash to say that these were the only two options for all theories. Point particles are a convenient kind of particular to think about when discussing the bundle theory. There could be just four properties bundled together, a certain mass, a certain charge, a certain magnetic moment, and a certain spin.

independently of whether the universals are instantiated. For example, when universals are combined by mereological sum, set-theoretic membership, or conjunction they are combined independently of whether the universals are instantiated or not, since these modes of composition do not require the universals to be instantiated — let us call these formal modes of composition.⁴ An extensional criterion of identity is characteristic of such modes of composition. In order for a combination of this sort to exist, all that is required is that the universals exist — however existence for universals is understood.⁵ Because an immanent universal is *one thing* that can occur in many places as a whole at the same time, it can be thought of apart from any instantiations, “in the abstract”, as Russell suggested,⁶ without implying that it exists independently as an abstract or Platonic entity.⁷ Universals can also be thought of as combined in the abstract to form mereological sums, or sets, or conjunctions. Nothing has to be done to the universals for them to be combined in these ways; in fact, it is not possible for these combinations to be formed by establishing relations between universals. Although it is possible to think

⁴ Though these are the obvious formal modes of composition, others are conceivable, such as ordered set. The idea of a particular being an ordered set of universals might have something to recommend it: an extension universal is instantiated first, then a mass universal is instantiated on top of it, and then a colour universal is instantiated on top of that.

⁵ For example, Armstrong’s instantiation requirement for the existence of a universal is a universal exists if and only if there is at least one instantiation. But even according to this requirement, certain universals could be thought of as combined, say as forming a set, without that having any bearing on whether they are instantiated together or not.

⁶ In *The Principles of Mathematics*, Russell made distinction between a relating relation and an abstract relation in order to explain “double aspect” problems. Although some people have regarded it as an ontological distinction, my view is that this distinction should not be taken seriously as an ontological distinction, and a case can be made that this was Russell’s final view.

⁷ There are two senses of ‘abstract’. In the Platonic sense, abstract objects are objects that exist in the Platonic heaven, a realm that is separate from and independent of the space-time world. To be abstract is to exist in that legendary realm. The other sense (Aristotle, Locke, Cartwright) is required by immanent realists: a universal is something that can be thought of in the abstract, that is thought of in a way that is independent of any of the occurrences of the universal. This makes sense just because a universal according to the immanent realists is one thing that can occur as a whole at many places at the same time.

about a universal in the abstract, universals do not occur in the abstract; they do not have an alternative existence in the Platonic heaven.

Co-instantiation bundle theories are also conceivable, where the universals are combined by being instantiated together. In order for there to a combination of this sort, the universals must be instantiated and be instantiated together. The claim of co-instantiation theories is that when universals are instantiated together at a certain place, in a certain way, which needs further specification, the result is a particular. It is not an unreasonable claim, because the fundamental idea of immanent realism is that a universal only occurs instantiated at a certain place or instantiated by a certain particular.⁸ The very idea of instantiation for a first order, immanent universal presupposes a particular. My aim is to show that a co-instantiation version of the bundle theory that does not have the extensional criterion of identity can be consistently maintained, and I claim that co-instantiation is a primitive notion and the only primitive notion needed.⁹

2. *Formal Modes of Composition*

This section discusses formal modes of composition, such as mereological sum, set theoretic membership, and conjunction. I start by considering O'Leary-Hawthorne and Cover's mereological version of the bundle theory, which to some extent recognizes one

⁸ A universal is one thing that can be instantiated as a whole at many places at the same time. Or it could be said that a universal is something that can *be found*, or can *exist*, or can *occur*, or can *be present* or *located* as a whole at many places at the same time. The first term, 'be found', is epistemological and therefore unsuitable; the second, 'exist', is alright but raises questions about what it is for a universal to exist *simpliciter* and to exist at a place; the other terms, such as 'occur', can be regarded as a neutral terms that commit us to as little as possible. 'Instantiated' is a very appropriate term, since it is the technical term for the basic phenomenon of immanent realism.

⁹ A substratum theory might require only instantiation and not co-instantiation. In any event immanent realism requires one or the other; they are very close to each other and they can be elucidated in similar ways.

of the problems with a purely mereological mode of composition. They claim at the beginning of their article, “A World of Universals”, that the natural way of constructing a particular out of universals is to regard a particular as a mereological sum of universals.¹⁰ It appears that their theory is committed to the following three propositions: (1) the criterion of identity for particulars is that two particulars are identical if and only if they have the same properties, (2) a particular possesses each property essentially, and (3) a particular is a universal.¹¹ If their theory were committed to just these propositions it would be an independent-of-instantiation theory. But it does not appear to be a pure independent-of-instantiation theory because later in their article they add a compresence condition, which we shall come to in a moment.

The motivation for the claim that a particular is a universal is to give them a world where there is nothing other than universals, “a world of universals”. It is an additional claim because if certain things all belong to the same kind, it does not follow that their sum belongs to that kind, though this may be a common assumption.¹² For example, the sum of a number of point particles does not have to be a point particle, though it is possible. On the other hand, although it is possible to talk about a mereological sum of individuals such as elephants, it makes no sense to suggest that the mereological sum of elephants is an elephant — it is not even a vertebrate. Mereology makes most sense for

¹⁰ Cf. John O’Leary Hawthorne and Jan Cover, “A World of Universals”, *Philosophical Studies* 91, pp. 205-219, 1998, p. 205. See also the later paper of John Hawthorne and Ted Sider, “Locations”, *Philosophical Topics* 30, pp. 53-76, 2002.

¹¹ Cf. O’Leary Hawthorne and Cover, “A World of Universals”, p. 208. But “... one might construe them as bundles of states of affairs. For ... the mere existence of collocation, redness, and squareness does not suffice for the state of affairs *Redness is colocated with Squareness*.”

¹² Perhaps most philosophers who endorse (1) universalism about composition plus (2) uniqueness about composition plus (3) transitivity about parthood also believe that the whole is of the same kind as its parts. But it is an additional assumption. I am grateful to Cody Gilmore for this nice way of putting it and for a number of important criticisms.

parcels (or quantities) of matter, and the mereological sum of a number parcels of matter is clearly a parcel of matter. It could be claimed that a sum of material objects such as elephants, though not an elephant, is a material object in the way in which mereologists understand material objects. This reduces material objects to parcels of matter, which is something that mereologists might be happy with. But if universals are more like point particles and elephants than parcels of matter, then a sum of universals is not a universal — speaking somewhat metaphorically, universals do appear to be more discrete than parcels of matter. But if it is not a universal, what is it? Perhaps it is some sort of formal entity introduced by certain formal rules in the same way that a set of elephants could be regarded as a formal entity introduced by rules.

Set-theoretic membership is another mode of composition. If a particular were the set of its properties, then the criterion of identity for particulars would also be that two particulars are identical if and only if they have the same properties, and a particular would possess its properties essentially. But a particular would not be a universal since a set is not a universal, at least not according to the common views about the nature of sets.¹³

If universals can be joined by conjunction, then conjunction could be regarded as another mode of composition. A particular would be a conjunction of its properties, and we would write: $a = P \ \& \ Q \ \& \ R$. The criterion of identity would be that two particulars are identical if and only if they have the same properties. A particular would possess each property essentially, and a particular would be a universal, in this case less

¹³ If a set were a particular, it would be something that occurs only once, as we should expect. The difficulty is that it would not be clear where it would occur. The traditional location for sets, following Frege and Quine, is in the Platonic heaven, or world of abstract objects. But we want particulars that are found in the space-time world and ideally at just one place. If a way could be found to regard sets as occupying a place in the space-time world, it might be a more plausible suggestion.

controversially, since a conjunction of universals is more plausibly regarded as a universal. Otherwise the characteristics of the conjunction version of the bundle theory appear to be the same as those of the mereological version.¹⁴

Compare the summing of tropes and Platonic universals. It would be unenlightening for trope theorists to say that a concrete particular was just a mereological sum of tropes, because a number of tropes can be combined mereologically without their having to be in the same place at the same time, indeed there is no need for them to have any sort of relation to each other whatsoever. It is not at all clear that the mereological sum of tropes would be a trope, but it is also unlikely that trope theorists would want it to be.¹⁵ It is possible for there to be mereological sums of Platonic universals, since the rules for forming mereological sums can be applied to entities in the Platonic heaven. There is no reason to suppose that a mereological sum of Platonic universals should itself be a Platonic universal, unless perhaps the mereological summing of Platonic universals is equivalent to conjunction. And as with all examples of mereological sums, the existence of a sum does not require that the components have any sort of relation to each other. A Platonic bundle theory of particulars does not appear possible, because a mereological sum of Platonic universals cannot be regarded as a particular, since there is no reason to suppose that two universals summed in heaven are going to be summed on earth. Mereological sums of Platonic universals are like marriages, made in heaven, but unlike marriages there they stay.

¹⁴ Some people might insist that conjunction as usually understood combines propositions or sentences, and claim that it is not clear what it is to combine two universals by conjunction. We can draw a parallel with negation. We can recognize the significance of external negation in logic, while admitting that there is also such a thing as internal negation. Perhaps something similar is true of conjunction; perhaps there is such a thing as internal conjunction that combines properties, in addition to the standard conjunction that combines propositions or sentences.

¹⁵ For Keith Campbell tropes are abstract particulars and they combine to form concrete particulars.

One difficulty in claiming that a particular is a mereological sum of immanent universals is that it is not clear how immanent universals are to be summed mereologically speaking. Are they summed in the abstract, in the appropriate sense of ‘abstract’ though clearly not in the Platonic heaven; or are the instantiations of the component universals summed, though I do not pretend that the idea of summing instantiations is a clear one?

It is easy enough to say that there exists a mereological sum of certain immanent universals, just because, at least according to mereological universalism, all possible sums exist. In fact, nothing about the nature of universals appears to stand in the way of universalism for all three formal modes of combination: that is, all combinations of universals formed by mereological summing, set-theoretic membership, or conjunction appear to already exist and do not have to be made. But there is nothing anyone could do to form these combinations anyway. It makes no sense to talk about bringing universals together to form a sum or set; there is no sort of bringing together or any other form of action that could possibly be relevant. In contrast, particulars are things that can be created and destroyed.

A mereological sum of particulars is like a set of particulars in that the components of the sum, the parts, can be located anywhere; it is the same sum however near the components are to each other or however far apart they are. Similarly, the existence of a mereological sum, or set, or conjunction, of universals does not entail that the universals are present together in the same place at the same time. The additional assumption that a sum of universals is a universal does not help. A particular would then be a universal and would be something that can be located as a whole at many places at

the same time. But there is no reason why “the place” at which the sum universal is located should always be a single place within a limited, convex boundary, as it is with our favourite material objects, or that its constituent universals should all be located together in the same place. There is no reason why the constituent universals should not be located all over the place.

O’Leary Hawthorne and Cover recognize that something needs to be added at one point in their paper, though I was not entirely sure how to interpret them from just reading their paper. They add the condition that the universals that constitute it must be compresent; that is, located at the same place at the same time, but they do not mention any other relation between them. They do not say very much about compresence: “Let’s not worry here whether ‘compresent’ must be something over and above ‘spatio-temporally colocated’.”¹⁶

And they say nothing about instantiation, perhaps because instantiation suggests instantiation *by* some particular. Realists, however, whether Platonic or immanent, cannot avoid instantiation. For immanent realists being located for a universal is being instantiated. There is no need to think of a universal as being instantiated by something irreducibly particular, being “instantiated at a place” could be regarded as equally primitive. They should really add that the universals need to be co-instantiated, but then co-instantiation, or indeed compresence, does not figure in the criterion of identity.¹⁷

¹⁶ O’Leary Hawthorne and Cover, “A World of Universals”, Note 7. See also pp. 213-214. “To claim that some number n of universals form a bundle only if there is some n -adic bundling or compresence relation that they stand in is not yet to say what the bundling relation amounts to, or to supply an analysis of compresence.” (Note 8, to page 214) They appear to think that the compresence relation is not included in the bundle. Douglas Ehring thinks it should be, see “Temporal Parts and Bundle Theory”, *Philosophical Studies*, 104, pp. 163-168, 2001, p. 165.

¹⁷ L. A. Paul has also defended a mereological bundle theory: “The cup’s property of being red is a logical part of the object, the red cup, and this particular is the fusion of all its parts. The red cup has many logical

With the compresence condition added their theory can be summarized as follows:

1. A particular has no constituents other than universals — common to all bundle theories.¹⁸
2. A particular is identical to a mereological sum of universals.
3. Mereological sums of universals that are particulars are universals.
4. A particular possesses each property essentially.
5. The criterion of identity for particulars is that if *a* and *b* are particulars, then *a* is identical with *b* if and only if *a* has the same constituent universals as *b*.
6. A particular is located at a certain place at a certain time, if and only if all the constituent universals are located at that place at that time — compresence condition.

The result can be called the mereological sum plus compresence version of the bundle theory.

3. *Criticisms of the Mereological Sum plus Compresence Version of the Bundle Theory*

First, as was discussed in the first section, the claim that a sum of universals is itself a universal is problematic. Is the claim that all sums of universals are universals, or that only the sums of universals that are particulars? But there does not appear to be any good reason why only some sums of universals are universals. It seems more reasonable to

parts, including the properties of being red, being ceramic, and being in my office.” (“Logical Parts”, *Nous*, 36, pp. 578-596, 2002, p. 581.) Logical parts are to be distinguished from spatial parts, for whereas the former are properties, the latter are objects, but both are dealt with by mereology. Paul defines property possession, which she calls instantiation, as the fusion of a property to a location (p. 584).

¹⁸ The universals that constitute a particular are, presumably, a subset of its intrinsic properties, but there is no need to specify which. Nor is there any need to get into discussion a discussion of the nature of intrinsic universals. A reasonable definition would be: an intrinsic property is a monadic non-compound property of a particular. This excludes relational properties, ones involving other objects and ones involving parts, and also compound properties formed with the logical constants including identity. There is also no need to get into discussions of sparse and abundant theories of universals.

suppose that all sums of universals are the same kind of thing whatever that might be, and that this would be a matter of necessity.

Secondly, for O’Leary Hawthorne and Cover a particular is a universal and its criterion of identity is that two particulars are the same if and only if they have the same component universals. They are willing to accept the counterintuitive consequence that the same particular can be located in many places at the same time. If you count particulars by strict identity, there is just one particular, they say, even if “folk ontology” counts many particulars.¹⁹ Whereas nominalists believe that there is only one category of entity, namely particulars in the standard sense that they can exist at only one place at a given time, . O’Leary Hawthorne and Cover’s views seem to entail universalism, which is the doctrine that there are only universals and no particulars in the standard sense.

But it is indeed counterintuitive to suggest that a particular can be in many places at the same time. Two particulars that have exactly the same intrinsic properties but occupy different positions should be as different as two particulars that differ very slightly in intrinsic properties and occupy different positions. Imagine two particulars that differ slightly in intrinsic properties and imagine changing their properties continuously until finally they have exactly the same intrinsic properties. Why at this point do they suddenly become the same particular, despite all appearances to the contrary?²⁰ As far as causality goes, two particulars with exactly the same properties are

¹⁹ Cf. Robert Merrihew Adams, “Primitive Thisness”. Vallicella takes O’Leary Hawthorne and Cover to task for not explaining particulars as we know them. See William F. Vallicella, “Bundles and Indiscernibility: A Reply to Hawthorne”, *Analysis*, 57, 1997, pp. 91-94. He is replying to O’Leary-Hawthorne, J, “The Bundle Theory of Substance and the Identity of Indiscernibles”, *Analysis*, 55, 1995, pp. 191-96.

²⁰ I imagine that O’Leary Hawthorne and Cover might be strong-minded in the face of these criticisms and insist that particulars are universals and we should put up with the consequences even if counter-intuitive.

as different as two particulars whose properties differ only slightly. Though they may refuse to admit that there is anything to count, there are at least two causal centres, meaning that you can interact with one or interact with the other, and the causal interactions of the one are independent of the interactions of the other.²¹

Thirdly, all mereological sums are possible, but not every collection of universals can be combined together to form a particular. It is an important fact about particulars that there are many properties that are incompatible, such as two different mass properties or two different shades of colour,²² though there is nothing in mereology itself that prevents their being summed. The mereological sum plus compresence version of the bundle theory provides no reason why incompatible properties should not be located at the same place at the same time as constituents of a single particular. Some further explanation of how universals combine to form particulars is required.

Fourthly, being located at the same place at the same time is not a sufficient condition for two universals to be properties of the same particular. If it were, then two particulars could not occupy the same place at the same time. It is, in fact, physically possible for two particulars to occupy the same place at the same time, since sourceless electromagnetic fields (electromagnetic waves) are physically possible, being allowed by

But this line will not appeal to all philosophers. The appeal of the strong-minded approach may depend on what other benefits come with the mereological approach and what other options are available.

²¹ An object's being a causal centre does not imply that all the effects take place at the object. For example, the sun might interact with an asteroid by annihilating it on impact and with the earth by moving it. Some people (David Hume, Max Born) think all causal interactions should involve contiguity, but this is not essential to the notion of causality. According to the Newtonian point of view, both the sun and the moon exert a force on the earth, but it seems clear enough that the sun and the moon are distinct causal centres. When there is action at a distance an object is a causal centre by being one term of a causal relation. In the case of two objects with exactly the same properties, they are distinct causal centres because they are causally independent; to suggest otherwise would be to suggest a world governed by laws different from the ones that govern this world.

²² Determinate exclusion principle.

Maxwell's equations, and they pass through each other with ease.²³ It also very likely that this is true in the actual world. If it is physically possible for two particulars to occupy the same place at the same time, then it is metaphysically possible. It follows that being combined as a mereological sum and being compresent are not sufficient for universals to form a particular.²⁴ Something further is required. The mereological sum plus compresence theory could add a condition such as:

7. In order for a particular to be located at a certain place at a certain time, no universals other than the constituent universals can be located at that place at that time — completeness condition.²⁵

A completeness condition is required because otherwise the theory implies that any universal present in the same place at the same time as the constituents of a particular will also be a constituent of the particular. This clause rules out two particulars occupying the same place at the same time, but it does so by fiat.

²³ If they had sources someone might try to regard them as properties of the source.

²⁴ Dean Zimmermann comments that “Fields seem like funny individuals; enduring does not seem to make sense for fields (is this part of the field at t identical with this part of the field at time $t+?$)?” I answer that a static electrostatic field can be regarded as marked out by lines of force and the equipotential surfaces orthogonal to them, which are spheres in the case of an isolated charged point particle at rest. In this way the arbitrary undetached parts of a classical field are determinately marked out, in fact better marked out than they would be in a (hypothetical) piece of continuously divisible matter. If a point particle goes from rest to having a constant velocity, the lines of force and equipotential surfaces change continuously, with the new equipotential surfaces becoming oblate ellipsoids. There is no difficulty then in tracing the arbitrary undetached parts of the field through time, whether the field is static, or moving, or accelerating. Fields are almost as worthy particulars as material objects. Moreover, material objects are partly composed of fields; they are put together by fields; and their behaviour is partly explained by fields: “Because the electric potential due to all the atoms of the crystal is just the sum of the potentials due to each particle out of which it is constituted, it follows that the whole pattern of equipotentials is contracted in the direction of motion and left unaltered in the perpendicular direction, in just the same way as happens with the field of a single electron.” (David Bohm, *The Special Theory of Relativity*, New York, Benjamin, 1965, p. 24, on the Lorentz-Fitzgerald contraction.) There is a difficulty with extended fields due to simultaneity being relative to an inertial frame, and there is just the same difficulty with material objects. Classical fields differ from classical matter in that they obey the principle of superposition, which does create a difficulty for fields of the same type. But in quantum mechanics matter and fields obey a principle of superposition.

²⁵ In his version of the bundle theory, Russell spoke of a complete compresence of universals.

Fifthly, if a particular were just a universal that was the mereological sum of certain universals, the following problem would arise. Imagine a particular that has two constituent universals, *F* and *G*. Suppose that *F* is located (or instantiated) at just three places and *G* is located (or instantiated) at just three places. Suppose also that at one place *F* and *G* are located together and that at a second distinct place *F* and *G* are located together, and that at a third distinct place *F* is located by itself and at a fourth distinct place *G* is located by itself. The particular that has *F* and *G* as its constituents is clearly instantiated twice at the first and second mentioned places. Why is it not instantiated a third time just because its constituents are instantiated? This difficulty is easily avoided by adding a compresence condition. It appears, then, that a particular is a universal that is a sum of universals such that only certain instantiations of the constituents are instantiations of this universal. This is not an ordinary universal, though it is not clear what it is.²⁶

Moreover, if a particular were just a universal that was the mereological sum of certain universals, merely possible particulars would exist.²⁷ For whatever criterion is adopted for the existence of universals, it is possible for all of the constituent universals of a certain particular to exist and for them not to be compresent: the sum and therefore the particular would exist but it would not be located anywhere in the world, which is

²⁶ Dean Zimmermann suggests that they might have meant “that individuals are universals, namely ones that are compresent; while denying that such universals are necessarily ever compresent, or (therefore) necessarily ever individuals?” I take this suggestion to be that a particular is a sum of universals that in this world happens to have compresent instantiations and only compresent instantiations. There might be another possible world where that sum might not have any compresent instantiations and so would be a merely possible particular. But there are possible worlds where the sum has compresent and non-compresent instantiations. In those possible worlds, which probably include the actual world a particular cannot be identified with the sum of universals.

²⁷ Jan Cover tells me that it was not their intention to contemplate uninstantiated particulars.

counterintuitive.²⁸ This difficulty is also easily avoided by adding a compresence condition. But again this shows that it is not an ordinary universal, because for ordinary universals the question of uninstantiated universals can at least be raised.

It is also difficult to see what work mereological summing does. It does not explain how the universals are combined to form a particular, because it does not bring the universals together into one place, and for there to be a particular the universals at least have to be together in one place. But even being together in one place is not enough for universals to form a particular. Neither does being summed confer causal powers on the universals: no plurality of universals has causal powers in virtue of being a mereological sum, or indeed in virtue of being a set or conjunction. And as I shall argue later the properties of a particular are not causally independent.

The motivation for making use of the notion of mereological sum is difficult to see. The best that can be said is that a particular is associated with a mereological sum of universals. But you might just as well say that a particular is associated with a set of universals, and so it is; or you might just as well say that a particular is associated with a conjunction of universals, and so it is.²⁹ One of the advantages of abandoning the formal modes of combination is that they imply that the extensional criterion of identity is true for all particulars, and it would be a good idea to get rid of that.

²⁸ Immanent realists are divided on the issue of whether there are uninstantiated universals. Armstrong thinks that a universal exists if and only if it is (or has been or will be) instantiated. If all the component universals of a particular were instantiated in the past but no longer then the components would exist and the particular would exist. But because it is not instantiated, it is what others would call a merely possible particular. Another view is that a universal exists if and only if it is possible for it to be instantiated (Panayot Butchvarov, *Resemblance and Identity*, Bloomington: Indiana University Press, 1966, pp. 193-7, Andrew Newman, *The Physical Basis of Predication*, Cambridge: Cambridge University Press, 1992, Chapter 3).

²⁹ There are reasons for preferring mereology to set theory, though there are those who still prefer set theory. My point is that neither of these formal modes of composition, however good they may be formally, can explain how universals are combined to form a particular.

4. *Compresence Trope Theory versus Inherence Trope Theory*

In order to understand how universals are co-instantiated, it is instructive to consider a division of opinion among trope theorists about how properties as tropes are combined to form a concrete particular. I suggest that a lesson can be learnt from tropes and then applied to universals. Trope theory is the view that the properties (characteristics or features) of particulars are themselves particulars. The main disadvantage of trope theory is the difficulty it has in explaining generality, since trope theorists need to adopt some other theory of universals to explain generality.³⁰ The main advantages of trope theory are that most people assume that particulars are well understood: properties as tropes are the only constituents of concrete particulars, and tropes explain the causal powers of particulars.

They are two opinions as to how tropes are compresent. According to Keith Campbell's *compresence* version of trope theory, tropes are inter-penetrable and form an ordinary concrete object merely by being present together at the same place at the same time. Although he does not use the language of mereology, someone could claim on his behalf that a concrete particular is a mereological sum of tropes that are compresent. However, it is difficult to see what work the notion of mereological sum would do, or what difference it would make if someone were to claim that a particular is a set of tropes that are compresent, though invoking sums and sets certainly sounds theoretical enough.

Campbell takes the advantages of his view to be that there is only one ontological category, namely tropes, and the mysterious relation of instantiation is done away with,

³⁰ See Armstrong, *Nominalism and Realism*, Cambridge: Cambridge University Press, 1978, Chapter 8.

being replaced by mere compresence. (If it were replaced by another sort of relation, even a causal relation, it would be a very strange one.) He admits that there is a metaphysical possibility of tropes becoming detached from concrete particulars. But why this does not happen is a mystery. Indeed, it is a mystery as to why tropes go around in the usual, very traditional combinations, particularly because tropes are supposed to be the terms of causal relations and there appear to be no causal relations between compresent tropes. The properties that form a concrete particular by being compresent appear to come together and stay together by accident. Campbell's theory also implies that all combinations of properties are equally permissible.³¹

According to Arda Denkel's *inherence* version of trope theory, there are two distinct ontological categories, namely concrete particulars and tropes.³² Tropes "inhere" in each other to form concrete particulars in such a way that they cannot be detached; in this version, mutual inherence, which is a substitute for instantiation, has some important work to do.³³ That properties are locked together with other properties in a particular can

³¹ See Keith Campbell, *Abstract Particulars*, Oxford: Blackwell, 1990, pp. 20-21. Tropes are particulars that are independent entities each with its own natures. Tropes form concrete objects by being compresent, not by inhering in each other. "It is a *matter of fact*, and not a metaphysical necessity, that tropes commonly occur in compresent groups." He returns to the subject later (pp. 130-33), recognizes some difficulties, and moves towards revisionary metaphysics. An intermediate position is that causal laws, or just physical laws, govern compresence. One difficulty with this position is that the laws are unknown to science.

³² Arda Denkel, *Object and Property*, Cambridge: Cambridge University Press, 1996. Peter Simons distinguishes three different types of trope theory. According to the *bundle theory*, a particular is formed by tropes being compresent, and a particular monopolizes its position because it is complete (Campbell, *Abstract Particulars*, Oxford: Blackwell, 1990, p. 21). According to the *substrate theory*, besides the tropes there is a substratum on which the tropes are dependent and which explains the unity of the collection of tropes. According to the *nuclear theory*, a substance contains a nucleus of essential tropes, the individual essence, upon which the non-essential tropes are dependent. See Peter Simons, "Particulars in Particular Clothing: Three Trope Theories of Substance", *Philosophy and Phenomenological Research*, 54, pp. 553-75, 1994. Of these, the bundle theory is a compresence version and the substrate theory is an inherence version.

³³ Denkel, in fact, adopts the Fregean metaphor favoured by many realists and claims that tropes are unsaturated, and therefore fit into each other like the "links in a chain" without the need for any intermediary: "... a particular property is an *unsaturated* entity; it is saturated by existing in compresence

be called the *cage of inherence*. Denkel thinks this view is preferable to the compresence view for two reasons. First, only some combinations of properties are permitted: a material object necessarily has one and only one determinate shape, one and only one determinate mass, and so on (determinate exclusion principle), whereas the compresence view implies that all combinations are equally permissible. Secondly, concrete particulars interact causally in a way that involves several of their properties, whereas the compresence view implies that tropes are causally independent of each other.³⁴ The inherence view apparently regards concrete particulars as wholes as the terms of causal relations.

These two points do show that compresence trope theory is inadequate; in fact, it can be argued that they show that trope theory itself is inadequate.³⁵ It is less clear how the inherence trope theory explains the determinate exclusion principle and the joint causal action of properties. It is all loaded on the shoulders of the mysterious relation of mutual inherence. Tropes apparently fit into each other in such a way that they act jointly in causal interactions; and the way that they fit into each other is governed by rules that imply the determinate exclusion principle. It comes down to this: if tropes fit into each other in a way related to their natures (like Tractarian objects forming states of affairs), then it is conceivable that there is some explanation for these things; but if tropes just

with other properties. Together, a plurality of unsaturated existences complement and saturate each other, forming a more saturated entity. A property is saturated *fully*, when it exists in a compresence of sufficient diversity. At such a level of sufficiency, every property in the compresence is saturated by every other fully, and the *complete* compresence they form is a unity, an object, a fully saturated entity.” Denkel, *Object and Property*, p. 191.

³⁴ For example when a quantity of heat enters a body the resulting temperature depends on the original temperature, the mass of the body, and its specific heat.

³⁵ In *The Physical Basis of Predication*, pp. 239-43 I discussed both these points and argued that they showed that trope theory generally was inadequate.

happen to occupy the same place at the same time (as Campbell suggests), there is no possible explanation for these things.

5. *Two Views of Co-instantiation*

There are two analogous views of how universals are co-instantiated, that is two views about how universals are compresent. Universals could be combined at instantiation to form a particular independently of each other by just happening to be at the same place at the same time, so that they are instantiated independently of each other. Or universals could be combined at instantiation to form a particular in such a way that the instantiations are related to each other and dependent upon each other. The first option, *independent compresence*, would be analogous to Keith Campbell's version of trope theory, whereas the second option, *dependent compresence*, would be analogous to Arda Denkel's trope theory.

The problem with independent compresence is that it does not explain the joint causal action of properties or the determinate exclusion principle; and more to the point, independent compresence could not explain these things. On the other hand, though dependent compresence does not actually explain the joint causal action of properties or the determinate exclusion principle, it makes it conceivable, if not likely, that there should be some explanation for these things. It makes it conceivable that there is some basis in reality for rules such as the determinate exclusion principle and some basis in reality for why the properties of a particular act jointly in causation, and for why a universal cannot be detached from a particular and go off by itself — perhaps more of a

worry for trope theory. What that basis is, we cannot say; all that can be given are rules that govern how universals are instantiated together.

Dependent compresence can be pictured as universals being co-instantiated in the sense that they inhere in each other. The idea is that the universals fit into each other in a way related to their natures to form a particular, in a way that is analogous to the way Tractarian objects are supposed to fit into each other to form states of affairs. The universals fit together without the need for an intermediary to bind them together; and it can be argued that there must be some things that are bound together in this way. Co-instantiation must not be understood as a real relation: it is not an entity of any sort, let alone a constituent of the bundle.³⁶

The co-instantiation of a number of universals cannot be explained in terms of a relation between them. That would make co-instantiation a matter of a number of first order universals falling under a second order universal. The reason is that whether some first order universals fall under a second order universal or not is independent of any particular instantiations of the first order universals and independent of whether those first order universals are instantiated or not.³⁷ This makes co-instantiation primitive.

³⁶ An example of the cage of instantiation. I think that the idea of the cage of instantiation is consistent with Lowe's doctrine of the ontological priority of particulars and with Armstrong doctrine of the mutual dependence of universals and particulars.

³⁷ See the discussion at the end of section 2. A second order universal would not have the right sort of implications about instantiation that would explain a particular. At best, a relation between universals would act in way analogous to a law of nature. For example, there is a relation of subordination between the universal "whale" and the universal "mammal", and this relation implies that whenever the universal "whale" is instantiated the universal "mammal" is instantiated, but not vice versa. This is a relation between species and genus (in the philosophical sense), which is similar to a relation between determinate and determinable. There are also relations between universals that have negative consequences for instantiation. For example, there is a ratio relation of "2 times" between the determinate universals "has mass 4 pounds" and "has mass 2 pounds", but this relation between universals has only negative implications concerning instantiation, since the universals are incompatible.

Is a particular something in addition to the universals that are its constituents, according to the dependent compresence account of co-instantiation? Yes, the universals that are its constituents are entities and the particular that they constitute is an additional entity. But this phenomenon is widespread. The members of a set are entities and the set they constitute is an additional entity.³⁸ The same goes for sums. Assuming that a conjunction of universals is a universal and universals are entities, the component universals are entities and the conjunctive universal is an additional entity. Bundle theorists who hold that a particular is a universal and hold to some independent-of-instantiation mode of composition must agree to the same thing: the constituent universals are entities and the bundle is an additional entity, a universal that is a particular. But neither independent-of-instantiation bundle theories nor co-instantiation bundle theories entail that an additional entity is required to bind the universals together, in the sense of an additional constituent such as a substratum. Similarly, the members of a set, though supposedly bound together, are not bound together by an entity of any sort.

My view is that there are two fundamental categories, universals and particulars. Neither is more fundamental than the other and neither can be explained in terms of the other. They cannot be defined, but rules that characterize them would explain them in terms of each other, as in the case of point and line, or possibility and necessity. A particular is a particular, but its constituents are universals.

The mode of composition, co-instantiation, is indeed mysterious and irreducibly *sui generis*. But for all immanent realists, and indeed all realists about universals,

³⁸ It does not follow that it is a real entity. Some people would deny that set is a real entity on account of its not being a causally significant entity. It could then be regarded as an objective but not real entity, following Frege, or a fictional or arbitrary entity following Russell.

instantiation is primitive — one person’s “primitive” is another person’s “mysterious and irreducibly *sui generis*”. But there is no instantiation without co-instantiation, so co-instantiation is not an additional primitive, and it could be regarded as *the* primitive term. Ontologies that include realism about universals will also require something like instantiation as primitive. For immanent realists instantiation or co-instantiation is not an arbitrary addition to their theory; it is part and parcel of their explanation of their universals. The co-instantiation view is a bundle theory because it regards universals as entities that are combined to give a further entity namely a particular.³⁹ Neo-Aristotelians, on the other hand, do not regard a particular as the result of combining entities together. For them, particulars are the fundamental and irreducible entities and universals are “abstracted” from them.⁴⁰

6. *No Need for Substrata*

Co-instantiation for immanent universals does not require a substratum — a bare particular in which they inhere. There is nothing in the nature of immanent universals that implies a substratum, or pin cushion, model of instantiation. In that theory, the universals are the pins and the substratum is the cushion. The substratum is supposed to perform two principal functions: (1) it enables a universal to be instantiated and (2) it enables several universals to be instantiated together to form a concrete particular.

The underlying idea is that a universal cannot be instantiated without the presence of something irreducibly particular to perform these functions, and, of course, to assert

³⁹ My view that universals are entities that are as fundamental as particulars may be influenced by some other views I hold: for example, (1) that there is only one mode of existence, (2) that everything that exists is real and everything that is real exists, and (3) the criterion for something’s being real is whether it has causal significance.

⁴⁰ I take Jonathan Lowe and Michael Loux to be neo-Aristotelians.

the substratum theory is to deny the bundle theory, and vice versa. The intuitive appeal of the substratum theory probably arises from a Platonic intuition about universals. If universals were located in the Platonic heaven, then there must be something in the space-time world that is not a universal that performs these functions, something that anchors them, or on which they focus, or which participates in them — Platonism always needs its metaphors. That something cannot be a universal, because according to the Platonic view universals are not located in the space-time world. This intuition makes sense in Platonism just because Platonic universals are flighty things that must remain located in the Platonic heaven, while particulars must be located in the space-time world. But equally, by the same token, there is no need for such an entity if the universals are immanent universals, just because the only places where the down to earth immanent universals are located are specific locations in the space-time world.⁴¹

There are also other things that it could be asked to do: (3) explain the numerical unity of a particular, (4) explain what individuates particulars, and (5) explain what persists through time. (3) — but if universals do not need a substratum to inhere in, a substratum would not help explain numerical unity. (4) — individuation is a difficult issue that is discussed in the next section, but substrata could be said to individuate particulars if two substrata could be said to differ absolutely, though by hypothesis they have no properties. This merely highlights the problematic nature of substrata. (5) — a reasonable theory of simple particulars should allow them to change through time.

⁴¹ There is no obvious reason why a universal should not be instantiated alone. But if there is a universal that can be instantiated alone, the reason that this can happen has nothing to do with fundamental facts to do with the nature of instantiation, or the nature of immanent universals as universals. It may be logically impossible for *some* universals to be instantiated alone, but the reason why this cannot happen will have to do with the nature of those universals not the nature of universals in general. It may be physically impossible for all or some universals to be instantiated alone, but the reason will have to do with the laws of nature and the specific nature of those universals.

Possible persistence conditions for such a particular could be that it follow a continuous space-time path while falling under the same set of determinables.

7. *Black's spheres, the bundle theory, and the Identity of Indiscernibles*

Max Black's famous thought experiment presents a difficulty for the bundle theory. He considered a possible world in which there are only two iron spheres a short distance apart. The two spheres have exactly the same intrinsic properties, and because of this and because there are only two of them, they also have the same pure relational properties. A pure relational property is one that involves a relation and a monadic universal but no individual particulars, for example "orbits a star". An impure relational property involves a particular, for example "orbits the sun". Pure relational properties are qualitative properties, whereas impure relational properties are not qualitative. We can therefore say that there are no qualitative differences between Black's spheres.

If a particular is a bundle of its properties and particulars are subject to the extensional criterion of identity, then these two spheres are the same particular, counter to the obvious metaphysical possibility of two such spheres. O'Leary Hawthorne's response to Black's thought experiment was to affirm that the two spheres are indeed the same particular. This is a most interesting application of their doctrine that a particular is a universal, and their theory does indeed credit particulars with the extensional criterion of identity.⁴²

⁴² See J. O'Leary-Hawthorne, "The Bundle Theory of Substance and the Identity of Indiscernibles", *Analysis*, 55, pp. 191-96, 1995. Black's original paper is: M. Black, "The Identity of Indiscernibles", *Mind*, 61, pp. 153-64, 1952. For a critique of O'Leary-Hawthorne, see William F. Vallicella, "Bundles and Indiscernibility: A Reply to Hawthorne", *Analysis*, 1997, pp. 91-94.

Bundle theories that make use of the formal modes of composition, set, sum, or conjunction, must ascribe the extensional criterion of identity to particulars; and for them Black's thought experiment represents a serious problem.⁴³ But for those versions of the bundle theory that do not ascribe the extensional criterion of identity to particulars, whether it presents a direct challenge will depend on the relevant criterion of identity, if there is one.⁴⁴ Besides giving rise to problems for the bundle theory from considerations concerning (1) criteria of identity, it also gives rise to problems concerning (2) individuation, and (3) the principle of the Identity of Indiscernibles.

Despite the fact that the two spheres could stay just so from infinite time past to infinite time future, Black's possible world seems to be taken to be an exercise about two spheres at an instant in time that raises issues about synchronic identity.⁴⁵ The exercise seems to rule out suggestions that they differ because they have differed, or because they will differ, or because they could differ, which are sensible enough suggestions, but not within the terms of the exercise. For example, if the two spheres are numerically distinct particulars, then they have distinct causal powers — they do have the same general causal powers, but in the sense that if a third object *were* present, they would interact differently with it. Given that their intrinsic properties are the same and there is nothing else in their

⁴³ If Black's two spheres are the same bundle, then it appears that all counterfactual statements that are true of one are true of the other (cf. Dean Zimmermann, "Distinct Indiscernibles and the Bundle Theory", *Mind*, 106, pp. 305-8, 1997). This seems to be true, or at least plausible, for independent-of-instantiation bundle theories, but not true for co-instantiation bundle theories. It is difficult to know what to make of a counterfactual statement about universals bundled in the abstract, since counterfactual statements should mention places and times.

⁴⁴ Casullo and Rodriguez-Pereyra also deny, in effect, that particulars are subject to the extensional criterion of identity, see Albert Casullo, "A Fourth Version of the Bundle Theory", *Philosophical Studies*, 54, pp. 125-39, 1988 and Gonzalo Rodriguez-Pereyra, "The Bundle Theory is compatible with distinct but indiscernible particulars", *Analysis*, 64, pp. 72-81, 2004.

⁴⁵ Reference to the spheres presupposes a person outside the world who for some unexplained reason knows about their intrinsic properties and the relations between them, even though there is no possibility of a referrer having a relation with the spheres. Hence the problems raised by the spheres are metaphysical rather than about reference.

world, there is no sufficient reason for them to differ in the future. But if spontaneous action were possible, that is action for which a sufficient reason is lacking (contrary to the principle of sufficient reason), then they could differ in the future. To rule out spontaneous action as metaphysically impossible, you would have to be able to defend the principle of sufficient reason as metaphysically necessary. However, for the purposes of defending the bundle theory, there is no reason to accept the terms of the exercise and demand that criteria of identity only mention factors that obtain at a single instance of time, since the appropriate criterion of identity for an iron sphere probably does involve time.

What should we expect a criterion of identity to do for us? A criterion of identity has the general form:

If x and y are F 's, then $x = y$ if and only if xR_Fy ,

where xR_Fy can be called the relational criterion and R_F the criterial relation.⁴⁶ ' F ' refers to a sortal or kind of thing; for example ' Fa ' could say that a is a horse, or a is a set. The best known criterion of identity is that for sets:

If x and y are sets, then $x = y$ if and only if x has the same members as y .

Another is that suggested by Wiggins's in his book *Identity and Spatio-Temporal*

Continuity:

If x and y are material objects, then $x = y$ if and only if (1) x follows the same space-time path as y , and (2) there is a sortal such both that x and y fall under it at all points along their space-time paths.⁴⁷

⁴⁶ See E. J. Lowe, *Kinds of Being*.

⁴⁷ According to David Wiggins, the truth conditions for an identity statement such ' $a = b$ ' are as follows: "If one locates each of the particulars a and b [under covering concept or concepts] and, where appropriate, sc. in the case of 'identity through time', traces a and b through space and time [under covering concepts], one must find that a and b coincide [under some covering concept f]." *Identity and Spatio-Temporal Continuity*, p. 35. Wiggins may intend his criterion to apply to all "individuals", but it is possible that there are individuals that are not spatio-temporal entities. He cannot intend it to apply to all spatio-

I have altered Wiggins's actual version to make it read as a criterion of identity.

A criterion of identity gives necessary and sufficient conditions for identity for members of a given sortal, and therefore can be converted into a statement that gives the truth conditions for identity sentences about members of the sortal, which is how Wiggins and Lowe interpret criteria of identity. Criteria of identity, it is said, must be informative and non-trivial. The criterion for sets and Wiggins's criterion achieve this by referring to things other than members of the sortal: the set criterion refers to members of sets and Wiggins's criterion to space-time paths. But it is not clear how informative they should be. Giving necessary and sufficient conditions for identity is not the same thing as giving the principle of individuation, that that is specifying that in virtue of which things differ; and it is certainly not the same thing as giving an explanation of ultimate difference.

A criterion of identity can be thought of as having two components:

- (1) If x and y are F 's, then (if $x = y$, then xR_Fy).
- (2) If x and y are F 's, then (if xR_Fy , then $x = y$).

In the usual cases the criterial relation involves some sort of identity.⁴⁸ In the two examples given of criteria of identity, the sameness required is not obviously reducible even to a limited form of qualitative identity, and I take this to be typical. Nevertheless, the first component is a consequence of Leibniz's Law. Leibniz's Law is not something

temporal entities, since events are spatio-temporal entities and the criterion does not apply to them. Hence I put "material objects" for simplicity's sake, though the criterion also applies to spatio-temporal persons. The sortal mentioned in the criterion (covering concept) could be the substance concept, the most theoretically fundamental answer to the question "what is it?" (cf. *Sameness and Substance*, p. 79), or some other sortal that is entailed by the substance concept. If in order to persist through time a particular must fall under the same substance concept throughout the relevant period of time, then there is a sortal that a material object must fall under throughout its space-time path.

⁴⁸ An exception is Frege's original example of the criterion of identity for directions of lines x and y ; the criterial condition is that x and y be parallel. But perhaps his criterion is circular as parallelism is explained in terms of direction.

anyone wants to deny; what is controversial about it is how to formulate it. It must be taken as more general than “numerical identity implies qualitative identity”, or “numerical identity implies community of properties”. The most general version of Leibniz’s Law that I can think of is: the identity of x and y implies that whatever is true of x is true of y . I cannot think of any reason why Leibniz’s Law should not apply to all entities of all kinds, since identity applies to entities of all kinds.

The important component of a criterion of identity is therefore the second component, that the relational criterion implies identity for members of that sortal. This is not a consequence of the Identity of Indiscernibles (any version), since the Identity of Indiscernibles does not imply that xR_Fy is a sufficient condition for identity for members of the sortal F . For example, from the proposition that community of properties is sufficient for identity it does not follow that sameness of members is sufficient for identity in the case of sets. As Lowe observes, a criterion of identity expresses only part of the nature of the kind, though it does this in a particularly precise fashion.

Suppose then that Wiggins’s criterion of identity is the one that applies to the sortal that Black’s spheres fall under. By hypothesis the spheres occupy different places at any given time. They, therefore, possess different space-time paths. And, therefore, by Wiggins’s criterion of identity, they are not identical. We can see, then, that there is at least one reasonable criterion of identity according to which Black’s spheres create no difficulty for the bundle theory. On the other hand, there is no reason to suppose that there is a criterion of identity for every kind of entity.⁴⁹

⁴⁹ Is there a criterion of identity that applies to all entities? Leibniz’s Law applies to all entities, since it is the rule that characterizes identity: identity is that equivalence relation that obeys Leibniz’s Law, and for this reason it is a significant rule. If Leibniz’s law were formulated as “if $x = y$, then whatever is true of x is

It is no use complaining that Wiggins's criterion of identity offers no explanation for how the places occupied by the spheres differ. For one thing the thought experiment does not presuppose any theory about the nature of places. More importantly, criteria of identity are not about individuation. Wiggins's criterion of identity is appropriately non-trivial and is, in fact, consistent with a number of theories of individuation, such as individuation by matter, by prime matter, or by haecceities, none of which it mentions.

Many traditionally minded philosophers suppose that there must be a principle of individuation: something *in virtue of* which the spheres differ, something that *makes* them to differ, such as being made of different parcels of prime matter, different parcels of matter, or by possessing different haecceities. If they suppose also that the principle of individuation must be based upon components of the particulars, then they will find fault with the bundle theory. But the problem lies with these suppositions. If two things differ in virtue of something else, then this type of explanation cannot go on for ever and there must be things that differ absolutely: they just differ and do not differ in virtue of something else. So why shouldn't ordinary particulars differ absolutely as the mature Leibniz seems to have believed of his monads?⁵⁰ If *a* and *b* are two particulars with the same component properties and yet are two different instantiations of those properties, we could say, I suppose, that they differ in virtue of being two different co-instantiations of those properties, but I do not see how the language of 'in virtue of' helps. Moreover identity itself is something absolute. If a certain entity is the same as itself, there is

true of *y*", then the converse would be "if whatever is true of *x* is true of *y*, then $x = y$ ". This converse is a form of the Identity of Indiscernibles, but it does not appear to be very significant. It is just a way of saying that there cannot be a distinction without a difference, which is, in fact, exactly what its contrapositive is saying: "if $x \neq y$, then it is not the case that whatever is true of *x* is true of *y*." Combined with Leibniz's Law we get a criterion of identity for all entities, but not one that tells anything about all entities other than what we already know, that identity applies to all entities.

⁵⁰ See Hawthorne and Cover.

nothing in virtue of which it is the same as itself; there is no explanation for this fact; it just is the same as itself. Identity and difference are two sides of the same coin, so that if two things are different, there is nothing in virtue of which they differ; they just differ.⁵¹

There are difficulties for the bundle theory arising from the principle of Identity if Indiscernibles. For example this argument is given by Armstrong:⁵²

1. If the bundle theory is true, then it is a necessary truth.
2. And if the bundle theory is a necessary truth, then the principle of the identity of indiscernibles is a necessary truth.
3. But no version the identity of indiscernibles is a necessary truth.
4. Consequently, the bundle theory is not true.

It works by assuming the extensional criterion of identity:

1. Bundle theory: Necessarily, if a is a particular that possesses only the properties F , G , and H , then $a = [F, G, H]$, where the brackets indicate bundling together.
2. But if b is another particular with exactly the same properties, then $b = [F, G, H]$.
3. Therefore $a = b$.
4. Therefore, the principle of the identity of indiscernibles is necessarily true.

The reason it does not follow that $a = b$ is that whereas a and b may be bundles of the same universals they may not be the same co-instantiation of those universals. This is a more fundamental reason than citing Wiggins's criterion, since it is metaphysically possible that there are simple particulars other than material objects. If a did have the

⁵¹ I am grateful to Paul Audi for this point.

⁵² See D. M. Armstrong, *Nominalism and Realism*, Cambridge: Cambridge University Press, 1978, pp. 91-7.

same constituent universals as b , and if a and b were the same co-instantiation of those universals, then indeed $a = b$.

Black's thought experiment, in fact, enables us to see intuitively that it is metaphysically possible for there to be two qualitatively identical particulars. According to any version of the Identity of Indiscernibles that conforms to the schema "qualitative identity implies numerical identity", there must be some non-qualitative difference between the spheres. But we cannot infer from this that the bundle theory is false. The bundle theory merely implies that there are no non-qualitative constituents of a simple particular, not that there are no non-qualitative differences between particulars. It allows, therefore, that particulars could differ in something non-qualitative that is not a constituent, such as places, space-time paths, and primitive thisnesses (not components according to Adams), which are non-qualitative and not components of particulars. On the other hand, parcels of matter, haecceities, and substrata are non-qualitative and supposed by various people to be constituents of particulars, and would create difficulties for the bundle theory. It follows that the bundle theory is consistent with non-qualitative differences between particulars providing they are not constituents.

Leibniz's original version of the Identity of Indiscernibles falls under the schema "qualitative identity implies numerical identity".⁵³ It applies to monads, which do not have relations with other monads and do not have parts to have relations with, so the issue of relational properties of either sort does not arise. Qualitative identity is then a matter of possessing the same intrinsic properties.⁵⁴ Leibniz's version of the Identity of Indiscernibles would then be: "sameness of intrinsic properties implies identity".

⁵³ Leibniz, *Discourse on Metaphysics*, 9.

⁵⁴ See fn. 22 for a discussion of intrinsic properties.

Another version that falls under the schema “qualitative identity implies numerical identity” is: “sameness of intrinsic properties and sameness of pure relational properties implies identity”. They are both false and Black’s thought experiment shows they are false.

Black’s thought experiment does not show that the following version of the identity of indiscernibles is false: “sameness of intrinsic properties, sameness of pure relation properties, and sameness of impure relational properties implies identity”.⁵⁵ If the impure relational properties include ones referred to be the likes of ‘ = a ’, then it is true. It presupposes the non-identity of the spheres, so that the inference from this principle to the spheres being non-identical is circular.

It is difficult to know why we should be interested in the Identity of Indiscernibles. Why should there be a principle that gives sufficient conditions for identity for *all* particulars? Armstrong’s version is “sameness of intrinsic properties, sameness of pure relational properties, and sameness of world path implies identity”.⁵⁶ And the following version can be extracted from Wiggins: “sameness of sortal and

⁵⁵ Discussions about the identity of indiscernibles usually assume that there is a version of the principle that is true for all particulars, and nominalists might assume that there is a version that is true for all entities. I think that this is a mistake. Typically, a particular falls under a sortal and a sortal has associated with it a criterion of identity, and a criterion of identity is a principle that entails a version of the identity of indiscernibles. Wiggins’s criterion of identity for material objects cited in footnote 65 gives an example. But it involves identity through time and Black’s thought experiment is about identity at a time. Lowe suggests that there are particulars that fall under sortals that do not have a criterion of identity associated with them; he suggests subatomic particles. See E. J. Lowe, *The Possibility of Metaphysics*, Oxford: Oxford University Press, 1998, p. 62ff.

⁵⁶ Not exactly how Armstrong puts it. Instead of ‘world path’, he uses the term ‘total position’ for the “spatio-temporal area occupied by a particular from the beginning to the end (if any) of its existence.” He also says “guarantees identity”. See Armstrong, *Nominalism and Realism*, p. 123. Cf. “sameness of sortal and sameness of place implies identity”, Locke, *Essay*, II, xxvii, 2.

sameness of world path implies identity” .⁵⁷ These principles do appear to be true for all the medium-sized, material objects of our acquaintance, and Armstrong regards his version as a necessary truth, true for all kinds of particulars. The reason for regarding one of them as the principle of *the* Identity of Indiscernibles could be that Wiggins believes that space-time particulars are the only particulars that exist. For some reason there is no interest in an Identity of Indiscernibles that applies to all *entities*, universals included.

⁵⁷ Again a paraphrase. See David Wiggins, *Identity and Spatio-temporal Continuity*, Oxford, Blackwell, 1967, *Sameness and Substance*, Oxford, Blackwell, 1980, *Sameness and Substance Renewed*, Cambridge: Cambridge University Press, 2001.