

*Coincidence as Overlap*¹

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Material constitution and coincidence are widely discussed but poorly understood. This paper is an attempt to make progress by developing an account of how numerically distinct material objects coincide when one constitutes the other. I address two central issues: first, do material coincidents share their proper spatiotemporal parts, and if so, do they share all of them? Second, how can material coincidents share their spatiotemporal location and matter, so share material properties such as having mass m , shape s , and location l , but not share all of their properties? To answer these questions, I develop a property mereology for objects and argue that coincidents overlap with respect to all of their spatiotemporal parts but not all of their property parts. If we can adequately explicate coincidence, we can begin to answer questions about material constitution and related questions about *de re* modality, persistence, supervenience, redundant causation, event individuation, personal identity, nonreductive materialism in mind, and reference.

1. Introduction

Material constitution is everywhere: tables are materially constituted by hunks of wood, persons are materially constituted by bodies, statues are materially constituted by pieces of clay and mental states are materially constituted by brain states. When one object materially constitutes another, the objects share their material and their spatiotemporal location but differ qualitatively. For example, a person is essentially sentient but her body is not, a brain state is essentially physical but the mental state it constitutes is not, and a statue is accidentally mass m while its piece of clay is not. The differences need not be couched in terms of *de re* modality: a statue can be insured or

admired while its piece of clay is not, a table can be valuable while its wood is not, a person can be elegant while his body is not.² The problem of material constitution is of interest for its own sake, but also because it sits at the nexus of a number of central philosophical topics, i.e., *de re* modality, persistence, supervenience, redundant causation, event individuation, personal identity, nonreductive materialism and reference.³ All of these debates are affected by views involving the relationship between ordinary objects and the material that constitutes them.

The outstanding problem for those who wish to explain material constitution is to explain *material coincidence*: the coincidence of the ordinary material objects related by material constitution.⁴ How do materially coinciding objects manage to share their matter and occupy the same spatiotemporal region, yet remain numerically distinct? Applying a sobriquet from Fine (2003), *pluralists* are those who grant that material coincidents are numerically distinct. *Monists* argue that material coincidence is just identity.⁵

The intuitively appealing position is pluralism: it is natural to think that the statue has a context independent nature or essence that is different from the piece of clay, and thus that the statue is a different sort of thing from the clay. It is natural to think that as a result of deep, objective differences in the sorts of things they are, the statue can be destroyed while the piece of clay is preserved, e.g., when the piece of clay is molded into a brick. Monists must argue that such natural thoughts are mistaken.

But pluralism faces a deep and problematic objection: how is it possible to have multiple material objects that share their matter and occupy the very place at the very same time? Monists argue that pluralists cannot explain material coincidence, and so the seemingly intuitive position of the pluralist is inexplicable. According to the monist, pluralists cannot explain material coincidence (and as a result have no adequate account of material constitution). “What grounds the alleged modal differences between [material coincidents], given that they are otherwise so alike? They are the same shape, the same size, made of the same parts, have the same history and future, are the same distance from the bagel store, and so on and so forth. So what exactly makes it the case that they could have different shapes, sizes, etc.? [Monists] . . . suspect that their [pluralist] opponents simply have no answer to this question.” (Bennett 2004, 339-40) “I believe that the main burden [for pluralists], which is yet to be discharged. . . is to produce a serviceably clear concept of constitution.” (Kim 2005, 61) Harsher critics say that “[pluralism] reeks of double-counting. . . [the] multiplication of entities is absurd on its face” (Lewis 1986, 252) or tell pluralists they have “a bad case of double vision.” (Noonan 1988, 223) In this way, the less intuitive position of the monist—that somehow, there is only one object after all—gains a foothold. The suggestion is that without an explanation of material coincidence, we should beat a retreat to monism.⁶

This paper is devoted to blocking the retreat. I will explain how material coincidence is possible by giving a clear, reductive account of how numerically distinct objects coincide. My task is to provide such an account *given* that there are absolute *de re* modal differences (i.e., differences that do not depend on differences in semantic contexts) as well as nonmodal differences between material coincidents, not to argue *for* such differences. Thus, I will largely ignore positive arguments (such as there are) for monism.

2. Setting Up the Puzzle

Coincidence *simpliciter* involves co-occupancy or sharing of position. We can imagine many kinds of coincidence, such as a ghost walking through a wall or interpenetrating material objects made of different types of matter. Substantialists about spacetime may wish to hold that point-sized material objects spatially coincide with points of substantial space and temporally coincide with instants of time. It might even be possible for two particles made of different matter (of the same type) to coincide via material interpenetration.

Material coincidence is a special kind of coincidence, since coincidents share their matter as well as their location. In virtue of the fact that materially coinciding objects share their matter and spacetime region, they share their *material properties*. Material properties are roughly describable as nonmodal natural properties characterizing an object's matter, certain details concerning its matter (such as how the matter is arranged), and its location.⁷ I'll take a statue of Athena (call it "Athena") and its constituting piece of clay (call it "Piece") as a case study. Athena and Piece share their material properties: for example, if Athena has mass m , Piece has mass m ; if Athena has charge distribution cd , Piece has charge distribution cd ; if Athena has color c , Piece has color c ; if Athena has shape s , Piece has shape s ; if Athena has location l , Piece has location l ; and so on. In certain cases, other sorts of properties may be included in the set of material properties, such as having the same qualitative causal origin or causal history.

For simplicity, I will exclude cases of material coincidence involving change of properties over time. So my discussion of materially coincident objects Athena and Piece will assume that they exist unchanged in the very same place for exactly the same amount of time. I will also avoid an explicit discussion of any special problems involving materially coincident events—my ultimate conclusions about ordinary material objects should apply, *mutatis mutandis*, to events. Finally, from this point on, my uses of the terms "coincidence" and "constitution" refer only to material coincidence and material constitution, where these relations are not the relation of identity.

I'll discuss two main (and related) questions. First, how should the mereology of material coincidents, and thus the mereology of ordinary material objects, be understood? Do coincidents share their proper spatiotemporal

parts, and if so, do they share all of them?⁸ After I spell out the spatiotemporal mereological options for coincidents, I will address the second, and central, question that coincidence presents: how can coincidents share their material properties without sharing properties (such as *being accidentally of mass m*) that seem to supervene on material properties? The answer to the second question will show us how to answer the first.

3. Coincidence and Classical Mereology

What is the spatiotemporal mereological relationship between material coincidents? The skeleton of a mereology, \mathcal{M}^- , can be described using axioms A1-A3.⁹

- A1. x is not a proper part of itself.
 - A2. If x is a proper part of y , then y is not a proper part of x .
 - A3. If x is a proper part of y and y is a proper part of z , x is a proper part of z .
- (A1-A3 tell us that proper parthood is irreflexive, asymmetric and transitive.)

The mereological definitions D1-D5 can be added to \mathcal{M}^- to give \mathcal{M} :

- D1. x is a *part* of y iff x is a proper part of y or x is identical to y .
- D2. x *overlaps* y iff x and y have a part in common.
- D3. x is *disjoint* from y iff x and y have no part in common.¹⁰
- D4. x *partly overlaps* y iff x and y have some but not all parts in common.
- D5. x is the *fusion* (or a *sum*) of ys iff x has all the ys as parts and no parts disjoint from the ys .

\mathcal{M} is a basic framework for a mereology. However, to understand the content of \mathcal{M} and any extensions thereof, we must be clear about the nature of the parts we are talking about. In particular, if \mathcal{M} is to serve as a framework for a spatiotemporal mereology, it must be interpreted in terms of spatiotemporal parts. Let us adopt a generally accepted way to treat spatiotemporal parthood: spatiotemporal parts of objects are individuated by matter-occupied regions of spacetime. (The competing thesis that spatiotemporal parts are individuated merely by the region of spacetime they occupy is too weak, for it implies that ghosts share their parts with the walls they pass through and interpenetrating material objects share their parts.)

According to this approach, *proper spatiotemporal parthood* is irreflexive, asymmetric and transitive. If spatiotemporal parts are individuated by matter and region, then for objects composed entirely of spatiotemporal parts, such objects are the material contents of spacetime regions and proper spatiotemporal parts of such objects are material contents of subregions of these

regions. In accordance with \mathcal{M} , and given that the objects to which the mereology applies have no parts other than spatiotemporal parts, our basic spatiotemporal mereology \mathcal{M}_{SP} is:

A1_{SP}. x is not a proper spatiotemporal part of itself.

A2_{SP}. If x is a proper spatiotemporal part of y , then y is not a proper spatiotemporal part of x .

A3_{SP}. If x is a proper spatiotemporal part of y and y is a proper spatiotemporal part of z , x is a proper spatiotemporal part of z .

D1_{SP}. x is a *spatiotemporal part* of y iff x is a proper spatiotemporal part of y or x is identical to y .

D2_{SP}. x *spatiotemporally overlaps* y iff x and y have a spatiotemporal part in common.

D3_{SP}. x is *spatiotemporally disjoint* from y iff x and y have no spatiotemporal part in common.

D4_{SP}. x *partly spatiotemporally overlaps* y iff x and y have some but not all spatiotemporal parts in common.

D5_{SP}. x is the *spatiotemporal fusion* of ys iff x has all the ys as spatiotemporal parts and has no spatiotemporal parts spatiotemporally disjoint from the ys .

Note that according to the definitions, objects can partially spatiotemporally overlap (for example, two offices can share one of their walls). In such a case the objects are spatiotemporally different but not spatiotemporally disjoint. This sort of mereological difference is especially interesting because it highlights how numerical distinctness and mereological disjointness can come apart: objects can be numerically distinct while being merely mereologically different.

\mathcal{M}_{SP} is the basis for classical mereology, the most widely accepted theory of parts and wholes. (A full-blown classical mereology would require additional definitions and theorems. See Simons (1987) and Casati and Varzi (1999) for full-blown versions.) On the usual way of thinking about objects, ordinary objects are sums of spatiotemporal parts governed by classical mereology, hence, by \mathcal{M}_{SP} . Given this approach, can sense be made of cases where ordinary objects such as Athena and Piece share their matter and wholly occupy the same region of spacetime? There are two options: either Athena and Piece are spatiotemporally disjoint, or Athena and Piece spatiotemporally overlap.

How could Athena and Piece possibly be spatiotemporally disjoint? According to the definition of spatiotemporal part just adopted, if Athena and Piece share their matter and occupy the same region of spacetime, then

they *must* have the same spatiotemporal parts. Defenders of the view that coinciding objects are spatiotemporally disjoint must adopt a stricter notion of the individuation of spatiotemporal parts: sameness of matter and spacetime region occupied is not sufficient for sameness of spatiotemporal parts.

On such a view, if Athena and Piece are spatiotemporally disjoint, then Athena's matter m occupies spacetime region S , Athena is composed of spatiotemporal parts P , Piece's matter (also m) occupies region S , while Piece is composed of distinct spatiotemporal parts P^* . According to this view, objects can share their matter and region without sharing their spatiotemporal parts: exactly one fundamental physical particle in S is included in a small spatiotemporal part of Athena and the very same particle is also included in a small spatiotemporal part of Piece. But these small spatiotemporal parts of Athena and Piece are not identical, for they are individuated by something other than the fundamental particle and the region they share.

Without more elaboration, the view that Athena and Piece are spatiotemporally disjoint is extremely unsatisfying. How can the proper spatiotemporal parts of Athena and Piece be numerically distinct if they share their matter and region? What more is involved? How can Athena and Piece share their fundamental physical particles but not their spatiotemporal parts? These questions must be answered.

If Athena and Piece are *not* spatiotemporally disjoint, they spatiotemporally overlap to some degree. There are two ways that Athena and Piece can spatiotemporally overlap: either some (but not all) of their spatiotemporal parts are shared or all of their spatiotemporal parts are shared. If Athena and Piece spatiotemporally overlap by sharing *all* of their spatiotemporal parts, then they spatiotemporally overlap *entirely* with respect to their spatiotemporal parts: all the spatiotemporal parts of Athena are all the spatiotemporal parts of Piece. According to such a view, pairs of coinciding objects such as a person and her body, a table and its hunk of wood, and a pain state and its brain state share all of their spatiotemporal parts, proper and improper, since they share the same matter and occupy the same region of spacetime. This view has the advantage of allowing for the natural view that spatiotemporal parts are individuated by their matter and region.

Unfortunately, although holding that coincidents share all their spatiotemporal parts may do the most justice to the usual notion of how to individuate spatiotemporal parts, it has bizarre consequences: it seems to require the rejection of attractive mereological principles without adequate explanation. For example, on the usual interpretation of improper parthood, an improper part of an object is just that object. Is it correct to say that an improper spatiotemporal part of Athena is just Athena? And that an improper spatiotemporal part of Piece is just Piece? If so, then Athena and Piece cannot share their improper spatiotemporal part, since Athena is *not* identical to Piece.

Perhaps the view should be that Athena and Piece share just their proper spatiotemporal parts. The trouble is that this view implicitly rejects an important principle of classical mereology: the widely held *extensional principle* (sometimes called “uniqueness”) that objects with all and only the same proper spatiotemporal parts are identical.¹¹ A rejection of extensionality needs explanation.

Perhaps the solution is to reject this aspect of classical mereology and hold the view that coincidents share all their proper spatiotemporal parts. But this doesn’t seem right either. The trouble is that what we normally take to be the large spatiotemporal parts of coincidents, such as heads of statues and head-shaped pieces of clay, differ as much as the wholes they are parts of. Consider Athena and Piece. If the head of Athena is a spatiotemporal part of Athena and the head-shaped piece of clay is a spatiotemporal part of Piece, the same sorts of reasons for distinguishing statue and the piece of clay can return when considering their (larger) proper spatiotemporal parts,¹² for example, it seems like the head may be valuable or essentially head-shaped while its piece of clay is not. The motivations for holding that large proper spatiotemporal parts of Athena and Piece are numerically different are the same as the motivations for holding that Athena and Piece are numerically different. Complete overlap of (proper) spatiotemporal parts runs into at least as much trouble as the other options.

Perhaps one could retreat to the position that Athena and Piece are spatiotemporally disjoint with respect to their large proper spatiotemporal parts but overlap with respect to smaller ones. This is somewhat commonsensical but makes no advance on the mereological mystery. The claim that Athena and Piece share only small spatiotemporal parts is as obscure as the claim that Athena and Piece are disjoint: how are spatiotemporal parts being individuated, if not by matter and region? How can Athena and Piece share some but not all of their spatiotemporal parts even though Athena and Piece share all of their matter and region? What accounts for the size-based change in the individuation of spatiotemporal parts? What about an extremely small statue constituted by an extremely small piece of matter (with an extremely small head constituted by an extremely small head-shaped piece of matter)? The head and head-shaped piece of matter of these extremely small objects differ just as much as the head and head-shaped piece of matter of Athena and Piece. So size doesn’t matter after all.

Perhaps one could reject the uniqueness of fusion and hold that the smallest spatiotemporal parts of Athena, i.e., its simples, are spatiotemporally fused the Athena-way, while the spatiotemporal simples of Piece are the same simples but fused the Piece-way. An obvious problem with this strategy is that it might be empirically false that there are simples, since there could be ever-smaller spatiotemporal parts (gunk). Moreover, in the usual case where coincidents are macrolevel coincidents, even very small spatiotemporal parts, such as molecule-sized parts, could be sums of smaller simples, yet intuitively,

molecule-sized spatiotemporal parts are shared by such coincidents. The puzzling difference between spatiotemporal parts of coincidents is a difference that shows up somewhere in the transition from the macrolevel to the microlevel, not between the lowest possible level and all higher levels.¹³

We have arrived at one of the central mysteries of coincidence: what is the explanation of the spatiotemporal mereological relationship between coincident material objects? Each possibility seems to result in obscure metaphysical and mereological claims.¹⁴

4. Object Theory

One thing should be clear by now: if pluralism is correct, we cannot take ordinary objects to be material contents of spacetime regions.¹⁵ For whatever it is for ordinary objects such as Athena and Piece to be coincident, one thing they have in common is their matter and the region of spacetime they occupy. Taking Athena and Piece to be reducible to material contents of spacetime regions is a nonstarter.

This does not preclude the view that whatever an ordinary object is includes or involves its located matter—it precludes the view that every ordinary object is simply identical to its located matter. If ordinary material objects are not just material contents of spacetime regions, then ordinary material objects are not just sums of spatiotemporal parts (where such parts are simply material contents of spacetime regions). The result is immediate: *classical mereology is not the mereology of ordinary objects*.

Thus, the pluralist cannot adopt a theory of ordinary objects that takes them to be sums of classically understood spatiotemporal parts. Excavating the problems of coincidence has unearthed a much deeper issue, the issue of what objects fundamentally *are*. It turns out that the pluralist must be clear about what ordinary objects are before she can hope to give an account of how they coincide.

Below, I'm going to give an account of the metaphysical structure of ordinary objects and show how the pluralist can employ that account in the service of explaining the distinctive differences between coincidents as well as their spatiotemporal mereological relationship. The root of the treatment of coincident objects will turn out to depend on what objects are taken to metaphysically *be*. Moreover, we need a well developed theory of ordinary material coincident objects to give an adequate explanation of coincidence. Simply claiming, for example, that distinctive differences between coincidents can be explained by the existence of different supervenience relationships does not adequately explain why different supervenience relations should be thought to exist or what such relations amount to.¹⁶

So the pluralist needs to treat of the metaphysics of objects before she tackles the problem of coincidence. On behalf of the pluralist, I will provide a theory of objects as fusions of properties. I do not claim that my theory is

the *only* theory that can do the job (although I do claim it is the best theory for the job): other theories of objects, appropriately developed along the lines I set out in later sections, may also be able to make sense of coincidence.¹⁷ Once the pluralist has a clear theory of objects, the logical space of the problem will be well enough defined to direct her to appropriate solutions. Whatever theory is adopted, the pluralist must be clear about what theory of objects she is relying upon and how that theory makes sense of coinciding objects.

The theory of objects that I take to be most parsimonious and plausible is a version of *bundle theory*: objects, perhaps as a matter of contingent fact, are bundles of properties. Historically, the bundling relation has been taken to be a primitive relation, and has been variously characterized as “compresence,” “concurrence,” “co-location,” or “consubstantiation.” My version of bundle theory is not the traditional version, however; bringing mereological terminology together with the bundle theory of objects, I take objects (at a time) to be *fusions* of properties. Hence, I endorse a mereological bundle theory. This means that I embrace a property mereology in addition to a spatiotemporal mereology.

Mereological bundle theory takes ordinary objects to be nothing more than bundles of properties. Bundle theorists historically took objects to be bundles of instantiated universals, although most contemporary bundle theorists take objects to be bundles of primitively individuated instances of properties, a.k.a. tropes.¹⁸ I reject trope-theoretic versions of bundle theory in favor of a mereological bundle theory where objects are fusions of multiply locatable properties. Properties are primitive entities in this system, and, as I have discussed elsewhere, something like immanent universals.¹⁹ Ordinary objects can be characterized, at least roughly, as the objects that are fusions of properties in a region such that the fusion is saturated, i.e., includes a determinate of each fundamental physical determinable, and the fusion is a member of a natural or artifact kind.²⁰

My property mereology has an antecedent in Nelson Goodman’s work from the first half of the twentieth century. Goodman (1951) develops a version of a property mereology that takes qualitative parts to be appearances of spatiotemporally located trope-like entities. Building on an interpretation of Rudolf Carnap’s (1928) phenomenalist construction of quality classes in the *Aufbau*, Goodman (1951) held that fusions of such (appearances of) property instances that counted as (appearances of) objects were those to which the primitive predicate of “togetherness” applied. Goodman’s system expands upon the little-noticed point that Leonard and Goodman’s (1940) formal calculus of individuals included property instances as parts along with spatial and temporal parts.

Mereological bundle theory can also be found in the work of D.C. Williams (1953, 1986). Williams was an early defender of objects as bundles of tropes, and in his 1953, made suggestive remarks about tropes as the “abstract parts”

or “finer parts” of objects, where such parts are explicitly taken to be tropes or property instances. It is fair to attribute mereological bundle theory to Williams as well as to Goodman. However, Williams gives no explicit definition of qualitative parthood, no mereological axioms or definitions, no information about whether fusion is restricted or unrestricted (and if it is unrestricted, how to treat it), and no account of how qualitative parthood connects to spatiotemporal parthood. As Williams is not even minimally explicit about how a trope-theoretic mereological approach is to be formulated, he cannot be seen as venturing beyond more than a straightforward adoption of (a nonphenomenalist version of) Goodman’s system.

There are several important differences between my view and Goodman’s that result in quite different theories of objects. First of all, as I noted above, Goodman’s (1951) system describes the mereology of appearances of property instances (or “moments of experience”), while I am describing the mereology of properties.²¹ More importantly for the overall differences between our views, I do not take fusions of properties, in the first instance, to be fusions of trope-like spatiotemporally located entities, but to be fusions of primitive properties that can be multiply located, and I take the fusion of properties to be restricted. Thus, overlap can occur across locations, and there is no need for Goodman’s primitive predicate of togetherness. These differences mean that even apart from the realism of the approach that I am defending, my theory of properties and theory of objects is overall very different from Goodman’s. The differences translate into significant differences in our overall mereological systems and in the ontologies of objects they support: for example, my metaphysical interpretation and defense of the nature of parthood and of qualitative extensionality are fundamentally different from Goodman’s.

As I emphasized above, I reject fundamental tropes in favor of fundamental, multiply locatable properties (which is not quite the same thing as rejecting tropes in favor of universals). My properties are ontologically basic entities that, like immanent universals, are included in spacetime and multiply locatable. The properties and fusions of properties are particularized when bundled with relational properties of having such-and-such location. Properties such as mental properties supervene on fusions of lower level properties. Basic properties are moderately sparse and primitively individuated, but in practice we are able to distinguish between most such properties by distinguishing between the causal powers of their instances.²²

Further details are relevant. Unlike many advocates of bundle theory, I am not defending a conceptual analysis of the term “ordinary object,” but rather a reductive theory of the ontology of ordinary objects in the actual world and worlds suitably like ours.²³ Moreover, I am perfectly happy to allow for other sorts of entities to exist in the world, such as spatiotemporal relations or substance, so there is no need to construct everything in the world out of fusions of properties alone.

By defining objects as fusions of properties I can discuss ordinary objects directly, in terms of their qualitative properties, instead of characterizing them merely as hunks of matter in spacetime regions. I can also reduce the mysterious relation of “bundling” to a more familiar summing or fusion relation, restrict the fusion relation in order to avoid a proliferation of unwanted objects, and take advantage of associated mereological notions such as overlap and distinctness. Moreover, taking objects to be fusions rather than, say, sets, respects the natural intuition we have that summing or fusing things together creates objects. (Fusion has a certain oompah-pah.)²⁴ My treatment of objects as sums of properties may not be the only way to use the account of coincidence I will develop, but it is the simplest and best way. (In particular, one could explain coincidence the way I do by using a suitably modified version of my property mereology to develop an account of coinciding objects in terms of fusions of tropes or to develop an account of coinciding objects as fusions of substrates and attributes, where attributes are instantiated universals or tropes.)

We can understand the property mereology that grounds my bundle theory in more detail by developing it as an interpretation of \mathcal{M} . *Qualitative parts* of objects are properties included in the fusion that is the object. (Although I do not officially endorse haecceitistic or thisness properties, the term “qualitative” is not intended to exclude such properties, should they be parts of objects. Nonqualitative properties, if there are any, can be qualitative parts of objects.) We can develop a property mereology \mathcal{M}_{QP} in the following way:

A1_{QP}. For any proper qualitative part x , x is not a proper qualitative part of itself. (Proper qualitative parthood is *irreflexive*.)

A2_{QP}. For any proper qualitative part x and for any y , if x is a proper qualitative part of y , y is not a proper qualitative part of x . (Proper qualitative parthood is *asymmetric*.)

A3_{QP}. For any proper qualitative parts x and y , and for any z , if x is a proper qualitative part of y and y is a proper qualitative part of z , x is a proper qualitative part of z . (Proper qualitative parthood is *transitive*.)

D1_{QP}. For all objects x and y , x is a *qualitative part* of y iff x is a proper qualitative part of y or x is identical to y . (An object’s improper qualitative part is just itself.)

D2_{QP}. For all objects x and y , x *qualitatively overlaps* y iff x and y have a qualitative part in common.

According to D2_{QP}, if x and y each include property p as a part, then x and y qualitatively overlap with respect to p . For example, the wall on the north side of my office is white, and the wall on the south side of my office is white, so the north side and the south side of my office qualitatively overlap with respect to the property part of whiteness, even though they do not overlap

with respect to any of their spatiotemporal parts. Qualitatively similar objects may occupy distinct regions of spacetime even while they qualitatively overlap to a significant extent.

D3_{QP}. For all objects x and y , x is *qualitatively disjoint* from y iff x and y have no qualitative part in common.

D4_{QP}. For all objects x and y , x *partly qualitatively overlaps* y iff x and y have some but not all qualitative parts in common.

If x and y share no qualitative parts, then they are qualitatively (mereologically) disjoint. In the actual world, it seems likely that most objects will overlap to some degree, that is, they will be qualitatively different but not disjoint.

D5_{QP}. For all objects x and y , x is the *qualitative fusion* of ys iff x has all the ys as qualitative parts and no qualitative parts that are qualitatively disjoint from the ys .

D5_{QP} simply defines what it is to be a fusion of properties. Where ys are properties, if x has all ys as qualitative parts and no qualitative parts distinct from the ys , then x is the qualitative fusion (or qualitative sum) of ys : qualitative fusions of properties are bundles of properties. My bundle theory takes ordinary objects (and some not-so-ordinary proper parts of those objects) to be qualitative fusions. Of course, in the usual way, we can define qualitative parts in terms of qualitative overlap, being qualitatively disjoint or in terms of qualitative fusion, depending on what we take as the primitive.

As I noted above, I prefer a relatively sparse approach to properties: not just any predicate defines a property, and there are no negative properties, merely negative predicates (if an object is $\sim F$ then it does not include F in its fusion). I also hold that qualitative fusion is restricted.^{25,26}

My bundle theory does not include an analysis of our ordinary predication: there is no one to one relationship between the linguistic appropriateness of asserting that “O has F” or “O is F” and O’s including F in its fusion. There are at least two senses of “have” or “is” that we can use: I’ll call them the *predicative* sense and the *ascriptive* sense. “O has F” or “O is F” in the predicative sense only if O includes F; for example, “Athena has a mass of 10kg.” On the other hand, “O has F” or “O is F” in the ascriptive sense only when O is qualitatively fused with F, i.e., O itself does not include F. Occasionally, such as in cases where O is fused to F and F is a relation, we may wish to employ the ascriptive sense, as in “Athena is 10 feet from the door.” However, predicatively speaking, O is *not* F since O does not include F. What *does* (predicatively) have F in such a case, strictly speaking, is the qualitative fusion of O and F (the structural complex of Athena, the relation of *being 10 feet from* and the door).²⁷ What we are doing, in effect, when we ascribe F to O is pointing out that there exists another object, the fusion

of O and F. Ordinary predication also seems to require that the O referred to in “O has F” is an ordinary object, event or state of affairs. If O is, for example, a proper qualitative part of an ordinary object, such as the fusion of roundness and redness, it is linguistically inappropriate to say this abstract object has the property of being round.²⁸

Finally, my bundle theory allows for the possibility of actual-world cases of qualitatively indiscernible objects at different locations because such objects can be individuated by their location properties, by properties of their spatiotemporal parts, or primitively. Primitive individuation does not require the acceptance of primitive thisnesses or haecceities, but unless it is the property parts (instead of the whole fusion) that are primitively individuated, it does require the rejection of a mereological supplementation principle, *qualitative extensionality*, according to which objects (excluding objects that are qualitative simples) with the very same proper qualitative parts are identical.

Somewhat controversially, I think qualitative extensionality holds.²⁹ Acceptance of qualitative extensionality is not acceptance of what is standardly taken to be the “principle of the identity of qualitative indiscernibles.” This because by “proper qualitative parts” I mean to include many different sorts of property parts, including primitively individuated properties (if such there be), properties of having certain locations, and properties of having certain spatiotemporal parts. Whether one accepts or rejects qualitative extensionality will not affect the treatment of material coincidence I develop below.

5. Qualitative Differences

Now that we have a theory of objects to work with, we can consider the vexing problem of the basis for differences between coincidents. After I address this problem, I will return to the problems with spatiotemporal parts raised in §3.

There are two problems that need to be disentangled. First, there is a conceptual problem: how are we to make conceptual sense of numerically distinct objects sharing their matter and location? Second, there is a supervenience problem. Dean Zimmerman puts the supervenience problem this way: “[w]hat is so bad about coincident objects? The fundamental problem is this: if both my body and this mass of cells are physical objects that, though momentarily coincident and indiscernible, differ in their persistence conditions, then there are two objects exactly alike in every empirically discriminable intrinsic respect, one of which has the stamina to withstand pressures and survive changes that the other cannot.” (Zimmerman 1995, 87–8)³⁰ Call the properties that Athena has that Piece lacks (and vice-versa) *distinctive* properties. What, if anything, do the distinctive properties supervene upon? Athena’s distinctive properties cannot simply supervene on its material properties, since these properties are shared by Athena and Piece. Likewise, Piece’s distinctive properties cannot simply supervene upon its material properties.

Thinking in terms of a property mereology (and a mereological bundle theory) of ordinary objects will solve the conceptual problem. Working out just how objects have their *de re* modal properties and certain other sorts of properties, along with being clear about what properties ordinary objects include in their fusions, will solve the supervenience problem. Again, take Athena and Piece as a case study.

5.1. *The Conceptual Problem*

Mereological bundle theory gives us an answer to the conceptual problem right away. Consider Athena and Piece: they share their material properties. In mereological terms, Athena and Piece qualitatively overlap with respect to their material properties, but they do not fully qualitatively overlap, since they differ with respect to their distinctive properties.

Under mereological bundle theory, since objects are not just hunks of material in a region, we can see how objects can partially qualitatively overlap while fully overlapping with regard to their material properties. Since properties are not usually individuated by their region (both the redness and the roundness of an object can entirely occupy the region of the object), we can carve objects at their property joints without carving them at their spatiotemporal joints. Thus, Athena is an object that includes its material properties along with its distinctive properties, while Piece is an object that includes its material properties along with *its* distinctive properties. Since we can have partly overlapping fusions of properties that include the same material properties, we can make conceptual sense of coincidence.

Some might ask: in virtue of what do we include some properties in the fusion that is Athena and others in the fusion that is Piece? This question confuses the ontological with the epistemological and the semantic. *We* don't do the carving: the world does. Nature carves objects at their joints. We are assuming the distinctive properties exist when the material properties exist, and we associate certain properties with Athena and other properties with Piece because as a matter of ontology Athena includes certain properties and Piece includes certain (other) properties. We take fusions of certain types of properties to be statues, and other types to be pieces of clay. This is not arbitrary: it comes from our ability to recognize the categories of the world. What are we doing, when we recognize the qualitative differences between Athena and Piece, is recognizing that Nature carves these ordinary objects along qualitative rather than spatiotemporal joints.

5.2. *The Supervenience Problem*

To address the supervenience problem, we must first identify the kinds of property differences between coincidents. The stock examples focus on modal differences. For example, in the case of Athena and Piece, property differences include *being accidentally of mass m* versus *being essentially of mass m*. Kit

Fine (2003) argues that there can also be significant nonmodal differences: "...in the familiar case of the statue, there will be a clear sense in which the statue may be *defective, substandard, well or badly made, valuable, ugly, Romanesque, exchanged, insured or admired* even though the [piece of] alloy that makes it up is not. These examples... do not draw upon *de re* modal intuitions." (206)

Even if some of Athena's and Piece's distinctive properties do not supervene on their modal differences, they could supervene on other properties. Could the differences between Athena and Piece supervene on properties of being different sorts, such as being a member of the statue-sort versus being a member of the clay-sort? This idea has intuitive pull. But it is unclear how it advances the issue, since differences in sort seem to supervene, at least partly, on differences in *de re* modal properties.

Bennett argues that "... it seems clear that if Lump1 and Goliath differ with respect to how innovative or valuable they are (etc.), such differences are explained by their sortal or modal differences, rather than the other way around (c.f. Olson 2001, 348). And although the relations between sortal properties and modal properties are arguably less clear, it is obvious that they cannot each be used to ground the other. That would be circular." (2004, 341)

Whether or not all such differences are explained by modal or sort differences, pluralists need an explanation of the modal differences between coincidents. Moreover, since the monist's objection is traditionally expressed in terms of the need for an explanation of the modal differences between coincidents, the pluralist needs to provide such an explanation. As we shall see, an explanation of the modal differences between coincidents will lead to a fuller explanation of differences between coincidents. Accordingly, in §5.2(a) I will examine cases of modal differences between Athena and Piece and develop a series of explanations of such differences indexed to different treatments of *de re* modality. In §5.2(b) I will extend the explanations to other differences between Athena and Piece.

5.2(a). Modal Differences. In this section, I will discuss the demand for an explanation of the ontological basis for distinctive modal differences between coincidents. Assume that Athena and Piece share their material properties and differ in some of their modal properties, and (unless otherwise specified) include any properties that supervene on modal properties or modal differences in the category of modal properties, including properties of being of a certain sort.

Why should we think that *de re* modal properties supervene on material properties? Call the material properties shared by Athena and Piece their *material core*. The thought is the one evoked by the quote from Zimmerman, above: if we consider an object's material properties of having a particular shape, mass, charge, or other physical characteristics, such characteristics

seem to determine how it could survive various changes.³¹ So our question is: if Athena and Piece share their material core, how can they differ modally? The answer to this question depends on the way that objects are taken to have their *de re* modal properties: the pluralist has several options.

(i). *Primitivism*. One way of thinking about modality is to hold that objects have their *de re* modal properties as a matter of including ontologically primitive essences. On this approach, an object's property of having a certain essence (or an haecceity, or a primitive thisness) is ontologically fundamental: the essence does not supervene on material properties. The object's essence determines whether and how the object is represented as being in other possible worlds, and thus, if it is *P*, whether it is essentially *P* or accidentally *P*.

My interpretation of such a treatment of *de re* modality is that objects have their *de re* modal properties simply in virtue of including their essences (or their haecceities or thisnesses) in their fusions. This conforms to the natural thought that objects include their natures, i.e., that they include their *de re* modal properties in their fusions. I do not subscribe to this sort of primitivism about essences, but those who do can use property mereology to explain material coincidence. Essence properties would be qualitative parts (even if they are nonqualitative properties) of the fusion that is the object. In the case of Athena and Piece, one could hold that Athena is a fusion that includes the material core along with Athena's essence, and Piece is a fusion that includes the material core along with Piece's essence, as shown in Figure 1.

Note that the supervenience problem is answered by rejecting it: according to this account, modal properties are not supervenient upon material properties. Those who are happy to be primitivists about *de re* modality now have an account of coincidence. But monists will want more explanation: where do brute essences come from?³²

(ii). *Emergentism*. Perhaps the answer to the supervenience problem is to hold that essences somehow emerge from material properties. Take an object to be essentially *P* iff it includes *P* but does not include the property of being accidentally *P*, and to be accidentally *P* iff it includes *P* and the property of being accidentally *P*.

If the *de re* modal property of *being accidentally P* were to emerge from a material core that includes *P*, we could explain how Athena is essentially Athena-shaped while Piece is accidentally Athena-shaped. The explanation (as shown in Figure 2) would be that Athena is a sum that includes the material core and its accidental properties but excludes Piece's accidental properties, and Piece is a sum that includes the material core and its accidental properties but excludes Athena's accidental properties.

On this approach, Athena is essentially Athena-shaped while Piece is accidentally Athena-shaped in virtue of the fact that being essentially

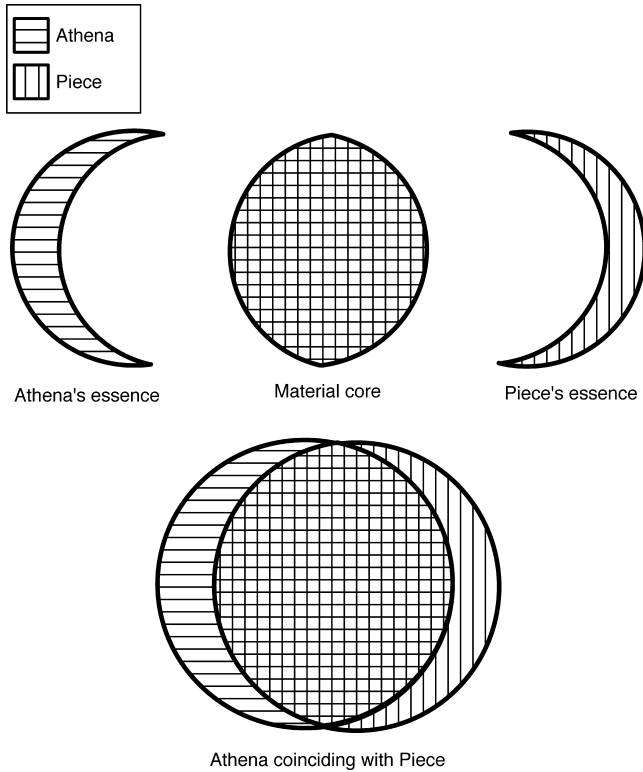


Figure 1. Primitivism

Athena-shaped is equivalent to including *being Athena-shaped* while excluding *being accidentally Athena-shaped* in one's fusion. The seemingly contradictory properties had by Athena and Piece are the result of differences in what is included in and what is excluded from each object.

This treatment of *being essentially P* as involving the lack of another property is representative of my general approach according to which there are far fewer properties than predicates and there are no negative properties (just negative predicates). In general, for the predicate of "*not-P*" to apply to an object is for that object to fail to include *P* in its fusion. For example, an object can be inelegant in virtue of its failing to include the property of *being elegant* in its fusion. Likewise, an object is essentially embodied in virtue of being embodied and not including the property of *being accidentally embodied*. The idea here is that to be essentially *P* is to lack an ability of a certain sort: the ability to persist through a change from being *P* to being *not-P*.

We have answered the supervenience question by showing how we can have coincident objects if accidental properties can emerge from the material

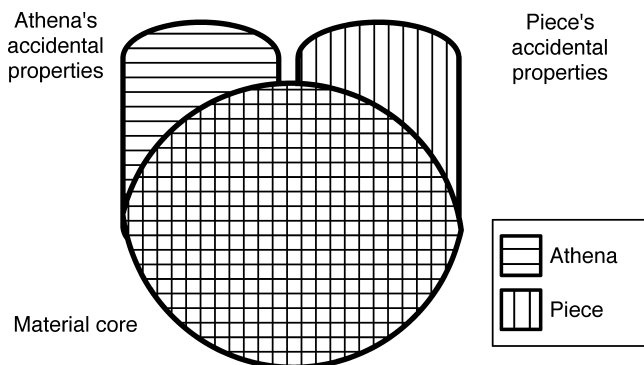


Figure 2. Emergentism

core. Carving objects at their joints can make it the case that one coincident is accidentally *P* while the other is essentially *P* just because the first includes being accidentally *P* and the second does not. (Thus, we have given a way to make sense of the way coincidents that differ modally violate the regional supervenience of the modal on the material core.) The problem with this approach is that just *why* such emergence occurs is a mystery. Why does the property of *being accidentally P* supervene on a material core that includes the property of being *P*?

Unless the pluralist can explain the reason for the emergence of such accidental properties, monists will cry foul. Monists will agree that objects' *de re* modal properties supervene on their material core but will argue that such supervenience must be explained. They will argue that simply taking it to be a primitive fact that somehow the modal properties emerge from the material core is not sufficiently explanatory.

Primitivism about how objects get their *de re* modal properties is thus at the nexus of the debate. If objects have primitive essences or it is a primitive fact that modal properties emerge from the material core, then modal differences are explained by how objects are carved at their property-mereological joints. But if the pluralist must explain how coincidents can differ in their modal properties within the context of a non-primitivist account of how objects' *de re* modal properties supervene on their material properties, her explanatory burden is not yet discharged.

(iii). *Reductionism.* The monist's demand for a reductive explanation of how coincidents can differ modally has its roots in the view that *de re* modality itself must be reductively explained. Such a view is usually understood in terms of representation *de re*, i.e., in terms of representation by possibilities of ways an object could or could not be.³³ This view rejects the idea that there are primitive essences that determine *de re* modal properties. Instead, the monist adopts an ersatzist version of a broadly Lewisian framework (following Lewis 1986).

According to an ersatzist treatment of modality, objects have their qualitative *de re* modal properties in virtue of being *de re* represented in certain ways by specified abstract representations—members of ersatz worlds, cashed out as pictures, sets of propositions, sets of properties, combinations of states of affairs, or the like. For the monist, similarities between an ordinary object's material properties and properties of possibilities (i.e., ersatz worlds and parts of worlds) determine how it is *de re* represented, which in turn determines the object's *de re* modal properties.³⁴ (Ersatz worlds and parts of worlds are abstract entities that represent concreta. This means that I am discussing similarity between objects and possibilities in the sense that objects would be similar to the things represented by the possibilities, were those things to exist.)³⁵

The monist's reductive approach to *de re* modality places the supervenience problem in sharp relief. According to the monist, by sharing their material properties, Athena and Piece share all of the nonmodal properties that are relevant to the determination of how they are *de re* represented. But if Athena and Piece share all such nonmodal properties, the monist asks, then why don't Athena and Piece share all their *de re* modal properties?

The monist has an answer to this question that the pluralist cannot accept: he argues that Athena is identical to Piece, and explains away the difference in the modal claims we make of Athena and Piece as due to different contexts of representation. "The (genuine or ersatz) world in question represents the one thing twice over, in two different ways. . . [there are] two different references, in different words, to the one thing. And I say that these two different references tend to evoke two different ways of representing, whereby one world can make conflicting representations *de re* concerning that one thing." (Lewis 1986, 253) By taking *de re* representation to be context-dependent, the monist can explain why we assign different modal properties to the object we call "Athena" and the object we call "Piece": by using different names we evoke different contexts. The view is that we cannot correctly assign *de re* modal properties to objects in any absolute, context-independent sense. Of course, since the pluralist thinks an object is assigned its *de re* modal properties in an absolute, context-independent way, she cannot accept this explanation.³⁶

To see how the pluralist can provide her own explanation of the modal difference between coincidents in the context of a reductive treatment of *de re* modality, we will need to look more closely at the premises that are usually taken to be part of the monist's reductive account of how objects have their *de re* modal properties. The monist's first claim is premise 1:

Premise 1. *De re* modal properties are determined by *de re* representation.

For the monist, for an object to be possibly *P* it must be *de re* represented as *P*. An object is *de re* represented as *P* by being *de re* represented by an ersatz individual that is *P*.

Accordingly, for the monist, an object is accidentally P iff it is P but possibly not- P , e.g., an object is accidentally Athena-shaped just in case it is Athena-shaped and it is *de re* represented by an ersatz individual that is not Athena-shaped. An object is essentially P iff it is P and not possibly not- P , e.g., an object is essentially Athena-shaped just in case it is Athena-shaped and it is not *de re* represented by any ersatz individual that is not Athena-shaped.

The second claim made by the monist is premise 2:

Premise 2. *De re* representation is based on similarity.

Most monists hold that *de re* representation of an object is based on some sort of qualitative similarity of the object to ersatz individuals (again, in the sense that the object would be similar to the thing represented by the ersatz individual, were that thing to exist).³⁷ The object is supposed to be similar in certain respects to ersatz individuals, and how the object is *de re* represented is based on this.

Figure 3 monist's interpretation of premises (1) and (2) for the object that is named "Athena" and also named "Piece". In Figure 3, Athena/Piece stands in many S -relations of being similar (with regard to different properties) to different ersatz objects, such as an ersatz clay bowl (of mass m) and an ersatz statue of Athena that has mass $m+1$. (For simplicity, here and below, I'll only show a couple of the similarity relations.) Athena/Piece is similar with respect to shape (S_{shape}) to the ersatz statue and is similar with respect to material (S_{material}) to the ersatz clay bowl.

Monists also usually defend a third premise about how objects have *de re* modal properties:

Premise 3. *De re* representation is inconstant, i.e., objects can be *de re* represented (and thus assigned their *de re* modal properties) differently according to different contexts.

De re representation is supposed to be inconstant because the ascriptions of similarity are supposed to be inconstant. The view is that if the ersatz individual is similar to the object in the respects selected by a certain context of modal ascription, it *de re* represents the object with respect to that context. But if the ersatz individual is not similar to the object with regard to the respects selected by another context, it doesn't *de re* represent the object with respect to that context. Since different respects of similarity are selected by different contexts, *de re* representation can differ, depending on context.

The premise is usually interpreted as a premise involving counterparts: in Lewis (1986), counterparts of an object determine its *de re* modal properties, and counterparts are selected by context-dependent *de re* representation. According to the monist, when we use the name "Athena" we evoke a context such that all of the object's counterparts have Athena-shapes. So, referring

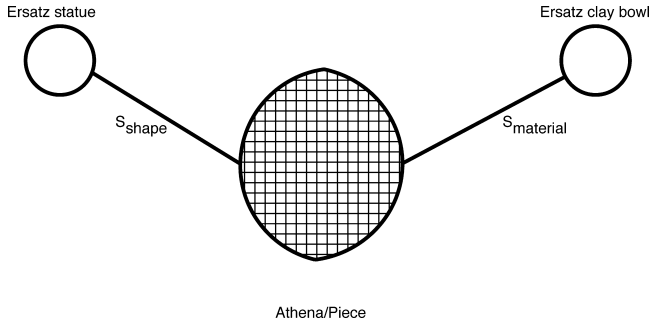


Figure 3. Monism

to Figure 3, we can say that Athena is *de re* represented by an ersatz Athena-shaped statue of mass $m+1$, and so Athena is possibly of mass $m+1$ (so is accidentally of mass m). By the same line of thought, we *cannot* say that Athena is *de re* represented by an ersatz clay bowl, because using the name “Athena” evokes a context that prohibits such non-Athena-shaped things from being selected as counterparts of the object. In this sense, Athena is essentially Athena-shaped.

Premise (3) is the premise the monist relies upon to explain the (seeming) difference between coincidents’ modal properties. The monist agrees with the pluralist that we can say that Athena is essentially Athena-shaped (while we *cannot* say this of Piece), but denies that this entails that Athena is not identical to Piece. This is unacceptable by the pluralist’s lights. The pluralist holds that assignment of *de re* modal properties is context-independent, and that there are modal differences between coincidents. By Leibniz’s Law, then, Athena cannot be identical to Piece. Since pluralists deny premise (3), the monists’ demand for an explanation of coincidence must be directed to pluralists who combine (1) and (2) with context-independent *de re* representation.

Now that we understand the monist’s position, how should the ersatzist pluralist who grants that *de re* modality should be reduced explain the modal differences between coincidents? The explanation the pluralist should give will accept premises (1) and (2), but take them to support a slightly different account of how objects have their *de re* modal properties. This difference of account, supported by a difference in background assumptions and the pluralist’s rejection of premise (3), will uncover the differences in the supervenience bases for the modal differences of coincident objects.

Premise (1) tells us that *de re* modal properties are determined by how an object is *de re* represented by possibilia and premise (2) tells us that *de re* representation is determined by similarity. The first difference between the pluralist and the monist concerns an assumption about the nonmodal

properties that form the supervenience base for *de re* modal properties. Recall that the monist assumes that when coincident objects share their material properties, they share *all* of their nonmodal properties, or at least all of the properties that play a role in determining the *de re* modal properties of the actual object. The pluralist should *not* grant this assumption. This will be important below.

The second difference between the pluralist and the monist concerns the role *de re* modal properties play in the composition of an object. The pluralist should point out that the monist is implicitly taking *de re* modal properties to be *external* to the objects (i.e., to not be parts of the bundle that is the object). Refer back to Figure 3. Since, for the monist, *de re* modal properties supervene on an object's material properties plus possibilities and the similarity relations the object bears to possibilities, *de re* modal properties reduce in part to external relations to ersatz individuals.³⁸ For this reason, according to this sort of monist, an object does *not* include its *de re* modal properties in its bundle—what the object (Athena/Piece) *is*, is just the fusion of material properties. This fusion of material properties stands in relations to ersatz possibilities, and in virtue of standing in these relations it is ascribed various modal properties. The monist is implicitly reducing the object to its material core (to a hunk of matter in spacetime?) and thus implicitly taking modal properties to be external to the object by taking them to supervene directly on external similarity relations and possibilities.

The pluralist should argue that this is a mistake: *de re* modal properties are part of what an object *is* and thus should be internal, i.e., included in the bundle that is the object. *De re* modal properties, as special properties that capture the nature of an object, should be internal to an object if anything is. Such properties are quintessential hypothetical properties that of course “point beyond themselves,” but this does not mean that they should literally be *outside* of the boundaries of the object.³⁹ They should supervene on properties internal to the objects, so that they themselves are entirely internal.

Including modal properties in what an object is makes perfect sense, since of any of the properties an object might have, *de re* modal properties are the best candidates for inclusion in the set of properties that compose the object. If an object is a fusion of properties, surely the properties that characterize and compose its nature, its modal properties, should be included in what the object is: so such properties should be taken as internal to the object, not external to it.⁴⁰

The monist rejects this picture because he takes assignment of *de re* modal properties to be context-dependent. Taking *de re* modal properties to be external to the object supports his version of contextualism about essence: it allows him to argue that we can truthfully say in one context that an object “is” essentially *P* while truthfully saying in another context that *the very same object* “is not” essentially *P*. This approach assumes that in restrictive contexts

we can ignore some of the things external to the object, that is, according to the monist's picture, we can ignore certain similarity relations to ersatz individuals.

The monist may try to reply to the pluralist by claiming that her argument is *ad hoc*: what gives her the right to define *de re* modal properties of objects so that they must supervene on properties that are internal to objects? But this claim will not fly. One of the main points of the pluralist's argument is that it is *the monist* who has illicitly redefined *de re* modality in pursuit of his reductionist strategy. By taking *de re* modal properties to be external to objects (indeed, by taking them to reduce in part to possibilia themselves!) the monist violates the natural thought that objects include their natures, i.e., that they include their *de re* modal properties. Whether such properties are primitive, emergent, or reduced to properties involving *de re* representation, they must be part of what the object is.

The monist may then challenge the pluralist to give an explanation of how *de re* modal properties are supposed to be internal yet point beyond themselves, i.e., how they are supposed to be internal yet determined by relations to external possibilia. Fortunately for the pluralist, a brief detour into the metaphysics of relational properties provides a ready answer. A natural way—and the right way—to think of relational properties of objects is to think of them as *monadic* relational properties that are generated by the existence of things standing in relations to other things. By saying these monadic relational properties are *generated* by things standing in relations to other things, I mean they are entailed in an ontological sense.⁴¹

This metaphysics of relational properties makes it clear how there could exist monadic relational properties apart from coincidents' material core that are relevant to the determination of their *de re* modal properties. Monadic relational properties of being *de re* represented in various ways are generated by the similarity (in certain respects) of the material⁴² core of the coincidents to ersatz individuals. *De re* modal properties supervene on these internal monadic relational properties plus material properties, yet point beyond themselves because their supervenience base is generated in part by external relations to possibilia.

All this entails that the pluralist means something quite different from the monist when she endorses premise (1). The pluralist agrees that *de re* modal properties are determined by how an object is *de re* represented, but she has a context-independent notion of *de re* representation, and takes the supervenience base for *de re* modal properties to be different from what the monist takes it to be. On the monist view, *de re* modal properties supervene on the material properties plus external *de re* representation relations and possibilia. On the pluralist view, *de re* modal properties supervene on the material properties plus internal monadic relational properties of being *de re* represented in certain ways.

So the differences between the monist's reductive program and the pluralist's reductive program result in different explanations of how objects have their *de re* modal properties. The monist holds that an object is accidentally *P* iff it is *P* but possibly not-*P*, and an object is essentially *P* iff it is *P* and not possibly not-*P*. The pluralist, on the other hand, holds that

- (i) An object is *accidentally P* iff it includes *P* and includes the property of being represented as not-*P*, and
- (ii) An object is *essentially P* just in case it includes *P* and does not include being *accidentally P*.

Now we have the means to explain the modal differences between coincidents: again, we simply carve objects at their qualitative joints. According to the pluralist, Athena is accidentally of mass *m* because it includes *being of mass m* and also includes, say, the monadic relational property of *being de re represented as mass m+1*. Athena is essentially Athena-shaped just in case it includes being Athena-shaped and does not include any monadic relational property of being *de re* represented by an ersatz individual that is not Athena-shaped. On the other hand, Piece is essentially of mass *m* because it includes *being of mass m* and does not include any monadic relational property of being *de re* represented by an ersatz individual that is not of mass *m*. Piece is accidentally Athena-shaped because it includes *being Athena-shaped* and also includes, say, the monadic relational property of being *de re represented as bowl-shaped*. Figure 4 represents the pluralist's view.

In Figure 4, the material core is shared, but different monadic relational properties are included in Athena and Piece, giving rise to different modal properties had by each coincident. (In the interest of simplicity Figure 4 shows only a couple of the similarity relations and relational properties that exist.) The material core shared by Athena and Piece is similar with respect to shape to the ersatz statue and is similar with respect to material to the ersatz clay bowl. By standing in these similarity relations to ersatz individuals, the material core generates *de re* representational properties of *being de re represented as mass m+1* and *being de re represented as bowl shaped*. Athena includes the material core plus the monadic *de re* representational property of *being de re represented as mass m+1* (along with other monadic *de re* representational properties not pictured), while Piece includes the material core plus the monadic *de re* representational property of *being de re represented as bowl shaped* (along with other monadic *de re* representational properties not pictured).⁴³

The pluralist's view takes *de re* representation to be based on the similarity between an object's material properties and the properties of possibilities, just as the monist insists it should be. But for the pluralist, since the monadic relational represented-by property of being similar in such-and-such a way is

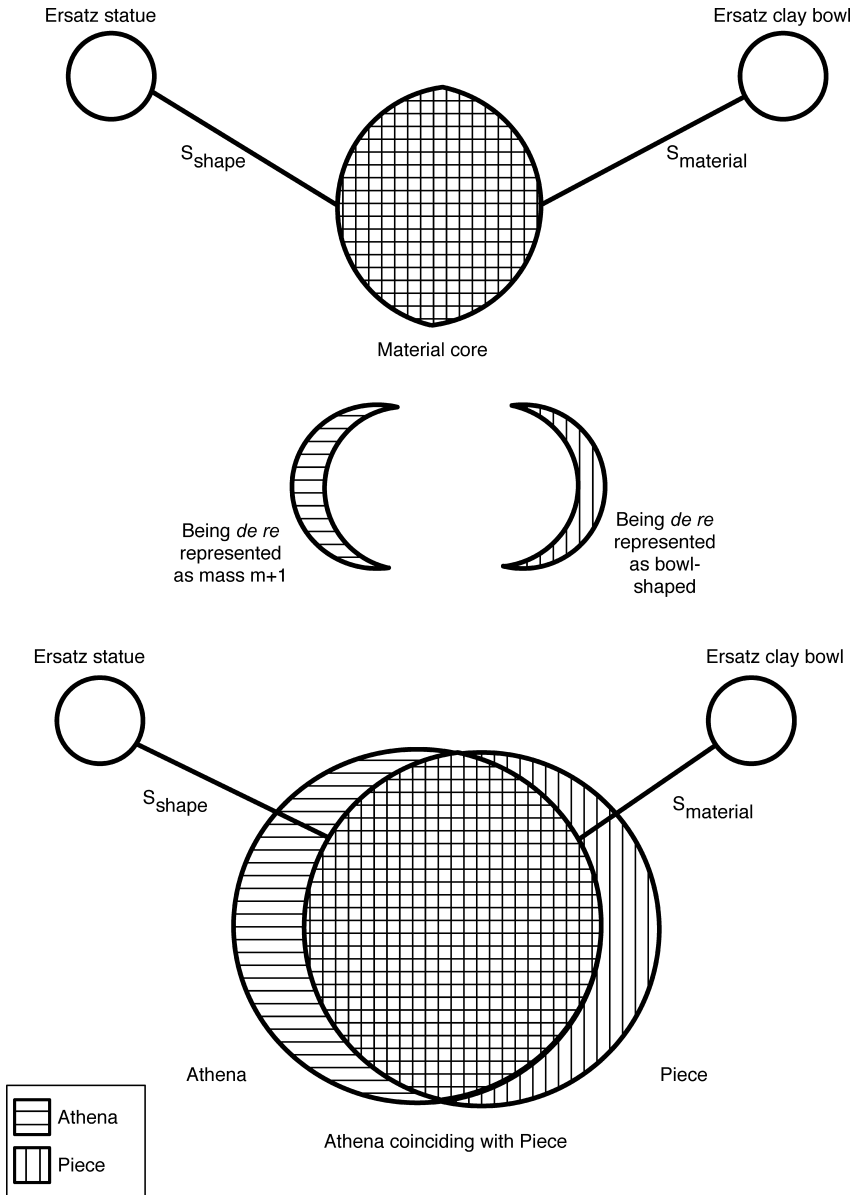


Figure 4. Pluralism

always part of the same object, we cannot truthfully say in one context that an object is essentially *P* while saying in another context that the very same object is not essentially *P*. If an object is essentially *P*, it is so absolutely. The rejection of this contextualist element of the monist's account of *de re*

representation should come as no surprise: such contextualism is part of what the pluralist has been rejecting all along. Instead of a contextualist explanation of the modal differences between coincidents, the pluralist offers an explanation in terms of a difference in supervenience bases. The monist can no longer assume that the pluralist has no account of the basis for modal differences between coincidents.⁴⁴

(iv). *Differences in Sort*. There is one final issue: what is the pluralist to do if she thinks differences in *de re* modal properties are to be reduced to differences in properties of being of a particular sort? (I am not such a pluralist, since I take properties of being of a sort to supervene on modal properties, but some take the inverse perspective.) On such an account, an object has the property of being of a particular sort by standing in the relation of *being a member of* to a sort. Here the monist's objection has the same form as before: material properties are the properties that determine what sort an object is a member of, so why aren't Athena and Piece members of the same sorts?

Pluralists sympathetic to the view that *de re* modal properties are determined by sorts can modify the ersatzist pluralist's reply (in §5.2.a.iii) to the monist to explain how properties of being of a sort are fundamental. Such a pluralist should explain *being a member of a sort* in terms of an object including a relational sort-property of *being a member of sort P* that is determined by the material core of that object standing in the membership relation to the sort *P*. If sort properties are fundamental, then they should be included in an object's fusion, since, like fundamental modal properties, they are properties that define what an object *is*. *De re* modal differences can then supervene on different properties of being a member of a sort, which in turn supervene on material properties plus different monadic relational sort properties.

5.2(b). *Interesting Differences*.

Some take coincidents to differ with respect to what I'll call *interesting* properties such as *being beautiful* or *being valuable* as well as differing modally and differing with respect to sort.⁴⁵ How are we to explain such differences? Perhaps interesting properties like *being beautiful* supervene on *de re* modal properties. If it is the modal profile of a thing that makes it the object that it is, this could be a reason for holding that statues are beautiful while their pieces of clay are not. If so, then interesting properties can differ between coincidents merely because of their modal differences. This approach allows for interesting properties to supervene on properties of being of a certain sort where sort properties supervene on modal properties.

But what if there are cases of coincidence where the interesting properties do not supervene on *de re* modal properties? Such properties may be thought to supervene on properties of being of a particular sort (where properties of being of a sort do not supervene on modal properties): it is because Athena

is a member of the statue-sort and Piece is not that Athena is beautiful and innovative while Piece is not.

However, I do not think such explanations work across the board. Properties such as *being beautiful* sometimes differ between coincidents, but sometimes do not. Surely we can imagine a case where a statue of Athena is beautiful simply because the marble it is made of—shaped, colored and polished the way it is—is beautiful. In such cases, *being beautiful* supervenes on Athena's material properties, and Piece is beautiful as well. Compare marble Athena to a statue of Athena made of twisted pieces of rusted metal and dirty glass from a junkyard. The material of this Athena is ugly, but the statue itself, regarded as, say, a representation of a sublime juxtaposition of wisdom with a post-industrial wasteland, is beautiful. Or consider a statue of Athena made of gold that is more valuable because of its provenance than because of its gold. (The gold Athena isn't weighed before being auctioned off at Sotheby's, although it is probably authenticated.)

This suggests that making sense of interesting differences between coincidents is complicated, and may need to be done on a case-by-case basis. If in some cases coincident objects share properties such as *being beautiful* because they share their material core, but in other cases they differ with respect to such properties despite sharing their material core, then *being beautiful* can have different types of supervenience bases. In some cases, such as the case of the marble Athena, an interesting property such as *being beautiful* supervenes solely on the material core. But in other cases, such as the case of the junk Athena or the gold Athena, interesting properties such as *being beautiful* or *being valuable* supervene on something in addition to the material core.

Perhaps, as I noted above, we just need to add *de re* modal or sort properties to the supervenience base to explain the interesting differences in the cases of junk Athena and gold Athena. But the cases of junk Athena and gold Athena suggest that the properties of *being beautiful* or *being valuable* are generated at least in part by relations to other kinds of external entities in addition to ersatz individuals and sorts. For example, junk Athena's interesting properties seem to be determined partly by the statue's relations to art communities and insurance agencies.⁴⁶ The interesting properties of gold Athena's constitutive piece of gold seem to be determined partly by the gold's relations to monetary communities. If so, then the supervenience bases of these interesting properties could include selected monadic relational properties that are partly generated by relations to these other kinds of external entities.⁴⁷

There is one more kind of case that should be discussed: the kind of case where properties of being of a sort supervene in part on relational properties determined by the material core of the object standing in external relations to entities that are neither sorts nor possibilia. For example, Duchamp's *Fountain* is only an art object in virtue of being displayed in a particular way, i.e., in virtue of being exhibited as art.⁴⁸ *Fountain* has the property of being an

art object partly in virtue of its material core standing in certain relations to the artworld, and having the resultant monadic relational properties included in the fusion that stands in the membership relation to the *art object* sort. The supervenience base for *Fountain's* property of being of a particular sort thus includes more than its modal and material properties.

These examples suggest that there are a variety of ways for coincidents to differ, and that the explanation of the supervenience bases for such differences will require attention to the nature of the coincidents involved. In any event, my discussion in §5.2(a) shows that the pluralist has the means to develop explanations for a wide range of interesting differences.

6. Ordinary Objects and Purely Spatiotemporal Objects

Now that sense can be made of the differences between coinciding objects, return to the spatiotemporal mereological issues discussed in §3. In §3, we saw that ordinary objects are not sums of spatiotemporal parts. I have argued that, fundamentally, ordinary objects are composed of property parts. How does a property mereology fit with a more traditional picture that takes an ordinary object to be constructed from matter in a region?

The way that ordinary objects are constructed from properties and matter in a region will depend partly on empirical facts about the fundamental properties of matter. The jury is still out on what these facts will be. But it is worth describing a particular approach to see, in general, how such an account should go. What I will do is describe one natural way of constructing objects given a few empirical assumptions, with the understanding that changes in the empirical assumptions may necessitate changes in the details of how objects are built. Take my description as a blueprint that can be modified once the empirical facts are better understood, since a property-based account is flexible enough to conform to a wide range of physical theories of the universe.⁴⁹

I will assume that matter in a region involves sums of located, physical particles in order to explore how ordinary objects with *de re* modal properties could be mereologically built from particles. On this view, matter in a region consists only of spatiotemporal sums of physical particles that have mass, charge and other fundamental physical properties. Reject the idea that these physical particles and sums of particles are ontologically basic. Instead, such particles and sums of particles are reducible to qualitative fusions (given our empirical assumptions about their characteristics) of fundamental physical properties, and are located by including relational properties of having a location.⁵⁰ On this picture, particles are spatiotemporal simples and spatiotemporal fusions of these simples are larger spatiotemporal parts and wholes. However, each particle and sum of particles is also a sum of properties, so a property mereology underlies spatiotemporal mereology.

Let me emphasize this point: when the particles are spatiotemporally summed, the resulting spatiotemporal fusions of located physical particles are *also* qualitative fusions of properties. This is essential—the same cake of matter can be cut in different ways, the property way or the particle way. The kind of cut depends upon the kind of composition. We must also be clear about the relationship between spatiotemporal and qualitative fusion: the spatiotemporal fusion of particle p_1 and particle p_2 is *not* a qualitative fusion of p_1 and p_2 ; it is a qualitative fusion (of the properties of mass, charge, . . . etc., and location of the spatiotemporal fusion of p_1 and p_2). This qualitative fusion of properties of mass, charge, . . . etc., and location is what I'll call a *purely spatiotemporal object*. A purely spatiotemporal object is simply matter in a region.

Purely spatiotemporal objects will have all their properties essentially on this account, so they are incomplete ordinary objects. Ordinary objects such as persons, bodies, hunks of matter, statues, lumps, minds, brains and the like include additional properties that purely spatiotemporal objects generate by standing in relations to external objects. Purely spatiotemporal objects, *qua* qualitative fusions, are then qualitatively fused with appropriate relational properties to give ordinary objects.

We thus have two separate mereologies: a spatiotemporal mereology and a property mereology, where the property mereology is more fundamental and more general. Each mereology characterizes objects, although a spatiotemporal mereology can only characterize purely spatiotemporal objects. Qualitative parthood is transitive across qualitative parts and fusions and spatiotemporal parthood is transitive across spatiotemporal parts and fusions.

Recall the basic axioms and definitions for a spatiotemporal mereology \mathcal{M}_{SP} described in §3:

A1_{SP}. x is not a proper spatiotemporal part of itself.

A2_{SP}. If x is a proper spatiotemporal part of y , then y is not a proper spatiotemporal part of x .

A3_{SP}. If x is a proper spatiotemporal part of y and y is a proper spatiotemporal part of z , x is a proper spatiotemporal part of z .

D1_{SP}. x is a *spatiotemporal part* of y iff x is a proper spatiotemporal part of y or x is identical to y .

D2_{SP}. x *spatiotemporally overlaps* y iff x and y have a spatiotemporal part in common.

D3_{SP}. x is *spatiotemporally disjoint* from y iff x and y have no spatiotemporal part in common.

D4_{SP}. x *partly spatiotemporally overlaps* y iff x and y have some but not all spatiotemporal parts in common.

$D5_{SP}$. x is the *spatiotemporal fusion* of y s iff x has all the y s as spatiotemporal parts and has no spatiotemporal parts spatiotemporally disjoint from the y s.

\mathcal{M}_{SP} is perfectly adequate as long as we are clear that it only applies to purely spatiotemporal objects, not ordinary objects, and spatiotemporal parts are individuated by matter and region. We can thus preserve a role for classical extensional mereology: it is the mereology of purely spatiotemporal objects.⁵¹

Once we have an account of purely spatiotemporal objects we have a blueprint for building ordinary objects: spatiotemporally fuse enough particles together, then qualitatively fuse the resulting purely spatiotemporal objects (*qua* qualitative fusions of properties) with appropriate additional properties. On this account, a thing with *de re* modal character such as an arm is a qualitative fusion of a purely spatiotemporal object (a fusion of particles P) with appropriate relational properties. The addition of the relational properties will give us an object with the *de re* modal, sort and other properties of the arm. To build a body, spatiotemporally fuse P (not the arm!) with more particles, then qualitatively fuse this larger spatiotemporal object with some of the additional relational properties it generates.

This account of how objects are built from properties and spatiotemporal parts shows how ordinary objects are composed partly of spatiotemporal parts: purely spatiotemporal objects are included as proper parts of the qualitative fusions that are the ordinary objects. In other words, the spatiotemporal parts of ordinary objects are the spatiotemporal parts of the purely spatiotemporal objects included in ordinary objects.⁵²

If this is correct, then coinciding ordinary objects share their spatiotemporal parts because they share a purely spatiotemporal object as a proper qualitative part. Coincidence is partial qualitative with complete spatiotemporal overlap.

7. Ordinary Parts

If parts of ordinary objects like heads, arms and torsos are not spatiotemporal or qualitative parts, then what sort of parts are they? How are we to make sense of the intuitive notion that, say, a statue is the fusion of its arms, head and the rest of its body?

Pluralists need to define a broader sort of part; call such parts *ordinary parts*. Ordinary parts will be individuated by matter, region and suitable nonmodal and modal properties, with corresponding definitions of distinctness, fusion and overlap. Coinciding objects will include the same purely spatiotemporal objects and so share their spatiotemporal parts, but they will not share many of their ordinary parts.⁵³

Pluralists who wish to give a complete account of ordinary objects can make a start (but only a start!) on this project by using \mathcal{M}^-_{OP} , the skeleton of a mereology of ordinary parts:

A1_{OP}. For any proper ordinary part x , x is not a proper ordinary part of itself.

A2_{OP}. For any proper ordinary part x and y , if x is a proper ordinary part of y , then y is not a proper ordinary part of x .

A3_{OP}. For any proper ordinary parts x , y and any z , if x is a proper ordinary part of y and y is a proper ordinary part of z , x is a proper ordinary part of z .

Purely spatiotemporal objects are shared between coincident objects, but many ordinary parts are not. As in §6, take physical particles to be qualitative fusions and spatiotemporally fuse them to create larger purely spatiotemporal objects. Ordinary parts are qualitative fusions of larger purely spatiotemporal objects (*qua* qualitative fusions) with appropriate relational properties.⁵⁴

For example: particles are fused to create a purely spatiotemporal object that, when qualitatively fused with appropriate relational properties, is an ordinary part such as a clay arm. To build a clay statue by attaching a clay head to a clay body, the largest purely spatiotemporal object that is a proper qualitative part of the head is spatiotemporally fused to the largest purely spatiotemporal object that is a proper qualitative part of the body to create the largest spatiotemporal object that is a proper qualitative part of the clay statue. When this spatiotemporal object is qualitatively fused with the right relational properties, we have a clay statue.

Thus, ordinary fusion works by first fusing the largest spatiotemporal parts of the ordinary parts, and then fusing these with (selected) relational properties. This means that ordinary mereology is very different from the other mereologies we have considered. In particular, ordinary fusion is *structured*: when we add a clay arm to a clay body, the ordinary fusion of these parts involves a complex interplay of spatiotemporal and qualitative fusions. There is a related difference: ordinary fusion is *sort-relative*. This is because many ordinary parts are sort-relative: the head and the body are ordinary parts of the statue, not the lump, while the head-shaped and body-shaped pieces of clay are ordinary parts of the clay. A statue is a fusion of *its* ordinary parts, and the lump of clay is a fusion of *its* ordinary parts.

Questions abound for the pluralist. How should the sort-relativity of fusion be developed? Are molecules of clay ordinary parts of both the statue of Athena and Lump? (This assumes that molecules are not the basic physical particles that are spatiotemporal simples, since molecules presumably include accidental properties as well as fundamental physical properties.) Can ordinary sort-neutral parts such as molecules be fused to create both Athena and Piece? If the answers to the last two questions are “yes,” this suggests that both Athena and Piece are ordinary fusions of the very same ordinary parts. If so, then ordinary mereology violates uniqueness.

Pluralists are thus charged with the task of developing and understanding the mereology of ordinary objects and their ordinary parts. They also find

themselves with several different mereological systems, but this is of less concern. To be sure, there is a cost in simplicity of exposition, but the cost is primarily in terms of a multiplicity of formal systems of representation. The most important ontological point is that ordinary objects are more than mere material contents of regions and cannot be adequately represented by classical mereology.

Notes

¹ I'm indebted to many students and colleagues who discussed drafts of this paper with me.

² Lynne Rudder Baker (1997), Kit Fine (2003), Jerrold Levinson (1988), and Stephen Yablo (1987) all point out differences in these sorts of properties. Fine is especially clear about this.

³ Michael Rea (1997a) has a nice discussion of how material constitution is related to the way proper names refer.

⁴ Constitution and coincidence do not require material objects, or even objects composed of spatiotemporal parts. An immaterial mind could be constituted by an immaterial body, and a spatiotemporally partless piece of metal could constitute a statue. I'll set these interesting cases aside in what follows.

⁵ Assuming that the coinciding objects occupy the same region of spacetime. Arguments for monism are given by many, e.g., Allan Gibbard (1975), Mark Heller (1990), David Lewis (1986), Denis Robinson (1982) and Theodore Sider (2001).

⁶ This is not to say that there are no positive arguments for monism, just that the most convincing argument for monism is negative. Different monists weigh the importance of the negative argument differently. For example, Bennett (2004) takes the negative argument to be an important argument against pluralism, but not a "knockdown objection."

⁷ The monadic relational properties of being *de re* represented in certain ways that I discuss in §5.2(a) are not included among the material properties.

⁸ I assume here that ordinary material objects have spatiotemporal parts rather than just spatial parts or no (proper) parts at all.

⁹ See Casati and Varzi (1999), ch. 3, and Simons (1987), ch. 1, for discussion.

¹⁰ Other names for non-sharing of parts are "distinct" or "discrete."

¹¹ For discussion of spatiotemporal extensionality see Simons (1987). The extensional principle applies to any object such that if it has a proper spatiotemporal part it has another one disjoint from the first (so the principle does not apply to simples).

¹² I am indebted to John Heil and E.J. Lowe for pressing me on this point. Heil defends (in conversation) the possibility of what he calls "substantial parts" coinciding with spatial parts. Lowe (2003), esp. p. 157, holds that when some bronze constitutes a statue, the "component parts" of the bronze, including its particles, are component parts of the statue, but some parts of the statue are not component parts of the bronze.

¹³ Thomson (1998) argues, in effect, that the difference between the statue and the clay is a difference in how their spatiotemporal parts are fused.

¹⁴ Simons (2000), ch. 6, discusses related issues. There are other views in the vicinity that the pluralist may wish to explore. Kit Fine (1999) defends a nonclassical spatiotemporal mereological treatment of ordinary objects. Mark Johnston (1992) argues that there is no metaphysically neutral conception of "material part" that can be used to motivate the claim that coincidence is identity. Judith Jarvis Thomson (1983) defends an especially narrow definition of "part." Samuel Levey (1997) discusses the possibility of coincidents based on differing principles of composition. E.J. Lowe (1998) discusses some of the issues involving individuation of spatial parts and the problem of coincidence, and holds that "spatial part" is ambiguous between the notion of a substantial part that is spatially extended and the notion of a spatially defined segment of a spatially extended substance.

¹⁵ Defenders of the view that ordinary objects reduce to material contents of spacetime regions include Gibbard (1975), Heller (1990), and J.J.C. Smart (1963). I think of this view as a neoquinean treatment of objects. The view is only “neoquinean” because most defenders of the view accept some sort of *de re* modality, and because Quine himself held a view that was more radical than the usual material contents view. (Quine (1976) argued that objects are reducible to spacetime regions and then to pure sets.)

¹⁶ Oron Shagrir (2002), p. 177, emphasizes this as part of a critical discussion of claims that the problem of coincidence can be solved merely by postulating different supervenience relations.

¹⁷ I am indebted to Karen Bennett for pressing me on the need to make this point clear. For reasons to adopt my theory of objects, see my (2002) and my (2006 forthcoming).

¹⁸ Bertrand Russell (1940) defends compresence of universals, and Hector-Neri Castañeda (1974) defends constubstantiation of universals. John Bacon (1995) defends concurrent tropes and Keith Campbell (1990) defends compresent tropes. Jonathan Schaffer (2001) endorses compresence understood as co-location in spacetime.

¹⁹ I discuss additional details and advantages of my property mereology and mereological bundle theory in my (2002). There I use the term “logical part” to refer to qualitative parts.

²⁰ I’d like to thank Jonathan Schaffer, Michael Friedman and an anonymous referee for *Noûs* for discussion of this way of characterizing ordinary objects. Sydney Shoemaker (unpublished) develops a view according to which ordinary objects are saturated and fall under natural and artifact sorts, and uses it to explain realization in terms of material constitution.

²¹ However, Leonard and Goodman (1940) held that “concrete entities” could have property instances as parts. “In our interpretation, furthermore, parts and common parts need not necessarily be spatial parts. Thus in our applications of the calculus to philosophic problems, two concrete entities, to be taken as discrete, have not only to be spatially discrete, but also temporally discrete, discrete in color, etc., etc.” (p. 47) I assume here that Leonard and Goodman are taking color parts to be spatiotemporally located property instances (as opposed to properties), since this assumption is required for their general parthood relation to be transitive.

²² This is a contingent truth about our world. Properties instantiated in worlds with different laws of nature may exhibit different causal powers.

²³ It is unclear which ontology of objects is best supported by contemporary physics, in part because the reigning view, quantum field theory (QFT), is so poorly understood. My view is well supported by classical field theory, or any theory that allows some of the basic building blocks to be properties. A theory of objects as entities constructed from ontologically basic localized particles is contradicted by standard interpretations of QFT. See D.B. Malament (1996) for discussion.

²⁴ I’m indebted to Michael Friedman for this pleasing locution.

²⁵ Some of our intuitions about the restriction of spatiotemporal composition suggest that it is vague. Lewis (1986) and Sider (2001) use this fact to argue in favor of unrestricted spatiotemporal composition. But, should I wish to, I can grant that *spatiotemporal* composition is unrestricted without granting that *qualitative* composition is unrestricted. There are no vague intuitions about the (relevant) qualitative fusions: for example, fusions of contradictory properties and the like are clearly not possible.

²⁶ Note that since qualitative fusion may be restricted there may also be cases where proper qualitative parts P, Q and R are qualitatively fused together but there is no fusion of P and R, and so no object that includes P and R. Imagine an object O that includes *red*, *round* and *squashable* in its fusion. Is there an object that is simply round and squashable? If not, then this is an instance of restricted fusion.

²⁷ Although note that there can be a predicative sense of “Athena is 10 feet from the door” if we are referring to the relational property of *being 10 feet from the door* and we take Athena to be a thing that excludes the relation of *being ten feet from* and the door yet includes this relational property.

²⁸ I am indebted to Matti Eklund for this point.

²⁹ If qualitative extensionality is rejected, then the property mereology can be supplemented with the axiom that every object with a proper qualitative part has another proper qualitative part that is disjoint from the first.

³⁰ Zimmerman (1995). Similar objections are raised by Michael B. Burke (1992), Heller (1990), Eric Olson (2001), and Ernest Sosa (1987). (Olsen attributes strange theses to pluralists: for example, he thinks that pluralists hold that a person is not alive (while the animal that constitutes her is). I don't see why pluralists should think any such thing.) Bennett (2004) explores the objection in detail. Michael C. Rea (1997b) and Zimmerman (1995) argue that special sorts of supervenience allow for coincidence. Sider (1999) distinguishes between different kinds of global supervenience and argues that there is no compelling argument based on supervenience principles against the pluralist. Even if Sider is right, pluralists still need to explain in detail how coincident objects can be qualitatively different. Koslicki (2003) develops a theory of what she calls "constitutional supervenience" in order to give an account of the qualitative differences between objects related by the material constitution relation.

³¹ I have some hesitations about this claim, since it blurs together the claim that an object's material properties will determine which laws it is subsumed by, and hence its causal trajectory, with the idea that an object's nonmodal properties determine its modal persistence conditions. We must be clear that the demand for explanation is a demand for the explanation of what determines persistence conditions.

³² Another question asks about the object that includes both essences along with the material core in its fusion. Do the two essences interact somehow to generate a third essence? Since qualitative fusion is restricted, the primitivist could respond by denying that any such object exists.

³³ For discussion and development of this sort of ersatzism, see Lewis (1986), Divers (2002), Heller (1990) and Sider (2002). I'm indebted to Ted Sider for discussion of a number of the issues broached in this section.

³⁴ Strictly speaking, the *de re* modal properties also supervene on associated *de dicto* facts. I'll ignore this complication: it is irrelevant to what follows.

³⁵ I spell things out in ersatzist terms because ersatzism is far more popular than Lewisian modal realism. The Lewisian modal realist (see Lewis 1986) takes possible worlds to be concrete worlds like our own. Both the modal realist and the ersatzist reduce modality to *de re* representation, so the differences between modal realist and ersatzist views are not relevant to this discussion of coincidence.

³⁶ But see my (2004) for a role for context in determining which objects we refer to when making modal claims.

³⁷ See Sider (2002) and Sider (unpublished) for discussion. Although I don't have the space to discuss it here, I believe the ersatzist could hold that if the object were appropriately similar to the individual represented by the ersatz individual (were that individual to exist), this amounts to holding that the object would be crossworld identical (but *not* identical) to it. (Crossworld identity for the ersatzist is not identity, so why can't it be some sort of similarity?)

³⁸ The monist can hold that, strictly speaking, *de re* modal properties reduce to a structured complex of the object-plus-relations-to-possibilia. This won't satisfy internalist intuitions any better. Another alternative is to hold that objects somehow include ersatz individuals in what they are, which is implausible as well.

³⁹ Similar issues arise with regard to external content properties.

⁴⁰ See my (2004) for an additional reason to take modal properties to be internal to an object.

⁴¹ Someone might claim that relational properties must be reduced to the structured complexes of objects, relations and the external objects they are related to. But why should the pluralist accept any such thing?

⁴² I am assuming for simplicity that the coincident objects have no nonmodal properties aside from relational *de re* representational properties and material properties.

⁴³ A further objection to the pluralist might involve the claim that Athena has (in the ascriptive sense) Piece's monadic relational properties and so should have Piece's *de re* modal properties. This claim assumes that since the material core is fused to Piece's monadic relational properties and is also fused to Athena's relational properties, there exists a larger fusion of Athena's monadic relational properties, the material core, and Piece's monadic relational properties. But the pluralist takes qualitative composition to be restricted, and may well deny that there exists any such larger fusion. (I am indebted to Peter Roeper for this response on behalf of the pluralist.) The objection fails in any case since *de re* modal properties must be internal to an object.

⁴⁴ I have not discussed another issue that arises for the pluralist: how many modal profiles are instantiated in the region of Athena and Piece? (Bennett (2004) discusses a related point.) The monist should not object to the possibility of having many modal profiles, since he grants that there are as many profiles as there are contexts. Pluralists may feel differently. Some pluralists may prefer to restrict the number of modal profiles by restricting the number of coincident objects (via restricting qualitative fusion), others may accept the multitude of objects and use them to solve puzzles related to essentialism. See my (2004) and my (2006, forthcoming) for discussion of these issues.

⁴⁵ Interesting differences between Athena and Piece are presumably explained by monists by holding that context determines which properties are ascribed to the entity called "Athena" and/or "Piece." Fine (2003) argues that the contextualization strategy is semantically implausible for interesting properties. See Jeffrey King (unpublished) for a reply.

⁴⁶ Baker (2000) emphasizes the importance of relational properties involving things like communities and organizations.

⁴⁷ This strategy can also be used to explain Fine's (2000) example of how two objects of the same kind could coincide.

⁴⁸ In 1917, Marcel Duchamp created a sensation in the art community when he took a urinal, signed it "R. Mutt," called it "Fountain," and put it on display.

⁴⁹ My approach dovetails nicely with classical field theory. The ontology of quantum field theory (QFT) is so poorly understood (and any interpretation is so controversial) that we lack even the basic information needed to understand how ordinary objects might be constructed from quantum fields. I suspect, however, that when more is known about fundamental physical reality, the flexibility of a property mereology (which could include dispositional properties, determinable properties or abstract properties that might function consistent with the way that quantum mechanical operators function) will mean it can provide a much better account of how objects are constructed than a classical extensional mereological account. In any event, QFT excludes any account that takes localized particles to be *ontologically basic* entities (see Malament (1996) and Rob Clifton and Hans Halvorson (2002) for discussion).

⁵⁰ Relational properties of being located at points or at regions are included in fundamental physical particles in the same way that other relational properties can be included. Take the fusion of mass and charge to stand in the located-at relation to a point or region *S* in spacetime (assume substantivalism for simplicity). Property *L* is the monadic relational property of standing in the located-at relation to *S*, i.e. *being located at S*. The physical particle located at *S* is the fusion of mass, charge, etc., together with *L*. The view can be modified in standard ways to order to allow for particles to persist through change (i.e., we could take the sort of located physical particle just defined as a temporal stage of a persisting particle). See my (2002) for discussion.

⁵¹ It follows that the classical version of the extensional principle cannot be taken as a general principle of identity: if it is false to hold that every object is a fusion of spatiotemporal parts, it is false to hold that *A* is identical to *B* iff *A* and *B* share all of their proper spatiotemporal parts. A restricted version of the spatiotemporal extensional principle remains, of course: the principle is true for purely spatiotemporal objects because such objects are composed

solely of spatiotemporal parts (aside from the qualitative parts that compose the spatiotemporal parts).

⁵² In my (2002) I hold that coincident ordinary objects share their spatiotemporal parts in virtue of including the same purely spatiotemporal objects.

⁵³ Space constraints prevent me from giving anything more than a sketch of the next few steps towards explaining ordinary objects in pluralist terms (more than this must be a project for another day).

⁵⁴ There is vagueness about what counts as an ordinary part—when do we have enough matter and associated properties to have such a part?

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