

Stuff and coincidence

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Abstract Anyone who admits the existence of composite objects allows a certain kind of coincidence, coincidence of a thing with its parts. I argue here that a similar sort of coincidence, coincidence of a thing with the stuff that constitutes it, should be equally acceptable. Acknowledgement of this is enough to solve the traditional problem of the coincidence of a statue and the clay or bronze it is made of. In support of this, I offer some principles for the persistence of stuff that are general, not relying on the particular features of a kind of stuff in the way that principles for the persistence for a thing would. This provides a non-arbitrary grounding for stuff that is independent of the conditions on the nature and persistence of things the stuff composes. The principles also provide a general basis for responding to other questions about coincident stuff.

Keywords Mass term · Matter · Coincidence · Grounding

When I consider a clay statue sitting on a table, I have no initial, non-philosophical inclination to think that there is more than one thing occupying just the space that the statue occupies. But on reflection it may seem that I am forced to do so, since there is a piece of clay there that existed before the statue did and might exist after it. And the statue is not merely a phase of the piece of clay's history, since the statue could continue to exist there even if a portion of it, an arm, for example, were destroyed and replaced by another one made of different clay. The statue would then continue to exist even though the piece of clay was destroyed. So the statue and the piece of clay have different pasts and possibilities, enough to make a clear case for difference between them.

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When philosophers contemplate the relationship of an ordinary physical object to the stuff (clay, wood, copper or bronze, for example) that makes it up, they follow many different routes in trying to say something sensible about this problem of coincidence.¹ If two things coincide and share all of their qualitative physical properties, then what is the physical basis for predicating any different properties of them, and so what is the ground for distinguishing them at all? In particular, if the clay in a statue is some thing, then that thing and the statue coincide and have the same purely qualitative physical properties. But then how could they be distinct individuals? What would be the basis for their difference? On the other hand, it seems that the clay and the statue have different persistence conditions and that different possibilities (such as surviving the repair of an arm) are open to them, and so they must be distinct things. Every attempt to resolve the conflicting claims seems to involve some odd and problematic view, either denying Leibniz's Law or multiplying the number of objects we encounter.

I will argue here that a proper ontology of matter (stuff) can help with the problem of coincidence. Zimmerman (1997) ("Coincident objects: could a 'stuff ontology' help?") specifically challenges the idea that this can help with the problem, and Kleinschmidt (2007) poses a special problem for this kind of approach. I will respond to those challenges.

Zimmerman (1997, p. 20) argues that such coincident individuals "could not differ in... persistence conditions; there could be no ground for such a difference, since they are qualitatively identical and stand in the same relation to other things." (See also Burke 1992). But the presumption that we are talking about individuals is the very assumption that a stuff ontology should avoid. So one part of the answer is to indicate how some clay can exist, be the particular clay that it is, and have properties and persistence conditions without being an individual.² A thing and the stuff it is made of are distinct, but their coincidence is not coincidence of two things; the stuff is not a thing (though it constitutes a thing). A careful consideration of those persistence conditions will also provide the basis for a response to Shieva Kleinschmidt's problem concerning coinciding stuff (Kleinschmidt 2007).

In Karen Bennett's evocative terminology (Bennett 2004), the choice has been conceived as a choice between being a one-thinger and a multi-thinger. I am

¹ See Burke (1992, 1994, 1997), Cartwright (1970), Chappell (1971, 1973), Fine (2003), Jubien (1993), Koslicki (1999), Laycock (2006), Markosian (2004), Zimmerman (1995, 1997), for example. (These examples selected from a vast literature because they take or discuss different positions on the ontology of stuff.) Also called "the grounding problem," Bennett (2004), for example.

² The idea that the clay is not an individual has long been supported by Henry Laycock. See Laycock (1972, 2006), for example. However, I think that we can be even more rigorous in rejecting this idea, while developing a more systematic approach to the consideration of what the clay is. In particular, the connection with mass quantification, the general account of predication and quantification suggested here, the more rigorous avoidance of count terms in talking about stuff, and the suggestion of a more systematic development of mass term semantics all contribute. McKay (2008) has some relevant discussion of Laycock (2006).

Markosian (2004) introduces a view of stuff that is like mine in some ways, but mainly in support of a different project. Burke (1997) also endorses the idea that some stuff is not an individual. (See especially pp. 14–15.) Zimmerman (1997) responds to Burke's suggestion. Some additional rigor in our references to stuff enables us to respond to Zimmerman's challenges.

suggesting that the paradigm problem of coincidence allows for a response by someone who adopts a one-thinger position. The recognition of the proper status for stuff allows for unobjectionable coincidence without requiring coincidence of individuals (things).³

The suggestions offered here grow out of a more general consideration of mass terms and stuff, and they develop analogies with discussions of plural reference, predication and quantification.

1 Preliminary considerations

Anyone who admits the existence of composite objects allows a certain kind of coincidence. Consider a table, a typical composite object; it coincides with a table-top and some legs. This does not immediately pose any *problem* of coincidence, since the parts are many things and not some single thing that is coincident with the table. Very few see this coincidence as posing the same kinds of issues as coincidence of a single individual *a* with a distinct individual *b*.⁴ The parts can become scattered without lasting injury to the table, if the parts are suitably replaced. And the table can go out of existence without the parts going out of existence, if the parts are scattered and not replaced.

There are reasons for our attitude toward the coincidence of a thing *T* with its parts. Each part has its own conditions of persistence, and (at least in most cases of artifacts) there is no reason to take those to be based on the conditions of persistence for *T*. And the conditions of persistence for the parts collectively are independent and general; fundamentally, the condition for their collective persistence is that each of them still exists, whether or not they remain parts of thing *T*. We don't need the table to know what to say about the persistence of the parts.

Prima facie, though, the considerations against allowing the coincidence of a single individual *a* with a single individual *b* might seem to apply to a statue and the clay that constitutes it. A statue's clay has qualitative physical properties that are the same as the statue's qualitative physical properties, so they provide the same base for other properties, and so how could the statue and the clay be distinct? What could be the ground of any difference in persistence conditions, abilities or potentialities? Ostension picks out a thing, and that thing has properties that are the ground for its potentialities (in time and possibility). Though we might distinguish a thing from the things that constitute it, it is difficult to distinguish a thing from some single thing that constitutes it, and the considerations against such coincidence of

³ I will remain neutral about whether we should allow coincidence of individuals; but by responding to the paradigm problem that leads to the multi-thinger position, perhaps I will undermine some of the motivation for it. On the other hand, by basing this on the independence of the persistence principles for stuff and things, perhaps we give comfort to the multi-thinger who can find an independent basis for the persistence principles governing different kinds of things that coincide.

⁴ Among the very few there may be some nihilists and some monists, who reject the idea of composite objects, and some philosophers who argue that the table parts are (collectively) identical to the table (many-one identity). Discussion of those views is outside our scope here. See McKay (2006, pp. 36–42), for a discussion of problems with many-one identity.

individuals may seem to apply equally to coincidence of an individual with the stuff that constitutes it.

What I have said so far might suggest a plural solution to the problem of coincidence (see Burke 1997; Nicolas 2008; Thomson 1998 for example). If the clay is many things, its many atoms or its many sub-portions, for example, then coincidence of the clay and the statue is no more problematic than the coincidence of the table and its table top and legs.

But a plural solution has to assume that there are some composing parts as a metaphysical and even as a semantic matter. Some form of general atomism would be one natural way to implement this, but that would be wrong.⁵ We have no compelling metaphysical arguments for a general atomism, and atomism is not an assumption that is built into the semantics of mass concepts. The concepts of *space* and *time*, for example, are mass concepts that few of us would say entail the existence of atoms of space or time. It seems that nothing could justify our making the assumption of atomism as a basis for resolving the problem of coincidence. Analogies with plurals may help us, but we should not resort to a reduction of mass-talk to plural talk about atoms.

Though atomism might seem to be the most natural route for understanding talk about some stuff as talk about some things, reducibility to ultimate atoms is not a necessary part of an attempt to construct a plural solution. What about sub-portions? A portion of clay is just the sum of all of its sub-portions. This does not require atomism; the sub-portions might be infinitely divisible into further sub-portions (at least in metaphysically imaginable clay). So it might seem that we could base a plural solution on that. But there are compelling reasons to think that some clay (the stuff) is not identical to the portion of clay that it constitutes. Even as neutral a count noun as ‘portion’ is still a count noun, identifying a thing, and we can differentiate that thing from the stuff that constitutes it.⁶ So the many sub-portions of the clay are many things, but they are distinct from the clay that constitutes them.

Two things need to be substantiated there: that we can talk about the clay in the ways that we wish to without using count nouns, and that the clay and the portion of clay that it constitutes are distinct. I will present considerations in favor of both of those claims as a part of my resolution of the problem of statue-clay coincidence.

⁵ Zimmerman (1995) argues very effectively in opposition to making this kind of assumption. Cf. Simons 1987, 155. “[A]lthough we know that as a matter of fact there are smallest possible portions of gold, namely gold atoms, this is not something which could be known a priori and should not therefore have any part in the *logical* analysis of such predications.” Also, see Laycock (2006, pp. 43–44), for example. I will exploit some analogies between plural talk and talk of stuff, but these analogies should not be construed as support for the idea that talk of stuff is somehow reducible to the plural. For one thing, the analogies would, at least as well, support the idea that plural talk is a special case of talking about stuff. See McKay (2015) for reasons why neither of these reductions can work.

⁶ Similar considerations apply to Cartwright’s even less apt term ‘quantities’. See below (and McKay 2015) for more detailed arguments against identifying some stuff with the portion of stuff that it constitutes.

I think that we can develop a more satisfying resolution to the problem of coincidence, if we accept a few ideas to be explained and developed here.

1. Reference to stuff. We can talk about stuff (water, oatmeal, sand, etc.) without using any count nouns (not even ‘entity’ or ‘portion’). Some water does not need to be some thing in order to exist or in order for us to refer to it.
2. Stuff quantification. When I drink some water (two and a half cups of water; a lot of water) I drink some stuff, but there is no thing and there are no things that I drink, or at least the existence of a thing or things that I drink is not a semantic consequence of the claim that I drank some water. Not all quantification is quantification over things. Quantifier words indicating existence (‘some’) or proportion (‘most’) apply to stuff as readily as to things. Other mass quantification involves measurement rather than individuation and counting.
3. Stuff persistence conditions. When we consider the issue of when some stuff *K* persists, and when some *K* at *t* is the same *K* as some *K* at *t*′, we can identify general principles of constitution and persistence associated with stuff terms. This is importantly different from the case of singular count terms; count terms are associated with widely varied, kind-specific, usually structure-constraining conditions of persistence for the individuals of that kind. Stuff, though, is generally scatterable without destruction, at least conceptually. Because of this difference, we have an independent ground for the claim that I have the same bronze today as yesterday even though my bronze statue, the thing that was constituted by the bronze yesterday, has been melted and the bronze now constitutes some hood ornaments. The particular bronze in question is not a thing, it is some stuff, and it has persistence conditions of a sort associated with every kind of stuff. The statue was a thing with the persistence conditions particular to statues (or perhaps more general to artifacts), but it has lost the structure required for the persistence of a thing of that kind.

We can consider each of these three points in turn, with an extended consideration of principles concerning *part* relations and persistence for stuff.

2 Stuff talk without count nouns, and stuff without things

Let’s make a linguistic resolution, intended to enhance metaphysical perspicuity: let’s talk about stuff without using count nouns. Ordinarily not all of our speech conforms to that resolution, but we should be convinced that we could talk about stuff, at least our most ordinary talk, without using count nouns, if we are to claim the kind of metaphysical independence of stuff that I wish to argue for. Occasional lapses should simply be cases of convenient but metaphysically misleading language.⁷

⁷ This will remind many of Strawson’s idea of a “feature-placing” language. See Strawson (1953–1954, 1959) (especially pp. 208 ff.). See McKay (2015) for additional discussion of the relation to Strawson’s ideas.

“I drank something very tasty at dinner.”

I drank some very tasty stuff at dinner.

I drank some stuff of a tasty kind.

If we take the occurrence of ‘thing’ in ‘everything’ very seriously, then ‘Everything that exists is a thing’ is a truism. However, it is not a truism that whatever exists is a thing.⁸ A lapse from our resolution not to use count terms is not metaphysically significant, as long as we could have done it right. Quantifier words “something” and “everything” might (in suitable contexts) be the ordinary ways to say “some stuff” and “whatever stuff”; we need not mistake that for ontology.

As has often been noted, ordinary uses of language can seem to suppose the existence of things that few of us really want to acknowledge as a part of our serious ontology: a sake (of my son’s that I did something for), for example. I might say *there is something in my basement that needs to be pumped out* when our linguistic resolution would recommend something more ontologically accurate, saying that *there is some stuff* (or *some liquid* or *some water*) *that needs to be pumped out*. Here we will try to talk about stuff in ways that do not mislead us into thinking that some stuff must be some thing.

Sometimes we use formal languages and their semantics as a basis for understanding what ontological commitments are really required. That might seem like a problem, since standard formal languages base their interpretation on a domain of things that can be assigned to variables. But in a formal language, when we assign a value to a variable, we can assign some stuff rather than a thing (or some things). The quantificational “Some sand is black,” “Little sand is black,” or “Most sand is black” will involve the predicates ‘x is sand’ and ‘x is black’. Work on the logic and semantics of plurals has already taught us that not every variable should be assigned an individual as value.⁹ We should not let the strictures of ordinary “singularist” first-order logic mislead us about semantics or metaphysics.¹⁰ There is no real conceptual barrier to assigning some stuff to a variable.

Similar things can be said about the use of mass terms¹¹ in demonstrative phrases and definite descriptions. ‘That sand’ refers to some sand, but not to any individual.

⁸ Alternatively, we might distinguish between ‘something’ and ‘some thing,’ and between ‘everything’ and ‘every thing,’ to make the resolution somewhat less stringent about the use of ‘everything’ and ‘something’. I will at least try to use the quantifiers ‘whatever ...’ and ‘some ...’ (where these can be filled out as needed with mass terms) rather than ‘everything’ and ‘something’ when talking about stuff.

⁹ See Boolos (1984, 1985), Lewis (1991), McKay (2006), Oliver and Smiley (2001, 2013), Rayo (2002), Yi (2005, 2006), for example. All introduce plural variables, to which many things can be assigned.

¹⁰ In other words, those who follow Quine in believing that paraphrase into a canonical language makes ontological commitment clear will need a different canon to accommodate the suggestions being made here about plural and mass predication and quantification.

¹¹ We should probably say “mass uses of terms” rather than “uses of mass terms”. As Pelletier and others have pointed out, we can coerce terms that are ordinarily mass terms into count readings (usually involving kinds or standard portions): ‘two wines’ for ‘two kinds of wine’ or ‘two glasses of wine’. We can also put any individuals through a universal grinder and then make a mass use of an ordinary count term: ‘there is carrot (spaniel; Rolex) all over the floor’. Most of what I am saying is focused on paradigm mass terms in their ordinary mass uses (‘water’, ‘clay’, ‘gold’, ‘bronze’, ‘oatmeal’, etc.). I don’t think that we need to worry about this additional refinement here. Cf. Pelletier (2012).

The water in my basement, the coffee in my cup, the mashed potato on my plate, the bronze or clay in the statue, the water that soaked my yard from last night’s rain. We are not talking here about particular things; in each case, we are talking about some particular stuff. Existence and particularity can attach to some stuff without that stuff’s being some thing.

Much the same can be said about uses of pronouns. “The gold in Aunt Suzie’s ring has been melted down, and it has been used to make another ring.”¹² The use of ‘it’ can be represented by the use of a variable to which some stuff (rather than some thing) is assigned in the semantics. Over time, there are two rings and some constituting stuff. The same gold can constitute both rings without being some third individual, and the gold can be the value of a variable and the referent of a pronoun.

The articulation of fundamental principles concerning the identity and persistence of stuff will help to provide a basis for an alternative understanding of stuff identity claims, and we can see how to provide an alternative grounding for stuff quantification, based on measurement rather than on individuation and counting.

3 Quantification

Some quantifier words indicate existence (‘some’) or proportion (‘most’), and those apply to stuff and to things. Other mass quantification involves measurement rather than counting and individuation (‘two and a half cups’). Measure words are mostly distinct in the mass and count cases (‘much’ vs. ‘many’, ‘a little’ vs. ‘a few’), but even proportional claims involving mass terms depend on measures of some kind.

A general development of quantification involving mass expressions would require an account of quantifier phrases, which involve a quantifier expression and a mass term phrase (i.e., a mass term, with or without a relative clause or adjectival modifier). Let’s use lower-case Greek letters for mass variables. For example:

Much wine is red. [much α : $W\alpha$] $R\alpha$

Most wine Charlie drinks is red. [most α : $W\alpha \wedge Dc\alpha$] $R\alpha$

Because ‘most’ is a quantifier-word used with both mass and count terms, and because ‘wine’ has both a mass use and a count uses (meaning *kind of wine* or *serving of wine* in the count uses), the second English example is ambiguous. The English sentence could mean *most kinds of wine...*, but we are interested in the mass meaning, involving just the measurable wine that Charlie drinks. Even that is somewhat unclear, though. Shall we measure by weight or volume in assessing whether most is red? This is not likely to matter for wine, though it might. If Charlie drinks his white wine very cold and his red wine very warm, then he might drink more white wine by weight and more red wine by volume. In order to evaluate a

¹² I refer to Helen Cartwright’s Aunt Suzie here (see Cartwright 1970, especially 27–28). Cartwright’s influential view introduces reidentifiable “quantities” of matter as fundamental subjects of mass predication. The treatment of these “quantities” as individuals is precisely what I intend to avoid. Reidentifiable stuff does not need to be a reidentifiable thing or a reidentifiable set of things, as Cartwright assumes. Her recognition of the reidentifiability of stuff, though, is exactly on the mark.

mass quantification, we need to identify a measure (weight or volume, in this case) on the stuff. This does not show up if we limit our consideration to ‘some’ and ‘all’, which involve existence only. And of course the need for restricted rather than unrestricted quantifiers also would not show up if we were interested only in ‘some’ and ‘all’. Taking quantification seriously, though, we should consider quantifiers other than ‘some’ and ‘all’ in a development of any kind of quantification.

The main point here is that measurement rather than counting is the basis for mass quantification. We need to know what measure we are talking about in order to correctly apply mass quantifier words (in some cases).

4 Persistence principles for stuff

We want to develop a statement of the persistence conditions for ordinary matter such as water, bronze, clay, gold, oatmeal, and lemonade. Ultimately, the principles should be general principles that provide for the continued existence of some stuff in a way that is independent of the continued existence of the things the stuff constitutes; for example, the gold in Aunt Suzie’s ring might later be the gold in two new rings, with Aunt Suzie’s ring destroyed, or the clay in a statue might exist before the statue does and become scattered even though the statue stays in one place, merely receiving a replacement of its lost parts.

Before introducing these general principles of persistence for stuff, it will be useful to formulate the basic principles of the relation that some stuff has to stuff that is part of it. So we will start with principles analogous to basic mereological principles relativized to a time (so that we can eventually talk about principles of persistence),¹³ where the fundamental relation is ‘ α is part of β at t ’ ($\alpha \leq_t \beta$).¹⁴

4.1 Synchronic principles

AXT $\forall t \forall \alpha \forall \beta \forall \gamma$ (if $\alpha \leq_t \beta$, then (if $\gamma \leq_t \alpha$, then $\gamma \leq_t \beta$)) (*Transitivity*)
If α is part of β and γ is part of α , then γ is part of β

AXE _{\leq_t} $\forall t \forall \alpha \forall \beta$ (if $\alpha \leq_t \beta$, then $E_t \alpha$) $E_t \alpha$:**df** α exists at t
If α is part of β at t , then α exists at t

AXR $\forall t \forall \alpha$ (if $E_t \alpha$, then $\alpha \leq_t \alpha$)
If α exists at t , then α is part of α at t

AXS $\forall t \forall \alpha \forall \beta$ (if $E_t \alpha$ and $\forall \gamma$ (if $\gamma \leq_t \alpha$, then $\exists \delta$ ($\delta \leq_t \gamma$ and $\delta \leq_t \beta$))), then $\alpha \leq_t \beta$)
If whatever is part of α overlaps β , then α is part of β

¹³ Nicolas (2008) also develops some principles for mass terms that are like mereological principles relativized to particular mass kinds. His approach differs in several important ways from the approach developed here. The principles that follow also bear some relationship to principles that Simons develops (Simons 1987); but they are more similar to principles that Bittrner and Donnelly (2007) develop in response to Barnett (2004), though with some significant differences from those as well.

¹⁴ This is the relation ‘ α is part of β ’, not ‘ α is a part of β ’. This is one component of the relation ‘ α is some of β ’, but it is not the whole story there.

This paraphrase uses this definition of ‘overlaps’, so we might as well introduce a formal predicate to abbreviate that: $\gamma O_t \beta: \exists \delta (\delta \leq_t \gamma \text{ and } \delta \leq_t \beta)$

We can state these equivalent forms of axiom **AXS**.

AXS.1 $\forall t \forall \alpha \forall \beta$ (if $E_t \alpha$ and $\forall \gamma$ (if $\gamma \leq_t \alpha$, then $\gamma O_t \beta$), then $\alpha \leq_t \beta$)
If whatever is part of α overlaps β , then α is part of β

AXS.2 $\forall t \forall \alpha \forall \beta$ (if $E_t \alpha$ and not— $\alpha \leq_t \beta$, then $\exists \gamma, \gamma \leq_t \alpha$ and not— $\gamma O_t \beta$)
If α is not part of β , then some stuff that is part of α does not overlap β

These basic synchronic principles are variations on basic mereological axioms. However, we add time relativity, and we do not assume that all stuff exists eternally. So we need to add the existence predicate and a related axiom, reflexivity needs to be conditional to times at which some stuff exists, and the “strong” supplementation principle (**AXS**) also needs to be conditional on existence.

The term “strong” supplementation is a bit of a misnomer when we do not have anti-symmetry. Without anti-symmetry, “weak” supplementation does not follow (see Donnelly 2011 for discussion). So we will identify our axiom as the “supplementation” axiom (**AXS**). We reject weak supplementation and anti-symmetry, to allow the possibility that $\alpha \neq \beta$ but $\alpha \leq_t \beta$ and $\beta \leq_t \alpha$ (Cf. Thomson 1998; Bittner and Donnelly 2007; Donnelly 2011).

Some useful definitions:

$\alpha <_t \beta$: **df** $\alpha \leq_t \beta$ and $\beta \neq \alpha$

$\alpha_1, \dots, \alpha_n$ **compose** γ at t : **df**

$(\alpha_1 \leq \gamma, \dots, \alpha_n \leq_t \gamma)$ and $[\forall \beta: \beta \leq_t \gamma] (\beta O_t \alpha_1, \dots, \text{ or } \beta O_t \alpha_n)$

If we have some (significant amount of) water α , then there is water that is part of it and hydrogen that is part of it. But some water β that is part of α is also “some of” α , while no hydrogen that is part of α is “some of” α .¹⁵

α is *some_K of* β at t : **df** $K_t \alpha$ and $K_t \beta$ and $\alpha \leq_t \beta$

This terminology is somewhat problematic, since it seems to allow that the hydrogen γ that is part of the water α is some stuff of α but not some water of α . Ordinarily we do not express the implicit kind term in ‘this is some (K) of that’, but I think that it must be understood if we are to make sense of ‘some of’ (or ‘portion of’). So when I said that no hydrogen that is part of α is “some of” α , I meant that no hydrogen that is part of α is “some water of” α (since hydrogen isn’t water). The hydrogen γ is some stuff of α (since γ and α are stuff). The gin in my class of gin and tonic is some_{fluid} of the fluid in my glass, but it is not some_{gin-and-tonic} of the gin-and-tonic in my glass; even though the fluid in my glass is the gin-and-tonic in my glass. In the phrase “some of the gin and tonic in my glass,” the words ‘gin and tonic’ have a double use, relativizing ‘some’ and characterizing the stuff in the glass. We do not ordinarily make the relativization explicit, though we can: *the gin*

¹⁵ What I say here about “some of” applies to ‘a portion of’ as well, except that ‘a portion of’ is a count term, and we wish to avoid that anyway.

is some fluid of the gin and tonic in my glass, but it is not some gin-and-tonic of the gin-and-tonic in my glass.

K-relative synchronic principles, for any simple, specific mass term K , are also of some interest.¹⁶

AXEK $\forall t [\forall \alpha: K_t \alpha] \alpha$ exists at t (For any mass term K)

i.e. $\forall t \forall \alpha$ (if $K_t \alpha$, then α exists at t)

Whatever is K at t exists at t

AXK $\forall \alpha_1, \dots, \alpha_n$ such that $K_t \alpha_1, \dots, K_t \alpha_n, \exists \beta, \alpha_1, \dots, \alpha_n$ compose β at t and $K_t \beta$.

Whenever $\alpha_1, \dots, \alpha_n$ are all K , there is some K -stuff β that $\alpha_1, \dots, \alpha_n$ compose.

AXK formulates a fundamental cumulativity feature of stuff that does not apply in the case of singular quantification over individuals, though this, like all of the other principles here, does apply when the quantification is interpreted plurally (and K is a typical plural count noun).¹⁷ Stuff agglomerates to make more stuff of the same kind. People agglomerate to make people, but they do not agglomerate to make a person.

An additional definition is useful:

γ ***K-overlaps*** β at t : **df** $\exists \delta (K \delta$ and $\delta \leq_t \gamma$ and $\delta \leq_t \beta)$

Then we can formulate another version of the supplementation principle.

AXSK $\forall t [\forall \alpha: K_t \alpha] [\forall \beta: K_t \beta]$

(if $[\forall \gamma: K_t \gamma]$ (if $\gamma \leq_t \alpha$, then $[\exists \delta: K_t \delta$ ($\delta \leq_t \gamma$ and $\delta \leq_t \beta$)), then $\alpha \leq_t \beta$)

*If whatever K that is part of α K -overlaps β , then α is some K of β .*¹⁸

i.e. $\forall t \forall \alpha \forall \beta$ (if $K_t \alpha$ and $K_t \beta$, then

(if $\forall \gamma$ (if $K_t \gamma$, then (if $\gamma \leq_t \alpha$, then $\exists \delta (K_t \delta$ and $\delta \leq_t \gamma$ and $\delta \leq_t \beta)$), then $\alpha \leq_t \beta$)

We require some limits on K in these axioms for stuff terms. K can be any simple, specific stuff term (like ‘clay,’ ‘gold,’ ‘water,’ ‘lemonade,’ ‘hydrogen,’ or ‘dirt’), but not all of the principles will apply to all mass term phrases (like ‘water weighing less than one pound’ for example); and perhaps they do not apply to abstract terms that have a similar grammatical status (‘beauty’ and ‘truth’).¹⁹ However, these limitations do not undermine applicability to the cases of importance in discussing problems about the coincidence of a thing and its matter. More importantly, some of these principles will also fail in the case of very general mass terms like ‘fluid’ and

¹⁶ I use restricted quantification here because it makes analogies to standard mereological principles more evident. I provide a version with unrestricted quantifiers also, for those who find that more congenial.

¹⁷ A few atypical count nouns, such as ‘classmate’ and ‘co-author’, are non-cumulative; **AXK** will not apply in those cases.

¹⁸ The paraphrase suppresses the initial universal quantifiers (and makes it implicit that α and β are K). Note that **AXKS** does not simply follow from **AXS**. If we were to delete the qualification in ‘ $[\forall \gamma: K_t \gamma]$ ’, writing ‘ $\forall \gamma$ ’ instead, we would have a principle that followed from **AXS**.

¹⁹ I have not explored the question of whether there are suitable measures to serve as the basis for quantification in these cases. It seems that there are none.

‘stuff’, and we will discuss those issues later. There are also some problems for non-stuff mass terms like ‘furniture’ and ‘silverware’, but there are several reasons for seeing those as a separable class of terms.²⁰

4.2 Diachronic principles

Our basic diachronic principles are all K-relative. For any simple, specific mass term K^{21} :

AXC $\forall t [\forall \beta: K_t \beta] \forall t' (\text{If } [\exists \gamma: K_t \gamma] \gamma <_t \beta \text{ and } [\forall \gamma: K_t \gamma] (\text{if } \gamma <_t \beta, \text{ then } \gamma \text{ exists at } t'), \text{ then } \beta \text{ exists at } t')$

i.e., $\forall t \forall t' \forall \beta (\text{if } K_t \beta \text{ and } \exists \gamma (K_t \gamma \text{ and } \gamma <_t \beta) \text{ and } \forall \gamma (\text{if } K_t \gamma \text{ and } \gamma <_t \beta, \text{ then } \gamma \text{ exists at } t'), \text{ then } \beta \text{ exists at } t')$

Principle AXC formulates constancy of agglomeration; i.e., scatterability. *For any K-stuff, β , if whatever K that is properly part of β at t also exists at t' , then β exists at t' .*

AXCK $\forall t [\forall \beta: K_t \beta] \forall t' (\text{If } [\exists \gamma: K_t \gamma] \gamma <_t \beta \text{ and } [\forall \gamma: K_t \gamma] (\text{if } \gamma <_t \beta, \text{ then } \gamma \text{ exists at } t' \text{ and } K_{t'} \gamma), \text{ then } \beta \text{ exists at } t' \text{ and } K_{t'} \beta)$

i.e., $\forall t \forall t' \forall \beta (\text{if } K_t \beta \text{ and } \exists \gamma (K_t \gamma \text{ and } \gamma <_t \beta) \text{ and } \forall \gamma (\text{if } K_t \gamma \text{ and } \gamma <_t \beta, \text{ then } \gamma \text{ exists at } t' \text{ and } K_{t'} \gamma), \text{ then } \beta \text{ exists at } t' \text{ and } K_{t'} \beta)$

Constancy of K-agglomeration. *For any K-stuff, β , if whatever K that is properly part of β at t is K at t' then β is K at t' .*²²

AXC and **AXCK** formulate the idea that even stuff that is separated in space still agglomerates (Bittner and Donnelly 2007, call principles like these “scatter” principles). The water in lakes Huron and Ontario at t is some water β , and if

²⁰ Several things indicate that terms like ‘furniture’, ‘silverware’ and ‘cattle’ can be separated from mass terms such as ‘water’ and ‘bronze’. First, *furniture*-words cannot be coerced for count purposes in the way that standard mass terms can. That is, though standard mass terms like ‘wine’ have count uses (like ‘three wines’) that apply to standard portions (*three glasses of wine*) or kinds (*three kinds of wine*), words like ‘furniture’ and ‘cattle’ resist these coercions. (**three furnitures. *three cattle(s)*). An explicit “classifier” term is needed for any count use of these terms. *Three pieces of furniture* or *three head of cattle*). See Wiese (2012) (and) Cowper and Hall (2012) for accounts of this. Second, size and shape predicates apply in ways that they cannot apply to standard mass terms. *Large furniture, large silverware, large cattle. Rectangular furniture, legless furniture, short-legged cattle*. Third, predicates liked *varied* and *numerous* can apply readily. *The furniture is varied, the cattle are numerous*. Even *the furniture is numerous*, despite the seeming number clash between the verb and the adjective. Fourth, some verbs allow *furniture*-type words but do not allow paradigm mass uses of terms. *John grouped the furniture*, but **John grouped the water*. Cowper and Hall (2012) argue that *furniture*-type words already have an individuation feature, and so they resist uses that would introduce (redundant) individuation, and they can be used bare in contexts that require the individuation feature.

²¹ Additional principles apply when a mass-term K expresses a mass property that has one or both of the following features as an aspect of its semantics:

It is non-accidental. (‘ice’ is accidental and ‘water’ is non-accidental.)

It is pure. (‘water’ is pure, but ‘lemonade’ is not.).

²² In the paraphrase I suppress the existence clauses. Those are not needed in any case, given **AXEK**.

whatever water that is (properly)²³ some of β at t exists at some time t' , then β exists at t' (even though β is now even more scattered than at t).

AXC applies even to ice that melts, if we assume that being ice is a (potentially) temporary property of some water (i.e., the ice = the water, but the water need not always be ice). If whatever that is properly part of the stuff that was ice at t exists at t' , then the total stuff that was ice at t exists at t' (though it might no longer be ice). **AXCK** says that if whatever that is properly part of the ice at t exists and is ice at t' , then the total ice exists and is ice at t' .²⁴

4.3 AXCB (constant basis)

$\forall t [\forall \gamma: K_t \gamma] [\forall \delta: K_t \delta \text{ and } \delta \leq_t \gamma] \exists \alpha_1, \dots, \alpha_n [\exists \beta_1, \dots, \beta_j: (\beta_1 = \alpha_1, \text{ or } \dots, \text{ or } \beta_1 = \alpha_n) \text{ and } (\beta_2 = \alpha_1, \text{ or } \dots, \text{ or } \beta_2 = \alpha_n), \text{ and } \dots, \text{ and } (\beta_j = \alpha_1, \text{ or } \dots, \text{ or } \beta_j = \alpha_n)]$
 $[\forall t': \gamma \text{ exists at } t'] (\gamma \text{ is composed of } \alpha_1, \dots, \alpha_n \text{ at } t', \text{ and (if } \delta \text{ exists at } t', \text{ then } \delta \text{ is composed of } \beta_1, \dots, \beta_j \text{ at } t'))$

i.e., $\forall t \forall \gamma \forall \delta$ (if $K_t \gamma$ and $K_t \delta$ and $\delta \leq_t \gamma$, then $\exists \alpha_1, \dots, \alpha_n$ and $\exists \beta_1, \dots, \beta_j$ such that $(\beta_1 = \alpha_1, \text{ or } \dots, \text{ or } \beta_1 = \alpha_n)$ and $(\beta_2 = \alpha_1, \text{ or } \dots, \text{ or } \beta_2 = \alpha_n)$, and... and $(\beta_j = \alpha_1, \text{ or } \dots, \text{ or } \beta_j = \alpha_n)$, and $\forall t'$ (if γ and δ exist at t' , then γ is composed of $\alpha_1, \dots, \alpha_n$ at t' , and δ is composed of β_1, \dots, β_j at t'))

The idea behind this axiom is that any stuff has some constant compositional basis. If some stuff is composed of atoms, then those atoms are the constant basis. (In the case of an atom of stuff, if there is one, the atom is its own compositional basis.) But we need not assume atomism. The principle requires only that at some level, there is some stuff β_1, \dots, β_j that composes any K stuff γ at all times at which γ exists. This will apply even to mixtures like lemonade, where there is some sugar, water and lemon-stuff that composes it at all times at which that particular lemonade exists. And it applies to whatever δ is some of γ at any time at which δ exists also. This is a ground for persistence that is not as conditional as **AXC** and **AXCK**.

4.4 Diachronic theorem

ThConstancy $\forall t \forall t' [\forall \beta: K_t \beta] [\forall \gamma: K_t \gamma] (\text{if } \gamma \leq_t \beta, \text{ then if } \gamma \text{ and } \beta \text{ exist at } t', \gamma \leq_{t'} \beta)$
 i.e., $\forall t \forall t' \forall \beta \forall \gamma$ (if $K_t \beta$ and $K_t \gamma$ and $\gamma \leq_t \beta$, then if γ and β exist at t' , $\gamma \leq_{t'} \beta$)
If γ is some K of β at t , then if γ and β both exist at t' , γ is some K of β at t' .

This simpler constancy theorem follows from **AXCB**, but it does not capture the fact that the totality of stuff has a constant compositional base. Many have endorsed a stronger constancy principle for mass terms:

*Strong Constancy: $\forall t \forall t' [\forall \beta: K_t \beta] [\forall \gamma: K_t \gamma] (\text{if } \gamma \leq_t \beta, \text{ then if } \beta \text{ exist at } t', \gamma \leq_{t'} \beta)$

²³ Without this restriction, the principle would be trivially true.

²⁴ The conception is like Cartwright's conception of "quantities" of matter, except that we will not apply a count term.

But this principle will not hold for mass terms that apply to mixtures like oil and lemonade, as David Barnett has shown.²⁵

5 The solution (the simple form)

Any stuff that constitutes a thing is stuff of some kind **K** to which these principles apply. The principles indicate the persistence conditions for stuff of kind **K**, and those are ordinarily independent of the persistence conditions of the thing the stuff constitutes. Thus, just by being some stuff of such a kind, the constituting matter of a thing has well-grounded persistence conditions that (ordinarily) differ from those of the thing, and we have solved a coincidence (grounding) problem.

This distinguishes the problem of statue-clay coincidence from the problem of the coincidence of the statue with *a piece of clay*. The clay is distinct from the piece of clay also, since the clay can survive scattering that would destroy the piece of clay. Introducing a count term makes a difference.

There is even a problem in using a count noun like ‘portion’ and talking of portions of clay. Doing that would differ in significant ways from our policy of just talking about the relevant stuff. To see the difference, suppose that I have some mud *m* in a roughly circular blob. I can conceptually distinguish the mud in the north half of *m*, call it *n*, from the mud in the south half of *m*, call it *s*. I can also distinguish the mud in the west third, *w*, the mud in the east third, *e*, and the mud in the central third, *c*. We can also distinguish the *portions* of mud that coincide with the mud that we have identified, call them *n'*, *s'*, *w'*, *e'* and *c'*. *n'* is one of *n'* and *s'*, and *n'* is not one of *w'*, *e'* and *c'*. Thus *n'* and *s'* are not (together) identical to *w'*, *e'* and *c'*.²⁶ Since they have equal claim to be *m*, we must conclude that *n'* and *s'* are not (collectively identical to) *m*, and *e'*, *w'* and *c'* are also not (collectively identical to) *m*. But *n* and *s* together are identical to *m*, and *n* is some of *e*, *s* and *w* together (i.e., some of *m*). So some stuff and the portion that it coincides with have distinct relations to *m* and to other stuff and portions of *m*. The stuff and the portions that coincide with them are not identical. No count term, not even ‘portion’, is a suitable replacement for a mass use of a term. Even if we agree that a portion of clay has the same persistence conditions as the clay that constitutes it, we still must conclude that the portion of clay and the clay are distinct.

6 Issues concerning limitations of the principles

Three limitations on the applicability of the principles we have set out are fairly easy to take. First: We cannot put a mass phrase, as opposed to a simple mass term, in place of the schematic ‘K’ in the axioms. The mass-term phrase ‘water weighing

²⁵ See Barnett (2004), Bittner and Donnelly (2007), Donnelly and Bittner (2009), or McKay (2015) for a fuller discussion of Barnett’s counter-examples to strong constancy.

²⁶ *n'* and *s'* also differ from *w'*, *e'* and *c'* in other properties. For example, *n'* and *s'* are two in number, but *w'*, *e'* and *c'* are not two in number.

less than one kilo' will falsify even the synchronic K-relative principles. Second: The principles are for material mass terms. Though general terms like 'beauty' and 'truth' share many of the grammatical features of material mass terms, there is no attempt here to apply the kind of part structure that is required by even the simplest of our principles. Third: terms like 'furniture', usually classified as mass terms, provide a basis for counter-examples to our diachronic principles; but they are a distinct class of terms from standard mass terms. (See note 20.)

Another limitation is a little more troubling, and there is a question that deserves exploration.

The principles don't apply with very general stuff terms like 'stuff' and 'fluid'. This is also related to problems about coincident stuff that Shieva Kleinschmidt has pointed out (Kleinschmidt 2007).

What about *mixtures* like punch and lemonade? Have we really solved the problems there?

7 The problem of general mass-terms like 'stuff' and 'fluid'

The solution to the problem about very general mass terms grows out of the solution to the Kleinschmidt Problem. So let's look at that problem and the solution first.

When some stuff K has identifiable "atoms", questions arise about the relationship of the stuff K to the atoms and to the stuff, if any, that composes the atoms. Shieva Kleinschmidt has shown how this raises an interesting issue about the coincidence problem and a stuff-solution of the kind I have offered. Although we want to solve the classic problem of coincidence of a thing with the stuff that constitutes it, we seem to run right into a problem about coincident stuff. Here are some examples that illustrate the problem.²⁷

Water: Suppose that I have a one-gallon puddle of water. The water is composed of H₂O molecules, and they are composed of hydrogen and oxygen particles ("atoms" in the non-philosophical sense). Let's suppose that those particles are composed of particle-stuff (to make a potentially very long story short). The water and the particle-stuff are of the same ontological category (stuff), they are co-located, but they have different persistence conditions. If some of the H₂O molecules break apart, we no longer have the same water, but we might have the same particle-stuff. So we seem to have the same kind of co-location problem that we had for the statue and the individual piece of clay from which it is fashioned. We have a new coincidence problem just as bad as the coincidence problem we started with, it seems.

Oatmeal: Suppose that I have a cup of oatmeal. I have a cup of suitably processed oats, and they are made from oat-stuff. The oatmeal and the oat-stuff are co-located. But they have different persistence conditions, since I could smash the oats into tiny

²⁷ Kleinschmidt (2007). The water and oatmeal examples that follow are revisions of her examples, preserving what is essential for us to consider.

fragments that would be too small to constitute oatmeal but that would still preserve all of the oat-stuff. So this stuff α (oatmeal) and stuff β (oat-stuff) are co-located but not identical, again raising the same puzzle of coincidence, it seems.

The response to this is based on the fact that the approach I have taken has already built in distinctness of identity conditions for stuff related in the indicated way. Most of the axioms are formulated as principles for K-stuff, for each kind of K-stuff, but not as principles for stuff in general. In other words, these are general schemas that apply for each kind of stuff, but the specific principles will in fact differ, since any actual axioms involve a particular stuff-kind term. Thus these examples do not create any formal conflict. The water and the particle-stuff might be co-located. Even so, our diachronic principles dictate only how the gallon of water is related to any water that is some of it and how the gallon of particle-stuff is related to any particle-stuff that is some of it.

If the particle-stuff can outlast the water, then they must be different stuff. But there is no problem in distinguishing them; they have different persistence conditions, even though the persistence conditions are of the same general form. The water molecules are a constant base for the water but not for the particle-stuff. The particle-stuff properly composes the molecular particles (we are imagining), but the water doesn't.

Constitution is not identity. The gallon of water, the gallon of hydrogen and oxygen particles, and the gallon of particle-stuff, are all distinct, though co-located. Because of the composition relations that exist, we do not have two, three or more gallons of whatever in one place. The co-location of the water and the particle-stuff is not more intrinsically puzzling than the co-location of the water and the particles, something that no one should regard as problematic. One gallon of water is constituted by one gallon of suitably-structured H and O particles.

But the answer is not that simple if we revert to more general terms. The water is some stuff, and so is the particle-stuff. So let's plug in the term 'stuff' in **AXCB** or in the constancy theorem that follows. It looks like we get a counter-example, because the stuff γ that is the water has water molecules as fundamental parts. If a water molecule can survive the replacement of a part, say an electron in a molecule β , then we might have the same stuff γ (water) at t' , after replacement, because we have the same molecules of water; but if an electron is replaced and wanders off somewhere else, the stuff δ (particle-stuff) that was part of γ at t (composing molecule β at t) is no longer part of γ , contrary to the **AXCB** (and the constancy theorem that follows from it) that requires constancy of composition for stuff. Even though the molecule is still part of the water, which we can suppose is unmoved and intact, the particle stuff has become (very slightly) scattered. The stuff δ (particle stuff) that is part of the stuff γ (water) at t is no longer entirely part of γ at t' , even though δ and γ exist at t' .

This shows that the constancy theorem that follows from **AXCB** does not apply with very general mass terms in place of K. In particular, if some K, δ , can be part of some K, γ , by constituting some things that in turn constitute γ , then K may provide a basis for counter-examples. And if K is very general, then this situation occurs. However, this situation does not occur in the case of standard, specific mass concepts. So when some stuff falls under a specific mass concept, the principles

apply, and we have a well-grounded answer to why the stuff has different persistence conditions than those of the thing the stuff constitutes. It is because it is stuff of a particular kind that is governed by these principles.

A related problem occurs with ‘furniture’. Though this is grammatically a mass term, it is a peculiar one (see note 20), and Mark Heller (personal communication) has pointed out that it provides a counter-example to the constancy theorem (and to **AXCB**). Lilliputian furniture A (300 little chairs) might be made into Gulliver furniture B (a big table and chair). B can survive the loss of a Lilliputian chair, but A can’t; they do not have the same constant basis. But the exclusion of ‘furniture’ from the allowable substituends for K in the diachronic principle doesn’t seem to have deep ramifications here. Even though it is grammatically a mass term, it is not a stuff term that is relevant to the coincidence puzzles we are considering. Also, the problems for **AXCB** arise here because of the application of a single term at two “layers” of existence, the same problem we have for very general terms like ‘stuff’ itself. So we can limit ourselves to terms that are not susceptible to that kind of multi-layered application, thus specifying a little more precisely why general terms and *furniture*-terms must be excluded.

8 What about mixtures?

We can make a simple punch from fruit juice, wine and ginger ale.

Fruit juice α

Wine β

Ginger ale γ

The fruit juice, wine and ginger ale are all liquids, so there is some liquid δ that they constitute, even before the punch is made.

Liquid δ

When they are poured together, we get

Punch π .

Punch π is some liquid too. On the one hand, it seems that we can say of these liquids that $\pi = \delta$. Yet δ existed before there was any punch. We seem to have our traditional coincidence problem back again. And we don’t have any obvious intervening objects; there are no punch atoms.

But I don’t see a real conflict with our principles here. There are two ways to go in developing a view about the metaphysics of punch (and other mixtures):

- (1) Some liquid came to have the property of being punch when it was all suitably mixed together in one bowl. The relationship between the liquid and the punch is like the relationship between some water and the ice that it constitutes for a while. The water is ice for a time, just as the punch liquid is punch only for a time. No conflict with our principles arises.

- (2) Some punch, a new liquid, came into existence when the wine, ginger ale and fruit juice combined. The wine is part of it (and so is the ginger ale, and so is the fruit juice). $\pi \neq \delta$. So a fundamental premise of the proposed puzzle is false.

Once you decide which of those positions to take, I don't think that there is any problem that can be generated for the principles. In case (1), $\pi = \delta$, but no conflict with our principles exists, since π (i.e., δ) has not always been punch. In case (2), the K-relative principles are punch-relative and liquid-relative, and again no conflicts with our principles arise.

Since these principles appeal to what is constant over time, it may be no surprise that we can answer the puzzle. We are doing so by grounding identity and non-identity claims in trans-temporal conditions. To be some specific material stuff is to be governed by those trans-temporal conditions, formulated in the diachronic axioms. To be some water, wood, oatmeal, clay, or bronze is to be governed by these conditions.

9 Persistence conditions

Considering the issue of when some stuff K persists, and when some K at t is the same K as some K at t', we identified general schemata for principles of persistence for stuff terms. The situation is different for count terms (in the singular); count terms are associated with widely varied, term-specific, usually structure-constraining conditions of persistence for individuals. Because of this difference, we can ground the claim that I have the same bronze today as yesterday even though my bronze statue, the thing that was constituted by the bronze yesterday, has been melted and the bronze now constitutes some hood ornaments. The bronze is not a thing, it is some stuff, and bronze has persistence conditions of a sort associated with every kind of stuff. The statue was a thing with the persistence conditions particular to statues (or perhaps more general to artifacts), and if it is melted or smashed, it loses the structure required for the persistence of a thing of that kind. Stuff persistence, governed by a background of general persistence principles (or, really, principle-types), contrasts with thing persistence. This contrast makes the recognition of stuff in our ontology helpful in understanding coincidence. Some stuff and some thing (or things) are distinct even when coincident because of the difference in persistence conditions. These persistence conditions are not specially grounded in the momentary features of the coincident stuff and things, but rather have distinct sources, in the general features of stuff and in the particular persistence conditions associated with each thing-kind.

There are also special conditions of persistence that differ for lemonade, gold, ice, oatmeal and furniture, etc. Some K-stuff can be non-accidentally or accidentally K, K stuff can be pure stuff or a mixture, and K stuff can have K "atoms" or not. (See Bittner and Donnelly 2007; Donnelly and Bittner 2009.) But these differences do not affect the general picture, that stuff is governed by general conditions of

persistence, while the persistence conditions for count kinds require principles that are more idiosyncratically specific to those kinds.²⁸

10 Conclusion

In so far as the problem of coincidence is a problem about the relationship between a thing and the stuff of which it is constituted, we have solved it.²⁹ Stuff and things have different persistence conditions. The persistence conditions for a thing are related to kind-specific principles (ordinarily involving structure) that ground the individuation of things of that kind. Several schemas for substantive conditions of persistence for stuff apply to every kind of simple material stuff.

11 The thinginess presupposition

The fundamental singularism of standard first-order logic has often led philosophers to try to identify single things that can serve as values of variables. This bias has made it impossible to deal with plural and mass predication and quantification in a sound way. The suggestion I am supporting is that we can solve some philosophical problems if we recognize mass (and plural) predication and quantification as legitimate on their own, without a singularist reduction.

Some stuff can coincide with a thing (as the bronze coincides with the statue) or with several things (as some bronze might constitute seven statues). Although some bronze and some statues it composes share some properties (have the same weight and location), they differ in many. The bronze is such that any bronze that is some of it is essentially some of it (it has the persistence conditions for pure stuff, not for a thing of some kind); the statues do not have that property, and they do not even have the analogous property that every artifact-part of them is essentially part of them. Each statue has the persistence conditions for a thing of the kind *statue*. The statues jointly have the analogous property that each one of them is essentially one of them, but the bronze does not have that property. In fact, nothing is one of the bronze.

Zimmerman (1997), for example, allows that the problem of coincidence does not arise when some thing coincides with some things, as the statue coincides with the atoms that compose it, or as a table coincides with a table-top and some legs, because the fact that the atoms and the statue, or the table and the table-parts, coincide “does not imply that there are two precisely coincident things.” (p. 19) It is only by making presuppositions that keep forcing the identification of the bronze as a thing that he is then able to argue that a stuff ontology requires coinciding things. By avoiding those presuppositions, we can see our way clear to say how some stuff

²⁸ Perhaps one could find some general schemas for principles for all artifact-kinds, others for all animal-kinds, etc. I have my doubts, but I don't mean to be ruling out that possibility here.

²⁹ We have not touched the problem of whether distinct things can coincide. We have addressed only the case of a thing's coincidence with the stuff that constitutes it.

can coincide with a thing. The stuff exists without being any thing, though it may be the stuff some things are made of.

12 More conclusions?

If your motivation in considering coincidence puzzles, like the clay-statue puzzle, was to get clear about the relationship of a thing to the stuff that composes it, I think that we have made progress. Stop thinking of the clay as a distinct thing and think of it instead as some stuff that, for a while, composes a thing.

What about the problem of the coincidence between a statue and a piece of clay? Since we can distinguish the piece of clay from the clay that constitutes it, don't we still have the statue-piece puzzle? It seems to me that there at least three attitudes that one could take. I am not ready to endorse any of these.

1. By solving the statue-clay puzzle, we have solved the interesting problem here. Thinking about pieces (quantities, portions) was just a surrogate way of thinking about the clay when we thought that whatever we talked about had to be a thing.
2. In solving the statue-clay puzzle, we have provided a model for the solution of thing–thing coincidence problems. The solution of the thing-stuff problem is that there are well-grounded principles for the persistence of stuff that are distinct from principles governing the persistence of a thing the stuff composes. Similarly, things of different kinds can be governed by distinct persistence principles, and those principles codify the different potentialities that the things have even when they coincide. So we have really suggested an answer to problems of coincidence in general; find independent, well-grounded, non-arbitrary principles of persistence for the distinct, co-incident individuals.
3. We haven't made any progress on the statue-piece coincidence problem. That problem stands untouched. We have only a partial solution to the problem of coincidence.

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