

“STUFF” AND SUBSTANTIAL CHANGE

by

Jan Swiderski

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Abstract

I consider whether coincident objects can be avoided, while preserving matter's survival of substantial change and the everyday understanding of identity, by recognizing the ontological category of stuff. In Chapter 1, I explain the "statue problem", which will serve as the guiding example of substantial change, establish the demands on an appropriate solution to it, and define the "stuff ontology". In Chapter 2, I present Grandy, Burge, and Jubien's solutions to the problem, which avoid coincidence by eliminating all objects, and argue that they are inferior to ones which – like Burke's and McKay's – include things in addition to stuff because of the latter's ability to preserve the analogy between the constitution of things by stuff and the constitution of wholes by parts. In Chapter 3, I defend Burke and McKay's views from objections, and demonstrate their superiority over the rival account of four-dimensional objects. In Chapter 4, however, I argue that, by imposing identity conditions on stuff, Burke and McKay reduce it to technical objects, thereby arguing in favour of coincidence between conventional and technical objects. The charge might be avoided by denying that technical "quantities" are genuine objects, but this response appears to attribute identity conditions, generally features of objects, to stuff. I conclude that the most promising avenue is to eschew the applicability of identity to stuff, and that Burke and McKay's account must be supplemented by a means of distinguishing the sense of sameness applicable to stuff from its counterpart applicable to things in order to present a coherent alternative to coincident objects.

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Chapter 1

Introduction

When some matter, like clay or copper, is made into a statue, what has happened to it? We are faced with two conflicting intuitions. On one hand, we want to say that the copper which pre-existed the statue continues to exist, and has come to occupy precisely the same space as the statue now does – in other words, the two objects coincide. On the other, since the clay and the statue have precisely the same properties, we would think that there is only one object around. It seems like we must either claim that what we would normally call “the statue” is, in fact, two objects in one place, or that, as a result of the sculptor’s manipulation of some copper, one object has come into existence, and another has ceased to exist. I will call this (apparent) dilemma “the statue problem”.

The former position – that, in certain situations, more than one object can occupy precisely the same space – is the generally accepted, standard view¹. It becomes more palatable when supplemented by a four-dimensional understanding of temporal objects². If objects are four-dimensional, the statue and the copper are distinct, overlapping four-dimensional objects which share some temporal parts (the parts located at the times at which the statue exists). They differ because they do not share *all* of their temporal parts.

There are reasons to be skeptical of both coinciding objects and four-dimensionalism. My goal is not to definitively refute either doctrine, but merely to consider whether it is coherent to deny both with minimal offence to intuitions or unwarranted ontological baggage by acknowledging the ontological category of stuff.

¹ Burke (592, footnote 1), cites Kripke (163-164), Lowe (1983), Pollock, Simons (1987), Thomson, Yablo and Wiggins (1967), among others, as supporters of the “standard account”

² Arguments in favour are presented, for example, by Heller, Lewis (1986), or Sider.

If our ontology includes objects only, there is no easy way out of the statue problem: we must sacrifice either the principle of one thing per place or the temporal persistence of matter. These are not, however, the only two possibilities. I propose that we *can* have our philosophical cake and eat it too, accommodating both controversial positions by abandoning an ontological prejudice in favour of objects.

The (apparent) dilemma of the statue problem can be illustrated in the following way. If “ p_1 ” is the copper at one time, “ p_2 ” is the same copper at a later time, and “ s ” is the statue, which exists at the same time as p_2 , but not p_1 , a rudimentary phrasing of the argument for the standard account of coincident objects is³:

1. $p_2 = p_1$
2. $p_1 \neq s$
3. $p_2 \neq s$

The counter-argument is, in effect, the reverse, beginning with a negation of the standard argument’s conclusion, and concluding with a negation of its first premise.

4. $p_2 = s$
5. $p_1 \neq s$
6. $p_2 \neq p_1$

1.1 The Metaphysical Wish-List

Let’s consider the features of an appropriate solution to the statue problem. This optimistic “metaphysical wish-list” would cater to intuitions underlying *both* of the initial

³ This argument can also be stated in tensed terms, as follows:

1. $p = p$ (at all times)
2. $p \neq s$ (at t_1)
3. $p \neq s$ (at t_2)

Although there are analogous paraphrases for the propositions which follow, I present only the tenseless versions of them for the sake of simplicity.

premises, 1 and 4. The more general principles behind 1 and 4 are the demands for our best-possible theory which constitute the first two points on our wish-list:

- A. Matter persists regardless of whether things made of it persist
- B. No two things exist precisely in the same place at the same time

So long as we limit our ontology exclusively to objects (which might be unnecessary), Principle A implies 1, and Principle B implies 4. These, together with the uncontroversial premise “ $p_1 \neq s$ ”, imply a contradiction:

- 7. $p_2 = p_1$
- 8. $p_2 = s$
- 9. $p_1 \neq s$
- 10. $p_1 \neq p_1$

One solution which purports to preserve Principles A and B without contradiction is contingent identity⁴. Some have argued that certain identities hold necessarily (the statue is itself necessarily, in that it *must have been* the statue), while other hold merely contingently (the copper could have been a shield, and thus is identical to the statue as a matter of contingency), yielding the non-contradictory result:

- 11. $\Box (p_2 = p_1)$
- 12. $\Diamond \sim (p_2 = s)$
- 13. $\Box (p_1 \neq s)$
- 14. $\Diamond \sim (p_1 \neq p_1)$

It is at least disturbing to relativize identity like this. On any reasonable understanding, to call something identical to something else is to say that it is the *same*, without qualifications.

Identity relativism is troubling due to its splitting of a normally absolute concept like “is the same

⁴ An argument for contingent identity is presented by Gibbard. Lewis (1983) also argues that the relation of persons to their bodies is one of contingent identity.

as” into two or many⁵. What’s more, the copper is at once necessarily diachronically self-identical, and also contingently so at other times. Where certain philosophers have believed themselves to have successfully avoided *two* of the horns of the dilemma, preserving Principles A and B, a third has sprouted and become their downfall. Thus, this third unsatisfying alternative suggests another demand on our desired theory:

C. The common-sense understanding of identity is preserved.

Upon cursory observation, Principles A-C appear irreconcilable. But some have suggested that they are not, so long as stuff is recognized as a distinct ontological category irreducible to things, and there is a sharing of space⁶ between the statue and some copper.

1.2 Background to the Stuff Ontology

Despite its intuitive appeal and apparent clarity, the concept of “stuff” defies definition through other means than a semantic distinction and a contrast with objects. The least controversial definition is roughly: stuff is the concrete, physical matter referred to in everyday language with mass terms, which has independent existence, but is not an object or objects (although it might, in certain contexts, constitute an object)⁷. Since mass terms are grammatically neither singular nor plural, whatever they designate is, analogously, non-discrete, uncountable, without units, and not an object. As Henry Laycock argues, this point is exceptionally intuitive: “(as the dictionary has it) material objects are precisely those objects that consist of *matter*, stuff

⁵ An argument against contingent identity appears in Burke, 593-594.

⁶ Following Burke, I reserve “coincidence” to denote the precise space-sharing between two or more *objects*, and use “space-sharing” or “co-location” to refer to stuff and a thing occupying precisely the same space. The etymology of the term “composition” suggests it might designate space-sharing, but I avoid it because of the connotations associated with its use by mereology (see, for example, Simons (1987), 228-237). This lexical concern is addressed by Markosian (407), who sees no better alternative and settles on “constitution”, aware that it, like “composition”, might be taken to refer to more than one *thing* sharing space.

⁷ Similar definitions, grounded in semantics and contrast with things, are given by Chappell (61), Laycock (1972: 3), Cartwright (1975: 31-32), Hacker (239), Zimmerman (1997: 53-54), Markosian (407-410), or McKay (2015: 1-2)

which may in fact persist, while the objects that it constitutes decay, disintegrate, or otherwise cease to be”⁸.

Stuff is also distinct from attributes or qualities. An attribute has no independent existence, requiring something *of which* it is an attribute. There is no concrete redness, for example, but there are plenty of red things. Some might be tempted to mistake stuff-talk for attribute-talk because the referents of mass expressions can (for the most part) exist only in conjunction with referents of count expressions. For example, water (or clay or copper or any other stuff), is always grouped into puddles, lumps or some *things*, such that we never have *just* water, but we have puddles and lakes of it. This is roughly Aristotle’s analysis of what we would call mass terms. In the *Categories*, he writes that “everything except primary substances is either predicable of a primary substance or present in a primary substance”⁹, a primary substance being, essentially, an individual, like a man or a horse. If primary substances are “the entities which underlie everything else”¹⁰, it is clear that, for Aristotle, stuffs like water are *in* primary substances in the same way in which attributes like “red” or “good at grammar” are.

Since, unlike attributes, stuff can exist independently¹¹, it can undergo substantial change, constituting one object at one time, and another at a later time. If I take a bucket of olive paint and paint a wall with it, nobody would be inclined to say that the *same* olive colour is on the wall as was in the bucket, or that the olive colour has transferred itself from bucket to wall. We might say that it is the same colour as a way of saying it is the same shade or the same type of colour, but, in this case, we are not making a claim about the two being strictly the same, but of the two things – the bucket and the wall – bearing a certain resemblance to each other. But we would, of course,

⁸ Laycock (1975), 92.

⁹ Aristotle, *Categories*, part 5.

¹⁰ *Ibid.*

¹¹ Some hold the view that whatever is concrete and exists, including stuff, depends on space-time for its existence. If this is true, my claim must be qualified such that stuff depends *solely* on the existence of space-time, while attributes depend on the existence of objects, which, in turn, depend on the existence of space-time themselves.

say that the same paint as was in the bucket is now on the wall, or that the stuff that constituted a *bucket* now constitutes a *coat*. On the basis of the strength of this intuition, we can distinguish stuff, able to survive the destruction of the objects which it constitutes, from attributes, which go out of existence along with the things which they are attributes of¹².

A useful distinction, pointed out by Ned Markosian¹³, is one between ontologies in which stuff is fundamental and thing-talk is reducible to stuff-talk, and ontologies in which things and stuff are both fundamental and neither kind of talk is eliminable in favour of the other. Departing somewhat from Markosian's terminology, I will refer to the former – stuff only – as “stuff (exclusive) ontologies”, the latter – stuff and things – as “stuff (inclusive) ontologies”. I will use “stuff ontology” as a general term for both types.

¹² None of this is the case for an attribute-Platonist: to her, no attribute would ever go out of existence, “wisdom” dwelling in its “platonian heaven” long after the death of the last wise thing (presumably long before the birth of the first one as well). Nonetheless, the Platonist can still distinguish *instantiations* of attributes, which require the existence of things, and stuff, which do not.

¹³ Markosian (2004), 412-413

Chapter 2

Stuff as an Explanation of Substantial Change

Having established the statue problem as an example of substantial change, the metaphysical wish-list as the set of demands on what an optimal solution to it would look like, and given a general account of stuff, which, I hope to demonstrate, provides a not altogether implausible alternative to coincident objects, I will now consider a series of responses to the statue problem which invoke stuff, beginning with stuff (exclusive) ontologies.

2.1 Grandy, Burge, and Jubien's Stuff (Exclusive) Ontologies

One means of denying coincident objects, while preserving stuff's diachronic identity, is Richard Grandy's relational account. Grandy dismisses constitution and overlapping as explanations of identity despite substantial change¹⁴, suggesting instead that any conventional object be treated "as a function from times to quantities of matter"¹⁵. Quantities of matter are defined as "spatio-temporally coherent and consist[ing] uniformly of the same type of stuff"¹⁶, avoiding the assumption that a quantity is a specific type of object¹⁷. A formulation of Grandy's system in predicate logic demands existential quantification over stuff, rather than over objects. This means that conventional sortal concepts like "is a ring" or "is a statue" are, on the relational view, second-order predicates ranging over relations (conventional objects being relations, on this view). The Fregean distinction between objects and concepts is preserved, but re-defined as one between different kinds of relations.

¹⁴ Grandy, 220

¹⁵ Grandy, 221

¹⁶ Grandy, 223

¹⁷ Whether this distinction is valid, or a mere stipulation, will be the subject of the final chapter. For now, let us suppose that quantities of stuff *need not* be objects.

Tyler Burge presents a similar view, describing substantial change as stuff of some kind coming to fall under different phase sortals. Burge calls the approach a “reductionism about physical objects that takes only a few sorts of objects as basic and ‘constructs’ all others in terms of them”¹⁸. But the “objects” Burge speaks of are not conventional ones, which are, on his view, “phases of something more basic”¹⁹, but rather a specific kind of object (if they *are* objects at all): quantities of matter.

Grandy or Burge’s relational analysis of the substantial change of a piece of unformed copper into a statue is:

15. $\exists t_1 \exists t_2 (\text{Unformed}(c, t_1)) \ \& \ \text{Statue}(c, t_2) \ \& \ t_1 \text{ is prior to } t_2$,

In other words: “the copper was unformed at one time, and a statue at a later time”. The two conventional objects (the unformed lump and the statue) are re-described as first-level relations (Grandy) or phase-sortals (Burge). Ordered pairs of designators of matter (“c” representing “this copper”²⁰) and times (t_1 and t_2) fall under these relations. The relational view need not invoke coincident objects to preserve the intuitive diachronic identity between, for example, the copper which was in the workshop yesterday and the statue-shaped copper which stands on the pedestal today. In proposition 15, the same term – c – appears in both conjuncts, and the stuff it refers to stands in two different relations to two different times.

Burge claims that this analysis has no consequences on ontology: he believes that only one-place predicates carry ontological import, and, since his view includes only relational predicates, “such assertions are not explicit about their ontology [...] the sorts of physical objects

¹⁸ Burge, 461

¹⁹ Burge, 464

²⁰ Grandy (222) formulates similar sentences without a demonstrative expression like “*this* copper”. Without the demonstrative, the statement is: $\exists t_1 \exists t_2 \exists x (Cx \ \& \ \text{Unformed}(x, t_1) \ \& \ \text{Statue}(x, t_2) \ \& \ (t_1 \text{ is prior to } t_2))$, where “Cx” is “x is copper”. According to McKay’s view, discussed in Section 2.3, the variables standing for stuff cannot, as Grandy believes, be of the same sort as those standing for individuals. However, since Grandy’s ontology features *no* variables for individuals as it is, his “ $\exists x$ ” can be understood as synonymous with McKay’s “ $\exists \alpha$ ”.

presupposed by ordinary assertions about change, on this view, would not be determinable on the basis of formal representations of those assertions”²¹. In one sense, it is hard to dispute this claim. Naturally, since statements of the form of 15 might be made about any objects at all – be they cats, thoughts, intentions or unicorns – there is no formal commitment to any type of object. In another sense, however, to say that, because 15 features no objects, it has no ontological implications is wrong. Holding 15 true commits one to certain ontological claims, namely, to the existence of the referents of the terms “c”, “t₁” and “t₂”, matter and time.

I see no reason why any non-idealist would be averse to the existence of matter and time, and am therefore perplexed as to why Burge denies that he is committed to them, but only to conventional objects. This might result from a belief that ontology must be concerned exclusively with objects, and it is bizarre to speak of matter and time as bona-fide objects. Burge claims that only monadic predicates bear ontological weight because it is precisely these kinds of predicates which demand objects of reference. The thought process seems to be this: “(i) ontology deals with what sorts of objects exist, and (ii) relations between matter and time feature no objects at all, therefore, (iii) these relations are ontologically neutral”. On his understanding, we have entered a philosophical basement, of sorts, and the real work of ontology is done one floor above us, where we determine which phrase sortals – like “cat” or “thought” – have real instances and which do not. But, barring a blind adoption of an object-obsessed everyday language as the ultimate arbiter of philosophical disputes, I cannot see why premise (i) should be adopted, especially since Burge’s own analysis of statements about change indicates that, fundamentally, reality is anything *but* object-based.

By presupposing that only objects could conceivably be bearers of ontological commitment, Burge has, by my understanding, missed the important insight of the relational view. Without this presupposition, any existentially committing claim, including relational

²¹ Burge, 465

statements like 15, is ontologically committing. Since, in Burge's own terms, all metaphysical claims are "constructed" out of propositions like 15, his own analysis suggests that it is precisely *not* objects which are ontologically fundamental, but matter and time. Thus, Grandy and Burge's relational picture of substantial change avoids coincident objects only through rejecting objects as a proper ontological category in general: we are, despite Burge's assertion to the contrary, left with a stuff (exclusive) ontology, with things reducible to stuff.

Michael Jubien's *The Fallacy of Reference* begins with what the relational view implies, namely, that the physical world is, most fundamentally, made up of stuff, not things²². Like Grandy and Burge, Jubien explains objects as relations. In his words, the "concept of 'ordinary thinghood' [...] is rather a *relational* property: the 'projection' obtained by fixing one of the *relata* of a more fundamental *relation* which holds between the stuff of various regions and, for example, ourselves"²³. Thus, Jubien couches his reduction of things to stuff in different terms than Burge and Grandy, with persons or observers replacing times as the second term in relations in which stuff stands. The eponymous fallacy of reference is the mistaken belief that certain expressions refer to "certain specific things"²⁴. Rather, Jubien argues, the only ontological facts are those which describe the occupation of certain space-time regions by stuff²⁵.

Jubien's analysis avoids coincident objects at their roots, since, he believes, there are, properly speaking, no objects at all, and no act of referring involved in talk of purported pedestalled coppery things. To arrive at the statue problem in the first place, we must consider talk of "the statue" and "the copper" to be genuine acts of reference – which, Jubien believes, they are not²⁶. On his analysis, to describe the formation of a statue out of copper is to talk about a statue-shaped region of space-time coming to be occupied by some stuff which was once

²² Jubien, 2

²³ Jubien, 3

²⁴ Jubien, 22

²⁵ Jubien, 17

²⁶ Jubien, 38

elsewhere (in the workshop, perhaps), or which once occupied a differently-shaped region (maybe one shaped like a lump), and it is perfectly plausible to assert the diachronic identity of stuff despite substantial change. Also, Jubien doesn't encounter the problem of determining whether "the pedestalled coppery thing" is best described as a statue or as a piece of copper: since the purported thing is itself a *fiction*, describing it in either terms is a purely pragmatic exercise.

Grandy, Burge, and Jubien present a compelling solution to the statue problem. Principles A-C have been preserved: there are never two things in one place, stuff remains identical despite substantial change, and the notion of identity is not heavily modified from its ordinary sense. Their ontology is non-contradictory and plausible²⁷ – although it differs from what Burge believes it to be.

The stuff (exclusive) ontology does, however, carry one unfortunate consequence. By reducing things to stuff, Grandy, Burge and Jubien go above and beyond Principle B, leading to the problematic and unnecessary dismissal of *any* instance of space-sharing. We are often inclined to think of more than one physical thing – albeit things of different types – in one place, which the stuff (exclusive) ontology cannot appropriately interpret. Consider:

“This house is made of bricks”

“A normal human spinal column has 33 vertebrae”

“There are only raisins and oatmeal in this cookie”

How might a stuff (exclusive) ontology analyze such pedestrian and clearly intelligible statements? The examples describe space-sharing between objects, or, more precisely, between things and the sums of their parts: “bricks” or “vertebrae” are clearly not names for stuff, as we can plainly count how many bricks or vertebrae there are. Thus, these sentences cannot be analyzed the same way as ones describing stuff constituting a thing.

²⁷ Some might consider the reduction of conventional objects to relations *prima facie* implausible – I do not, and see no real reason why it ought to be.

A stuff (exclusive) ontology can make certain claims about conventional objects. Even if conventional objects are relations, second-level concepts (corresponding to conventional sortal or characterizing concepts) ranging over first-level ones can still provide a paraphrase of object predication. Grandy uses the conventional sortal “is a ring” as an example: on the relational account, there is “a distinct predicate \mathcal{R} that applies to relations just in case they are rings”²⁸, so that the sentence “there is some ring which the bit of gold is at t ” is analyzed as:

$$16. \exists R \exists t ((\mathcal{R}(R) \ \& \ (Rgt)))^{29}$$

With this apparatus, we could attempt to paraphrase the above sentences as second-level predications over relations in the form of 16. If “is made of bricks” is taken to be a second-level property, Grandy’s analysis of the first sentence would be “a certain relation falling under the (second-level) concepts ‘is a house’ and ‘is made of bricks’ obtains between some stuff and a time”. Any similar type of property – “has 33 vertebrae” or “contains raisins” – can be applied in order to paraphrase these sentences. The same would be true of Jubien’s occupied regions of space: some would fall under an “is a house” concept, and, of those, some under an “is made of bricks” concept.

Although there are independent reasons to be uncomfortable with frivolous properties like “has 33 vertebrae”, “has 32 vertebrae”, “has 31 vertebrae”, and so forth, a more pressing concern is the dis-analogy between space-sharing things and stuff and space-sharing wholes and parts created by relational descriptions of these phenomena. If statements about the (purported) co-location of things with things (of a house with bricks, or a spinal column with 33 vertebrae) assert certain second-level properties of relations, they are radically different from statements about co-located stuff and things. For example, if the conventional object “house” is a relation between some stuff and a time, and the house is made of bricks (suppose, for argument’s sake,

²⁸ Grandy, 221-222

²⁹ Grandy, 222. In other words, “there is a certain relation which falls under the second-level concept “is a ring” which obtains between this gold and the time t ”

that there is no mortar, plywood, or suchlike, but bricks only), the stuff standing in a “house-type” relation is whatever stuff the bricks are made of – clay, presumably. Thus, “is bricks” and “is a house” are both relations which some clay stands in.

But, on the stuff (exclusive) view, the relationship between the bricks and the house would have to be described in a highly roundabout way: if both houses and bricks are reduced to stuff, we are left with a claim about one quantity of matter standing in two relations to the same time (or, for Jubien, the same observer). In order to assert the “is made of” relationship, we would have to refer to the regions of space occupied by the bricks and the house. If region “H” is what we would call the house, and regions “B₁, B₂, B₃ ...” are what we would call the bricks, the relation we are looking for might be represented by “B₁, B₂, B₃ ...” being all of the sub-regions of “H”. But to analyze the first example sentence above as making claims about some clay which stands in both a “is bricks” and “is a house” relation to a certain time and about the subdivisions of a certain region of space does not sound like an appropriate description of the specific type of relation which we believe to hold between the bricks and the house³⁰.

In order for sentences about parts and wholes such as the above to be coherent, some space-sharing (but not coincidence) by distinct things must be recognized, which the stuff (exclusive) ontology fails to do. On any understanding of houses and bricks, it is not simply the case that the house and the bricks are made of the same stuff: just as one relation holds between the house and the clay, *another* holds between the house and the bricks. The stuff (exclusive) ontology cannot make sense of this second relation, and to deny the ontological category of things is to be unable to describe the relation between material wholes and parts. To preserve the coherence of such talk, some type of material co-location involving things is required.

³⁰ The relational analysis also produces a significant difference between the metaphysical status of mud houses – consisting of stuff – and brick houses – consisting of things. As any inhabitant of a mud house will attest, although they differ structurally, they are still houses of the same kind nonetheless. I find it somewhat troubling to distinguish them in a philosophical sense.

Although the stuff (exclusive) ontology provides a reasonable solution to statue-copper coincidence, it does so at the cost of jettisoning the important relation between wholes and parts. I now turn to consider another evasion of coincident objects – the stuff (inclusive) ontology – which preserves the coherence of talk of material wholes and parts.

2.2 Burke's Stuff (Inclusive) Ontology

Michael Burke argues, as in argument 4-6 above, that it is never the case that, for any two objects, any space occupied by one is occupied by the other, and thus that any statue is *identical* to whatever copper it is made of and *distinct* from the pre-statue copper. In his words, “although there is here a piece of copper, it is not the one with which we began. We have the same *copper*, but not the same *piece* of copper”³¹. The two pieces are not identical because the earlier one “was merely a piece of copper, whereas [the later one] is also a *statue*. Given the assumption that a mere piece of copper cannot *become* a statue [...], Piece 2 cannot be identified with Piece 1. But why do I say that Piece 2 is (predicatively) a statue? Because Piece 2 is Statue. Providing we make this commonsensical assumption, we can see *that* Piece 2 is not Piece 1. And we can see *why* Piece 2 is not Piece 1”³². By recognizing the statue as genuinely real, Burke's ontology, unlike Grandy, Burge and Jubien's, includes both stuff and things, and is capable of coherently describing co-location between objects.

Distinguishing copper from a piece of copper allows Burke to explain (what he considers) an ubiquitous error in reasoning: the belief that today's piece of copper is the same as yesterday's piece of copper results from mistaking talk of *pieces* for talk of *copper*. Any *piece* (of copper, clay, or whatever) ceases to be itself upon, for example, being cut into five, or, according to Burke, being formed into a statue. The *copper* – which Burke describes as an aggregate of

³¹ Burke, 596

³² Burke, 596

copper atoms³³ - would remain itself no matter how it would be divided or formed. Regardless of whether we accept Burke's descriptions of stuffs as essentially "many" atoms constituting an aggregate, it is exceptionally plausible to recognize the conceptual difference between a piece of stuff and stuff, and it is only bizarre to speak of an object's sharing its space with a *piece*, but not necessarily with *stuff*.

Having helped himself to Wiggins' definition of a sortal concept as a potential answer to a "what is it?" question with "built-in" units³⁴, Burke must find his way out of a puzzle. Every sortal has specific persistence conditions or identity criteria, reasons *why* things are self-identical. For example, a person without hands is a person nonetheless, because hands have nothing to do with the identity criteria associated with the sortal "person", or why a person is a person. An (analogue) watch without hands, on the other hand, is hardly a watch. When, while admiring such a handless watch-face, we are asked "what is it?" we would likely answer something like "fashionable wrist-accessory", or "what was once a watch", not "watch", because the identity criteria for things falling under the sortal "(analogue) watch" include having hands. If the pedestalled, coppery thing is, as Burke purports, a single object, this one thing can be properly described as *either* "a statue" *or* "a piece of copper", which means that whatever is on the pedestal falls under two sortals³⁵. Since each sortal has distinct persistence conditions, whatever is on the pedestal has *two* sets of *conflicting* persistence conditions. Were it to undergo certain

³³ Burke, 605. Others, for example, Nicolas, have argued that masses *are* plurals.

³⁴ Burke, 599.

³⁵ One might worry that "statue" is not, strictly speaking, a sortal because it designates a kind of artifact – a product of human intention – rather than a natural kind. Sortal terms for natural kinds, like "dog", "tree", or "planet", have rigid identity criteria defined by the natural laws governing these sorts of things which can be empirically discovered. On the other hand, terms for artifacts like "statue" or "watch" have no such rigid conditions; whether something is or is not a statue is a function of the intention of its creator, not of the *nature* of the thing in question. There is no act of discovery involved in determining the persistence conditions of artifacts, as is the case with natural kinds, only a consideration of the intentions of their creators. Settling on the clear distinction between sortals for natural kinds and artifacts demands a thorough consideration of the difference of natural and artificial properties which I will not consider here. I will treat the notion of a sortal, following Wiggins and Burke, simply as an answer to a "what is it?" question, which can be determined without distinguishing the type of answer grounded in a natural law from the type grounded in intentions.

changes violating one set, but not the other, whatever is on the pedestal would, absurdly, both be and *not* be itself.

Those who believe in coincident objects have no such problem, because they believe that two things are on the pedestal, each falling under a distinct sortal, and each having its own persistence conditions. A stuff (exclusive) ontology, likewise, has no similar problem: if objects are reducible to stuff, conventional sortal concepts have null extensions, and, thus, no conflicting persistence obtain. Burke, preserving objects as well as stuff, is committed to non-null sortal concepts, and to things with two valid answers to the “what is it?” question falling under two sortals.

Burke’s solution is that an object falling under more than one sortal concept need not comply with the persistence conditions of each concept, and there is a principled means of determining which set of persistence conditions is relevant. Thus, for any object falling under multiple sortals, one of these will be “dominant”, defining the object’s persistence conditions³⁶. The dominant sortal is the one which entails the greatest range of properties: “statue” dominates “piece of copper” because it entails, for example, aesthetic or symbolic properties, which all statues share, while “piece of copper” does not. Since “statue” will dominate “piece of copper”, what sits on the pedestal has no conflicting persistence conditions: it is *not* identical to any past copper, and would cease to exist upon ceasing to fulfill the identity criteria associated with the sortal “statue”.

2.3 McKay’s Stuff (Inclusive) Ontology

Generally in the same vein as Burke, Thomas J. McKay applies a stuff (inclusive) ontology to problems of coincidence. McKay consider thing-stuff co-location a non-problematic instance of space-sharing, like the co-location of a table with its individual parts, as it does not

³⁶ Burke, 605

involve two precisely overlapping objects³⁷. He argues that copper must share all of its properties with the statue, but *only* if the copper is understood to be an object. We *can* explain statue-copper co-location while preserving intuitions about copper's diachronic identity so long as it is not a case of coinciding objects, but, plausibly, one of an object sharing space with stuff.

Standing in the way of accepting this belief, according to McKay, is the demand for an explanation of how the statue and the copper differ, given that they share precisely the same *physical* properties. It is insufficient to assert that matter differs from an object with which it is co-located because copper is stuff, while the statue is an object without providing a rigorous description of how stuff differs from things in general. McKay chooses not to refer to differences in modal or historical properties³⁸, perhaps because there might be good reasons to believe that such properties must be grounded in other, more basic, physical ones. His task, therefore, is to formulate a series of axioms which would describe the general features of stuff as differing from those of things, and to distinguish the copper from the statue thereby. He believes that these axioms can be formulated within the general framework of predicate logic, enriched with an apparatus for reference to and quantification over stuff.

The basis for this belief is the supposed analogy between stuff and plurals. Arguments for plural logic are supported by the fact that, in order to render certain everyday propositions logically perspicuous, we require instances of quantification over, reference to, and predication of more than one thing (at once, as it were)³⁹. To assert that "John and Carol are *two* children" isn't to say something about one thing, or about two things individually (John isn't two children, and neither is Carol), but of precisely two things; the property of being two does not distribute over individuals in the way in which the property of being a child does⁴⁰. If this is coherent in the case

³⁷ McKay (2015), 3

³⁸ I employ this type of argument in defense of Burke in Section 3.1.

³⁹ For arguments in favour of plural logic, see Boolos, Bell (585-588), Rayo (446-447), Yi, McKay (2006), Oliver and Smiley.

⁴⁰ This example is from Yi, 60-63.

of plurals, McKay argues that the framework of predicate logic can accommodate more than just individuals as the values of variables, and it is sensible to make the same sort of move with regards to stuff⁴¹.

Thus, as advocates of plural logic introduce a “plural variable” (if \mathbf{a} is a plural variable, $\exists \mathbf{a}(\mathbf{P}\mathbf{a})$ means “some things are P”), McKay introduces a “mass variable” (if α is a mass variable, $\exists \alpha(\mathbf{P}\alpha)$ means “some stuff is P”). With these, he formulates axioms on the basis of which stuff – copper, for example – differs from a thing – a statue. The synchronic principles for stuff are generally like those of mereological wholes⁴²: the “some of” relation is transitive, there is always some stuff which is some of some other stuff, any stuff is some of itself. The diachronic principle (“AXC”) states that “for any K-stuff, β , if whatever K that is properly part of β at t also exists at t^1 , then β exists at t^1 ”⁴³. In other words, stuff survives scatter, but not loss of whatever is some of it⁴⁴. Since the axioms provide general persistence conditions of stuff which differ from those of things, McKay claims to have distinguished stuff from objects like pieces or quantities of stuff.

With this grounding of the difference between co-located stuff and things, there is no longer a coincidence of two indiscernibles. McKay’s view, like Burke’s, is inclusive, retaining the ontological category of things together with stuff, and, thus, does not eliminate instances of non-problematic thing-thing place-sharing.

2.4 Measuring Up

We can now return to the metaphysical wish-list from section 1.2 and evaluate Burke and McKay’s stuff (inclusive) views’ adherence to Principles A-C.

⁴¹ McKay (2015), 6

⁴² McKay (2015), 8

⁴³ McKay (2015), 11

⁴⁴ McKay’s axioms are not without precedent Gibbard, Zimmerman (1995), Markosian, and Nicolas are just some examples of similar formulations.

Our wish-list demanded that matter, but not material objects, persist over the course of substantial change, *and* that there are never two coinciding, non-identical objects, *and* that the notion of identity is not heavily modified from its everyday meaning. In the stuff (inclusive) ontology, Principle A is satisfied: no two things occupy the same space; a thing and some stuff occupy the same space, but stuff is not a thing. Principle B likewise: the copper is the same before and after the creation of the statue, as it adheres to the persistence conditions specified by McKay's axiom despite undergoing change in arrangement. Finally, Principle C is satisfied: identity over time has only the commonsensical meaning "the same, without qualifications".

The entailments of the stuff (inclusive) ontology, do not, like propositions 7-10 above, contradict each other. If we recognize stuff as an ontological category, the constants p_1 and p_2 from propositions 1-10 designate some stuff, rather than an object. Thus, we can see that Principle B – no two things can occupy precisely the same space at the same time – does *not*, as it had initially appeared, imply premise 4 (or 8), " $p_2 = s$ ": the fact that no two *things* can occupy one space does not mean that a thing and some stuff cannot do so. Some copper can share its space with a statue while remaining distinct from it. Instead of 4-6 above, Principle B implies the co-location, rather than the identity, of a thing and stuff, yielding:

17. $C(p_2, s)$

18. $p_1 \neq s$

Where "C" represents the (symmetrical and transitive) relation of being co-located. It does not follow from 17-18 that $p_2 \neq p_1$, and, thus, these two premises with whatever is implied by Principle A. It looks like we've found our desired solution.

The statue problem is not the only one to which the stuff ontology provides a convenient solution. Many have puzzled over the relation between Theseus' leaking ship, rebuilt at sea plank by plank, and its doppelganger reassembled onshore with the discarded planks. There are no mysteries here if we talk about what the ship is made of. Since the ship and the wood of which it

is built are different, the former remains, but no longer consists of the same *wood* upon the removal of *the first* plank. Once the ship-replica is assembled from the flotsam, and the two strikingly similar ships come nose to nose, there is, once again, an easy answer. The ship on shore is co-located with the same matter (the same wood) as the seaborne was at the start of its extensive renovation project, explaining our conflicting intuitions in this case, but cannot lay claim to being identical with it any more than it can claim to be identical with some copse of long-felled, faraway trees. The ship at sea plainly remains self-identical, adhering to the persistence conditions associated with the sortal under which it falls. It sounds perfectly reasonable to me – perhaps my intuitions in this case are idiosyncratic – to say that, so long as it is still a ship, whether it is built of metal, glass, or cotton candy, the ship will remain *itself* despite changes, because it adheres to the identity criteria for the sortal under which it falls. The stuff ontology produces the clear, intuitive result. Other examples, which would usually drive us to believe in extravagant things like essences or four-dimensional temporal wholes, but, with the useful category of stuff, do no such thing, can be produced. Suffice it to say, we have much to gain in terms of explanation by adopting the view and only undefended prejudice to lose.

This view differs (or, as I will consider in Chapter 4, *purports to differ*) from the coinciding-objects view, avoiding the problematic description of two objects in one place. Since things do not exhaust all that exists⁴⁵, and all material objects must also share space with matter, concrete co-location is ubiquitous in the stuff (inclusive) ontology. In contrast to the stuff (exclusive) view, the stuff (inclusive) view allows for the possibility of certain kinds of thing-thing co-location. For example, we can still talk about co-located parts and wholes – a house

⁴⁵ It appears that the predicate “Ox”, meaning “x is an object” does, *contra* Frege, represent a genuine concept, and it is not the case that $\forall x(Ox)$ (“whatever is, is an object), but $\exists x(\sim Ox)$ (“it is true, for some values of x, that x is not an object”) provided that the variable “x” does not – as in Grandy’s example cited in footnote 20 above – presuppose reification. The pressing question, which I address in Section 4.1, is, if this understanding of the variable “x” is permitted, what it is supposed to represent.

shares its space with bricks (and both house and bricks *also* share their space with whatever stuff they are made of).

Chapter 3

Defending the Stuff (Inclusive) Ontology

Having described the stuff (inclusive) views of Burke and McKay, which appear effective at avoiding coincidence in instances of substantial change like the statue problem, I now turn to the evaluative portion of this project. In the first section of this chapter, I defend the view against two objections levelled against Burke. Next, I demonstrate the advantages of a description of substantial change invoking stuff over one offered by an ontology of four-dimensional wholes of temporal parts. Third, I consider and reject the possible charge that the description of the persistence of stuff presented here is purely theoretical, never obtaining in the real world. I conclude the chapter by responding to Quine's reduction of stuff to things, which will segue into the final chapter, in which I consider the troubling similarity between Burke and McKay's views and those sympathetic to Quine.

3.1 Plausibility and Coherence

One worrying feature of Burke's view is that it characterizes objects as essentially short-lived and unstable. This description leads E. J. Lowe to "most strenuously deny that [Burke's] position is more in keeping with common sense than the standard account can claim to be"⁴⁶. Burke imagines pieces of copper ceasing to exist upon certain manipulations, prompting Lowe's claim that "to suppose that the mere taking on of a certain shape by a piece of copper could terminate its existence is utterly fantastical"⁴⁷. Kathrin Koslicki echoes this worry, arguing that Burke's view "depends on attributing to objects persistence conditions which are radically different from those ordinarily ascribed to them"⁴⁸. By avoiding coincident objects, McKay, like

⁴⁶ Lowe (1995b), 176.

⁴⁷ Lowe (1995b), 174.

⁴⁸ Koslicki, 179, footnote 16.

Burke, is committed to the same termination of the existence of objects upon certain seemingly innocent manipulations which Lowe and Koslicki take exception to. I cannot deny that this feature of Burke and McKay's views might give one pause. If no object such as "the piece of copper" survives a certain changing of shape, objects come into and out of existence at an incredibly high rate. Even more strangely, when a statue is hammered flat, the resulting flat thing is numerically identical to the pre-statue piece of copper, which went out of existence and has now returned. It strikes me as disturbing to treat non-existence like a vacation from which one might return in certain circumstances.

To respond to this objection, we need not dispute the intuition that manipulations of arrangement should have no effect on what there is, but to interpret it as a result of mistaking talk of a *piece of stuff* for *stuff*. The stuff (inclusive) ontology does not entail that a sculptor terminates *copper* (provided she is not an alchemist, in addition to being a sculptor, and copper remains copper throughout the sculpting process), but only a *piece of copper*. We should not be concerned, as Lowe and Koslicki are, about the fleeting nature of objects, so long as stuff does not have a like nature. It is perfectly plausible that, as Burke and McKay argue, objects come and cease to be at a rapid rate, while stuff persists. In terms of dominated and dominating sortals, it would make more sense to answer a "what is it?" question concerning a pedestalled, coppery thing with "a statue", rather than "a piece of copper" (because the former fulfills Burke's criteria for a dominant sortal, entailing a greater range of properties). Thus, it makes sense to say that what is on the pedestal is clearly no longer a piece of copper, which has simply ceased to exist⁴⁹.

⁴⁹ There is another possible response to this worry, depending on a different understanding of the role of Burke's "dominated" sortal. If "dominated" sortals continue to apply to things, but in some weaker capacity (they are, after all, valid answers to a "what is it?" questions), Burke could claim that there is now a pedestal-occupying, statue-shaped *piece of copper*, a thing which continues to fall under the same sortal as it did in its pre-statue incarnation, despite this sortal now being dominated by the sortal "statue". On this reading, it is not the case that alterations of shape succeed in bringing things out of existence: the piece of copper is still around, but is now *also* a statue. This response would acknowledge the intuition that objects must be relatively stable and durable, but deny that objects whose sortals become dominated undergo substantial change at all. The problem with this response, however, is that, by claiming that the statue continues to be a piece of copper, although in some "weaker" sense, as a consequence of the applicability

The complexity here is that our view shouldn't consider it *false* that what sits on the pedestal *remains* a piece of copper. To an untrained eye, an abstract sculpture is just a piece of copper. Even a statue of Eleanor Roosevelt might be described as a piece of copper having a certain shape. But, if the piece of copper has ceased to exist when the statue was created, these descriptions are incorrect. I think Burke must bite this bullet – although its lethal force can be reduced considerably before it reaches him. While I wouldn't be inclined to call somebody who calls a statue a piece of copper a liar, I might accuse her of prevarication. The appropriate answer to a “what is it?” question, like a dominant sortal, is whatever description will furnish us with the best information about the thing in question. To call something a piece of copper, while it is clearly a statue, isn't to lie, but, I think, any court of law would consider this to be at least misleading. It is difficult to provide an argument for the more general description “carbon-based life-form” to be more appropriate than “person”, for instance. Thus, I do not think that it is impossible to agree with Burke that, for all intents and purposes, the piece of copper has gone out of existence. It has not done so because it has lost a certain essential property, but because anyone with a firm enough grip on reality and a concern for truth-telling would no longer describe it as such.

If we deny that fleeting objects are as “utterly fantastical” as Lowe purports, we must face the more startling consequence that objects can cease to exist, and then come *back* into existence. However, this “vacation-from-being”, in all its bizarreness, is still more acceptable than the alternative. Consider the following scenario⁵⁰: I disassemble my bicycle so that it can be packed into a crate and shipped from Kingston to Vancouver, where it is reassembled. Surely, *the same* bicycle as was previously in Kingston is now in Vancouver. But if we do not want to claim that, during the crate's cross-Canada journey, the bicycle did not exist, before returning from its

of the dominated sortal to it, I cannot see how Burke's view differs from one featuring coincident objects, as whatever is on the pedestal can be accurately described as one of two things.

⁵⁰ This thought experiment is inspired by Jubien, 16.

“vacation” upon reassembly in Vancouver, we must say that whatever was in the crate was the same bicycle. Surely, however, all of the bike-stuff required to assemble a bicycle is *not* a bicycle. If the bicycle *did* exist during transit, we are forced to say that it either existed only in some limited way, or both existed and did not exist at once. But I find it incredibly difficult to deny that being and non-being are absolute and mutually exclusive. I see no way in which something can *be* only partly, or both be and not be at once, as (some would like to say) is the fate of the bicycle in transit. By rejecting temporally discontinuous objects, we undermine a far more fundamental principle than we do if we accept them.

Another reason to be at least open to the possibility of temporally discontinuous objects is that spatially discontinuous objects are generally acceptable and extremely prevalent. Few would deny object-hood to, for instance, a dotted line, or (tokens of) the lowercase letter “i” or the number 11, despite each being composed of spatially discontinuous mounds of ink⁵¹. Nor does our knowledge of subatomic physics lead us to conclude that, since tables and chairs are mostly empty space between electrons and nuclei, they are not objects. If discontinuity in space is acceptable, which is difficult to deny, while discontinuity in time is not, we are owed some argument for the dis-analogy. Without such an argument, we have good reasons to accept Burke’s proposed fleeting objects, despite their accompanying strangeness.

Dean Zimmerman, echoing another of Lowe’s objections⁵², takes issue with Burke’s withholding of the label “object” from copper, but not from the statue, despite their having the same qualities. In his words, “how can distinct entities exhibit all the same qualitative properties and stand in the same relations to other things, and yet the one be a mere stuff while the other is a real object?”⁵³ Zimmerman understands Burke to have effectively argued for the coincidence of

⁵¹ A similar argument appears in R. Cartwright, 175.

⁵² Lowe (1995b), 177

⁵³ Zimmerman (1997), 23. Of course, saying that “*one is a mere stuff*” is both grammatically jarring and appears to misunderstand stuff’s uncountable nature – but Zimmerman’s point stands.

conventional objects with lumps of matter, which are objects nonetheless. However, McKay rightly observes that “additional rigor in our reference to stuff enables us to respond to Zimmerman’s challenges”⁵⁴, which I will now attempt to do.

Zimmerman’s objection depends on the empirical indistinguishability of the statue and the copper, which is inevitable given their sharing the same spatial location. One spatiotemporal location can only provide us with a single set of empirical data, so it is necessary that whatever shares a spatial location also shares all empirical properties, leading the arch-empiricist Locke to conclude that “whatever exists at any time [...] is there itself alone”⁵⁵. But the appropriate argument here can’t run from space-sharing to indistinguishability, because this is precisely what is at issue. The question we should ask is rather *whether*, given spatial co-location, stuff and things can be distinguished. Of course, if whatever is concrete has its qualities exhausted by or necessarily grounded in its spatiotemporal location, Zimmerman is right. But I can’t see how he could be. Regardless of whether the copper is, as Burke holds, an aggregate of particles, or, as others would claim, simply non-singular stuff, while the statue is non-controversially a single *unit*, there are numerous qualities which can be attributed to one, but not the other. Modal or historical properties having to do with breaking apart and replacing parts come to mind (copper can be divided into five, remaining itself, while a statue cannot). But we need not even appeal to non-actual or non-present features. For example, the statue has a certain shape – if it’s a statue of Eleanor Roosevelt, it has fingers, a head, eyes, and suchlike. But it makes no sense to say that mere stuff has a head. We can only say that some copper is *arranged* in the shape of a head. But a statue, properly speaking, cannot be *arranged*. Twenty statues of Eleanor Roosevelt can be arranged, into, say, a phalanx, but a *single* one cannot be arranged at all.

⁵⁴ McKay (2015), 2, footnote 2.

⁵⁵ Locke, II. xxvii. i.

These considerations suggest that the stuff (inclusive) ontology is not as bizarre and repulsive as some would claim. We can plausibly undermine the intuition that pieces of matter *must* survive re-arrangement as the result of the conceptual confusion of stuff for things, and make discontinuous things more plausible by considering their less-acceptable alternatives. We also have reasonable grounds on which we can distinguish things from stuff, and Burke can handily evade the objections against him.

3.2 Why Not Four-Dimensionalism?

The stuff (inclusive) ontology is not the only coherent one adhering to the plausible Principles A-C: conceiving of objects as four-dimensional wholes of temporal parts offers an enticing alternative. If we consider lumps of stuff as (reified) spatiotemporal objects consisting of time-slices, they remain self-identical despite substantial change, satisfying Principle A. The fact that two or more four-dimensional objects momentarily share a single part does not mean that they coincide in their entirety, satisfying Principle B. Finally, a four-dimensional object is “the same” as itself in the everyday sense of the term, satisfying Principle C. Although I can discern no obvious internal problems in the temporal-parts view, it fares significantly worse than the stuff view at preserving certain intuitions and everyday understandings of terms.

First, temporal parts cannot coherently explain what Allan Gibbard calls “career-long place-sharing”⁵⁶. Gibbard’s thought experiment features a lump of clay – “Lumpl” – and a statue made of it – *Goliath*. Unlike most material statues, which are preexisted by the matter of which they are made, *Goliath* comes into existence and ceases to exist precisely at the same time as Lumpl does. The purported four-dimensional objects Lumpl and *Goliath* are indistinguishable, and share all of each other’s temporal parts. But we can clearly distinguish a piece of clay from a statue in thought, which the four-dimensional picture fails to represent. Gibbard argues that

⁵⁶ Gibbard, 187-221

instances of career-long place-sharing mean that four-dimensional objects demand contingent identity to resolve all possible cases. Together with Burke, I take this demand for a modification of the notion of identity to be an undesirable feature of four-dimensionalism⁵⁷.

Second, the fact that stuff is co-located with things does not alter the everyday understanding of things as three-dimensional, enduring and, if need be, mereologically simple. To an adherent of four-dimensionalism, conventional objects are not as they seem, but are extended into every moment at which they exist. If I fish a nickel out of my pocket, study it, feel its weight, coldness, and texture, and inspect the designs on it, any reasonable person not in the throes of philosophy would confidently assert that I have familiarized myself with the *whole* nickel. The believer in temporal parts, however, would deny me this assertion. To her, no amount of studiousness would ever acquaint me with *all* of the nickel: a four-dimensional nickel is extended backwards in time to the date stamped on its face, and forwards until it is destroyed at some point in the future. In fact, what I've fished out of my pocket and familiarized myself with is not really an *object* at all, but only a part of an object⁵⁸. Furthermore, the part spanning the minute during which I study the nickel is further divided into infinitely many subparts, meaning that there are *no* mereologically simple objects (a kind of object which I am not particularly interested in preserving, although, I understand, some people are). In a stuff (inclusive) ontology, however, there is nothing wrong with our everyday talk of nickels: in turning over a nickel in my hand, I am, in fact, turning over a *nickel*, whole and complete, not a part of it.

Third, the stuff view describes objects' identity over time as the perfectly ordinary relation "being the same as", rather than the alternative "being *part of* the same *four-dimensional*

⁵⁷ Burke, 593

⁵⁸ Stage theory is the view that what I have thus far been calling temporal parts are more properly distinct, instantaneous objects, which stand in a counterpart relation to other instantaneous objects which we would normally call their later selves. Thus, for the stage theorist, the nickel is a multitude of individual objects. Since the line of attack in this section is an appeal to common sense, I hope it is sufficiently far from common sense to describe a single nickel as a multitude thereof.

thing as”. A non-philosopher, informing us, for example, that the watch Bill is wearing in a photograph is the same watch as he is wearing today speaks simply of *one* object. If Bill is a believer in temporal parts, however, he will disagree: “no, you are mistaken; the referents of your expressions are distinct; they are parts of the same object – my four-dimensional watch – but they are not identical; neither of the entities to which you refer are even objects at all, but temporal parts”. Certainly, there is nothing contradictory about Bill’s description of the situation. But we’ve lost our firm grip on the notion of identity. If identity is to remain unmodified, an assertion of the watch’s diachronic identity should have the form of other identity statements, like “Cicero = Tully” or “Scott = the author of *Waverley*”. But if watches are four-dimensional objects, “present watch = photographed watch” is inaccurate: the two sides of the identity statement are parts of the same whole, but are not the same thing. One could certainly bite this bullet, and claim that the identities which apply to the same object at different times are different in kind from those which apply synchronically. I anticipate this is how the temporal parts view would be defended. However, this splitting up of the intuitively absolute identity relation significantly undermines the plausibility of the view. The stuff view currently presented has, of course, only one type of identity applicable to objects⁵⁹. When we assert that things stand in this relation to themselves throughout their existence, we are using it in the most ordinary and commonsensical way possible.

Fourth, the stuff (inclusive) ontology recognizes a philosophical counterpart to the linguistic and semantic distinction between count and non-count expressions. Constructing an ontological distinction out of a semantic one has been a popular argument for the stuff ontology. It is difficult to dispute the claim that the phenomenon of mass nouns in natural languages like English is at least highly indicative of a conceptual distinction between countable and

⁵⁹ As I argue in Section 4.2, the strongest stuff ontology features two senses of sameness, but preserves only one sense applicable to objects.

uncountable existence. Thus, any ontology which, like four-dimensionalism, re-interprets the mass term phenomenon adhering to the doctrine of the exhaustiveness of singular reference appears to violate a significant and indelible intuition well-entrenched in our linguistic proclivities.

One might be suspicious of the explicit appeals to intuitions and “how we normally think about the world” in the arguments of the present section. Perhaps, the objection would run, philosophical inquiry ought to *question* and *undermine* such intuitions, not be *driven* by them. Although I sympathize with this general worry, my sympathy does not extend so far as to dismiss attention to everyday talk as irrelevant to philosophy, which the four-dimensionalist might be somewhat inclined to do. My reason for this is somewhat plain: I see no other arguments which could be given. Both rival pictures give reasonable, internally consistent explanations of certain phenomena, so favouring one over the other must turn on other considerations. Since the questions here are *metaphysical*, not physical, empirical considerations should not sway us in one direction or another⁶⁰. In such a case, I see nowhere to turn but to consider which of the views on offer coheres better with how we think and talk about the world in everyday life.

It is also worth noting that the stuff (inclusive) ontology does not demand abandoning the thesis that whatever exists is extended in time just as it is in space. It is perfectly coherent to maintain that both things and stuff are four-dimensional⁶¹, and there is a sort of multi-layered overlap between different four-dimensional time-worms of different categories, coherently preserving the four-dimensionality of concrete existence. However, since an alternative, more

⁶⁰ Simons (1998, 247-248) uses physics as an illustration of the advantage of the stuff ontology, and Ware (1975) muses that “scientists will *have to* be able to refer to stuff and things” (23). Although it would be an understatement to call my knowledge of particle physics limited, these, to me, sound like musings and speculation at best.

⁶¹ Of course, four-dimensional stuff could not have temporal *parts* (see footnote 65 below) as stuff could not constitute a unit such as a part. But one could maintain that stuff is extended in a fourth, temporal dimension in the same way as it is extended in the spatial three; the only caveat would be that it is four-dimensional *stuff*, not a four-dimensional *object*, without parts. However, four-dimensional stuff would have three-dimensional stuff stand in a “some of” relation to it, analogously to the relation between four-dimensional objects and time-slices.

plausible solution to that of coincidence is available, I see no reason to commit to four-dimensional objects for their own sake: shouldering *both* a commitment to two categories of concrete existence (stuff and things) *and* a picture of temporal existence highly offensive to intuitions (four dimensional objects) is worse than any one of the two views. Of the two options on the table, the stuff (inclusive) ontology provides a more reasonable picture of the world, and, as such, is preferable to the four-dimensional explanation of substantial change.

3.3 The Impracticality Worry

If some stuff persists only so long as all of it persists, practically *none* of the situations which we would want to describe as instances of diachronic identity between stuff are, in fact, such instances. It is true empirically that it is nearly impossible for stuff to remain identical over time when we are inclined to speak of “the same stuff”. Any situation in which we assert the sameness of stuff in response to acts of sculpting, transferring liquids from bottles to glasses, or dividing lumps of stuff into smaller lumps will inevitably result in some dispersal or scattering of very small amounts of stuff into space, and, thereby, a *loss* of identity. Such scattering is ubiquitous, even without re-arrangement: liquids evaporate and condense at room temperature, molecules ionize, and grains of sand are swept in every direction by the wind. If we adhere rigorously to the identity criteria for stuff stipulated by McKay and others, we can never truthfully say “the coffee which was in the pot is now in the mug” or “the gold in my ring was once in Aunt Suzy’s ring”. Some coffee or gold, respectively, would have been lost along the way⁶².

This feature of stuff might undermine the usefulness, and, perhaps, the validity of the category. What worth is there to considering the diachronic identity of stuff if such identities never *actually* obtain? Although I am not confident enough to assert that such cases would *never*

⁶² This worry is addressed by Cook, 131-134.

obtain (I understand – and vehemently hope – that certain experimental physicists have made every effort to ensure that portions of anti-matter kept in a vacuum by a magnetic field *do* continue to consist of precisely the same sub-portions), stability of amounts over time is at least a great rarity, and likely does not occur in cases which I have been using as illustrations of the advantages of the stuff ontology. Given this thought, some might claim that the stuff ontology fares no better than four-dimensionalism at preserving an everyday understanding of the world, and we ought to replace talk of stuff with stable, durable lumps or pieces thereof, which *would* remain themselves even if some very small amount of their constituent matter were sheared off. The objection, I envision it, would allege that the phenomenon of stuff's diachronic identity is a purely theoretical possibility, permitting us no new insights about the actual world: "the copper" never *in fact* remains identical despite the activities undertaken by sculptors or vandals. This need not mean that a stuff ontology is incoherent, but merely that it does not apply to the real world, which we should be concerned with.

I recognize the grounds of this concern, and cannot deny that most of us (who have yet to have had the opportunity to refer to portions of magnetically restrained antimatter, at least) have likely never asserted a true diachronic identity of stuff. But why should this be a problem? The goal isn't to *replace* everyday language, chastising those who talk about having the same coffee despite evaporation, but to provide a reasonable explanation and clarification of the concepts we operate with. Even if there are no situations in which there is a diachronic identity between stuff, it is at least logically and conceptually possible that there *might*. While the offence to intuitions which the four-dimensional picture was shown to commit made it difficult to imagine *any* circumstance in which it were true, it is certainly not *impossible* that stuff adhere to the McKay-type persistence conditions. Therefore, stuff's identity criteria are ontologically interesting: philosophical claims cannot be limited to the realm of the actual, but ought to, whenever necessary, delve into the realm of the logically possible. Since it is at least logically possible that

there are instances in which stuff retains its identity according to the rules stipulated, the practical, empirical worry whether it does is irrelevant to the question at hand.

3.4 Reducing Stuff to Things

Even if the ontological category of stuff presents a coherent and appealing solution to the statue problem, philosophers' unease with taking on ontological commitments like those which it implies has produced a long tradition of reducing stuff to things which we must now come to terms with. Although some would condemn any new categories of concrete existence as hugely detrimental to a theory, and strive to minimize ontological commitment by any means necessary, we should not bend to the materialist nominalist's demands not to offend her desert-landscape aesthetic sensibilities immediately. Despite the elegance and simplicity of reducing stuff to things, the philosophical question at issue is the extent to which explanatory costs can be imposed on a theory for the sake of simplicity. If we remain open-minded, this cost ought to be negotiable, and we must engage in some of what David and Stephanie Lewis have astutely called "haggling"⁶³ to weigh the respective values of simplicity against explanatory power. The stuff ontology confidently takes on complexity, taking it to be exceptionally useful and not exceptionally repulsive.

Quine, constructing ontology out of semantic analysis, encounters mass terms as problematic cases fitting on neither side of the object-concept dichotomy. An account of language development is at the heart of Quine's consideration of mass terms in "Speaking of Objects" and Chapter 3 of *Word and Object*. According to Quine, proficiency in the use of terms not associated with individual objects, like "red" or "water", is acquired on the same basis as proficiency in the use of names of individuals, like "Mama": they come to be understood following the sporadic reappearance of a feature of the world⁶⁴. Only upon the development of the adult conceptual

⁶³ Lewis and Lewis, 212

⁶⁴ Quine (1960), 115

scheme, he argues, can mass terms be differentiated from names of sporadically reappearing individuals: mass terms refer cumulatively to sums of scattered, discontinuous parts⁶⁵, each part being a conventional object. In contrast to P. F. Strawson, who understands the referent of “water”, for instance, as a “water feature”⁶⁶ – not a full-fledged object – Quine believes mass expressions refer to a concrete mereological sum of all of the water whose reference is divided among a multitude of things by count nouns like “puddle” or “lump”, which provide individuating standards.

Quine’s objective, however, is evident from the beginning: he seeks to preserve the central importance of talk of objects in a language whose “simplicity and naturalness – to us”⁶⁷ make it most useful for empirical science. He believes this language would include only objects as terms. “Speaking of Objects” *opens* with what is either a bit of obvious ignorance of semantics, or a very bold statement of Quine’s commitment to the exhaustiveness of singular reference: “we talk so inveterately of objects that to say we do so seems almost to say nothing at all; for how else is there to talk?”⁶⁸ Quine continues that “we need something like the apparatus of identity and quantification”⁶⁹, which is, of course, uncontroversial when we are, in fact, speaking of objects.

But do we really need identity and quantification to discuss *every* feature of reality, which clearly includes unquantified – and, perhaps, as we shall see later, non-identical – masses of stuff? Paying close attention to language use, we can give a perfectly reasonable answer to what Quine believes is a rhetorical question: rather than talking inveterately of objects, we can talk of stuff, with mass expressions. Laycock points out the difficulties the Quinean analysis encounters, leaving one “at home in recognizing the existence of sheep and rocks and planets,

⁶⁵ Quine (1960), 121. This is an unfortunate turn of phrase: a “part” of water would necessarily be a unit, which water has none of.

⁶⁶ Strawson, 202-209

⁶⁷ Quine (1957), 7

⁶⁸ Quine (1957), 5

⁶⁹ Quine (1957), 6

[but] nonetheless incapable of recognizing the existence of those very substances, like water, carbon, oxygen, and so on, of which these objects are composed: a rather curious predicament”⁷⁰. If we are to take the simple commonness of count expressions to indicate their primacy in thought, Quine begins to sound convincing. But I see no reason why practical considerations like these ought to take the wheel steering ontology, metaphysics or philosophy, and why philosophical considerations ought to *begin* at the contentious observation that there is only ever talk of objects. The Quinean game is rigged from the outset: as soon as we begin to play, the decision against stuff is already determined. But we have no reason to play in the first place, and only by refusing to do so does the defender of the stuff ontology emerge victorious.

Helen Cartwright reconciles Quine’s ontological methodology, which demands objects as the basic constituents of true statements, with semantic data indicating there are no conventional *things* referred to by mass expressions. She takes Quine’s treatment of mass terms as designating such entities as “the water part of the world” to be problematic because there are cases in which *many* individuating standards are present, and the reference of mass expressions is obscured⁷¹, and because it is only contingent that mass expressions have individuating standards at all⁷².

Cartwright’s positive argument for an explanation of mass expressions without divided reference begins with close attention to identity. Rendering identity (and distinctness) statements into a logically perspicuous notation reveals that they must involve two variables. Cartwright reasons that even identity statements featuring English non-count expressions, like “Heraclitus bathed in the same water today as he did yesterday”, will take the form “ $x = y$ ”, arguing that “it is reasonable in any case to say that where x is replaced by ‘yesterday’s bath water’ and y is replaced by ‘today’s bath water’, their values are one or two *things* or *objects* or *individuals*”⁷³.

⁷⁰ Laycock (1975), 92

⁷¹ H. Cartwright, 475

⁷² H. Cartwright, 477

⁷³ H. Cartwright, 474

Given this consideration, Cartwright aims to “explain the use of some count noun which will serve to specify the values of x for which [the assertion of identity between the subjects of mass expressions] is true”⁷⁴.

For Cartwright, the fact that certain mass expressions function non-problematically is enough to make it “plausible to say that there *must* be objects which serve as [the values of variables] whether an ordinary count noun is applicable to them or not”⁷⁵. Since the variables require individuals as values, she turns to “amount”: any instance of “some water” can be replaced by “an amount of water”⁷⁶. Thus, everyday language statements about sameness of stuff – like “yesterday’s bath water = today’s bath water” – are analyzed as assertions of identity between *amounts* of water. However, in claiming “some water” is the same, we must be talking about *all* of the water in question. Otherwise, “an amount of water such that x ” refers to many things, the entirety of x , but also all of its sub-portions. Cartwright makes objects out of what the stuff ontology would call stuff without relying on discreet patterns of scatter the way Quine does: even without a means of dividing reference like “that puddle of...” or “that cup of...” mass expressions, on her view, can nonetheless designate objects.

The slogan “no entity without identity”, combined with the demand to assert the existence of whatever mass expressions refer to while evading Quine’s mereological sums, lead Cartwright to introduce a count noun, “quantity”, acting as the argument in logical regimentations of mass expressions. This use of “quantity” is somewhat artificial, since Cartwright would paraphrase *all* mass expressions, even those which, in everyday language, feature no reference to quantity, but only to stuff like water or gold, as featuring this “placeholder” count noun. Thus, quantities differ from the subjects of everyday count placeholders in expressions like “two beers” or “two coffees”, which do not refer to liquids but to the containers of them. Mass expressions

⁷⁴ H. Cartwright, 474

⁷⁵ H. Cartwright, 480

⁷⁶ H. Cartwright, 480

which, Cartwright believes, implicitly refer to technical quantities, do not refer to objects “in any ordinary way”⁷⁷.

But, like Quine’s mereological evasion of the stuff ontology, Cartwright’s ontology of quantities is crafted with the sole aim of minimizing commitments and fitting into the paradigm of Fregean logic and singular reference. As such, the facts “on the ground”, the conceptual evidence that non-singular talk is as fundamental, prevalent, and non-problematic as talk of objects, are ignored. The reductionists fail to recognize the lack of grounding of their presupposition that objects must lead the way in everyday speech, ontology, and metaphysics. Without this assumption, it is apparent that, *contra* Cartwright, we *can* make sense of identity statements in which the two sides of the identity sign are not individuals, as Burke and McKay appear to have shown.

⁷⁷ H. Cartwright, 474

Chapter 4

Persisting Stuff Re-evaluated.

Thus far, I have defended Burke and McKay's stuff (inclusive) ontology, which provides a compelling alternative to the standard account of coincident objects in cases of substantial change like the statue problem by preserving Principles A-C, against both specific objections to its internal coherence and a general aversion to the category of stuff. A lingering worry remains, however. By supplementing predicate logic, "invented for the purpose of formalizing mathematics, where mass terms play no significant role"⁷⁸, with an apparatus for talk of stuff with persistence conditions, accounts like Burke's or McKay's risk slipping inadvertently back into an ontology of individuals. It is this problem, not those raised by Lowe, Koslicki, Zimmerman, or Quine and responded to above, which looms as a potential downfall of a stuff ontology solution to the statue problem. In this chapter, I outline this difficulty and offer some tentative responses to it as a means of supplementing the stuff (inclusive) ontology.

4.1 Persistent Worries

Although Quine and Cartwright might be accused of arguing against stuff in bad faith, on the basis of a steadfast adherence to an over-simplified ontology, and although I have hitherto been naively speaking of stuff's identity over time, there is something suspicious, which I hope to presently articulate, about identity statements without individuals. The preservation of the object-exclusive ontology when faced with non-count expressions is motivated by the slogan "no entity without identity", or, "any entity is identical (to itself)". As Cartwright has shown, it follows from this principle (henceforth NEWIP – "no entity without identity principle") that stuff cannot constitute a novel ontological category. Thus, to defend a stuff ontology, we must dispute the

⁷⁸ Grandy, 223

NEWIP, which, upon cursory observation, appears self-evident and undeniable. The imagination is strained by attempts to make sense of some value for x for which $x \neq x$. “ $x \neq x$ ”, encountered in a process of reasoning, signals a *reductio*, from which we must retreat back past some premise which would have led us to this proposition. The *meaning* of “=” stipulates that it is *never* the case that $x \neq x$.

We would do well to clarify the meaning of the NEWIP before proceeding. The narrow understanding of the principle treats “entity” as a synonym for “thing” or “object”. If the NEWIP just means “*anything* is self-identical” (and provided, as I have been urging, stuff exists), it asserts a trivial truth which applies only to objects. The wider understanding would adopt the dictionary definition of “entity” – which is, plausibly, “being, existence, as opposed to non-existence”, without talk of discrete units or individuals – and mean that “whatever exists is self-identical”⁷⁹. If Cartwright’s argument is to avoid circularity (or triviality), she must adopt this wider understanding. To defend the stuff ontology together with a wider understanding of the NEWIP, stuff must be demonstrably self-identical. If it weren’t, it would be devoid of “being, existence, as opposed to non-existence”.

Burke and McKay, by describing stuff as diachronically self-identical, adopt the wider understanding of the NEWIP, making identity claims without talk of individuals. Identity statements about Heraclitus’ bath water or the copper which makes up a statue (not quantities of them) are perfectly coherent, so long as it is coherent to attribute persistence conditions to stuff. In the next section, I conclude that the only way to defend stuff from Cartwright’s objection is to understand the NEWIP in a narrow sense, denying that stuff is identical. Given a narrow interpretation of the NEWIP, Cartwright’s “Heraclitus” argument can be simply side-stepped by

⁷⁹ Parsing out these two meanings of “entity” reveals a potential reason for the pervasiveness and apparent appeal of the object-exclusive ontology. The word’s double meaning – “an object” or “existence” – might lead on to mistakenly take the two concepts to be co-extensive. But since we recognize that (piano) keys are not the same as (house) keys, or that (sea) shells are not the same as (shotgun) shells, we should not infer that whatever has entity (whatever exists) is an entity (a thing)

agreeing that although things demand identity criteria, what Heraclitus bathed in is not a thing at all, but rather some stuff. This would mean that the English expression asserting that the water yesterday and the water today are “the same” is not a claim about identity. But, since Burke and McKay would paraphrase the entailment of Principle A (“matter persists regardless of whether things made of it persists”) relevant to the statue problem as “ $p_1 = p_2$ ”, they engage in no such side-stepping. They embrace the wide sense of the NEWIP by grounding stuff’s existence in its adherence to identity criteria.

The problem, however, is that by guaranteeing stuff’s entity (in the sense of “being”) through imposing persistence conditions on it, we have made it an entity (in the sense of “object”) precisely as Cartwright’s quantities have. No doubt aware of the possible objection, McKay confidently asserts that “re-identifiable stuff does not need to be a re-identifiable thing or a re-identifiable set of things, as Cartwright assumes”⁸⁰. On his view, mass variables – if α is a mass variable referring to some stuff, “ $(\exists\alpha)(Fa)$ ” means “some stuff is F” – do *not* stand for objects, whereas Cartwright understands a necessary condition for the coherence of statements about “the same water” to be that the referent of “water” is an object. The other views discussed here implicitly assume the logical machinery makes explicit. The relational analysis describes the change from unformed copper to a statue as the referent of some constant undergoing the change – “c”, as an identifying constant, being a name for an individual. Burke writes that both “aggregate of molecules” and “piece of copper” are sortals (the latter of which, entailing “a strongly unifying property”⁸¹, dominates the former). It appears that, for Burke, whatever is “an aggregate” falls under a sortal concept. The extensions of sortal concepts – what they range over – are determined by the values a variable might take. Thus, even if Burke will argue that whatever falls under the sortal “aggregate” is not properly an object, it must be represented by a

⁸⁰ McKay (2015), 7

⁸¹ Burke, 613

variable which has been existentially quantified over. The distinction between technical objects like quantities or parcels and the stuff of which they consist exists in everyday language and (apparently) in thought, and, throughout my argument for the stuff (inclusive) ontology's advantages, I have been treating it as valid. Despite McKay's insistence, however, I now turn to question it.

Some further terminological precision would be useful. V. C. Chappell, disagreeing with Cartwright's use of "quantity" as the count noun applicable to "some stuff" (his counter-proposal is "parcel"), points out that "'quantity' in the special sense is like 'set': as the same set of cats must be the same cats, so must the same quantity of gold be the same gold. But in the ordinary sense, 'quantity' is like 'number'; and the same quantity of gold need not be the same gold, any more than the same number of cats has to be the same cats"⁸². The "ordinary" sense of "quantity" refers to a certain abstract *magnitude*, a measure of how much stuff there is, without ontological significance. Since any concrete matter must necessarily be of some magnitude or other, even if we do not aim to reduce stuff to things, we cannot avoid speaking of quantities (in the ordinary sense) when speaking of stuff. But, in such a case, we speak of the quantity of stuff as a certain abstract feature of it, not as a bona fide contribution to ontology. The "special" sense takes the referent of "a quantity of gold" to be a concrete *object*. Recognizing Chappell's distinction, I will use "quantity_o" for Cartwright's special sense of the term, explicitly denoting an object, and "quantity_n" for the ordinary use of the term, analogous to "number" in expressions like "a number of books are on the table" (which, to anyone but an acolyte of unrestricted composition, do not entail the presence of an object like "a number" or "a set" on the table)⁸³.

⁸² Chappell, 66

⁸³ In addition to Chappell's "parcel", other suggested terms for what I call quantities_n have been "portion" (Gibbard, Markosian), "mass" (Zimmerman (1995, 1997)), or "plurality of *m*-elements" (Laycock). Burke speaks simply of "the copper" or "the clay" (as opposed to a portion of it).

A stuff ontology would necessarily describe the values of mass variables like α as persisting quantities_n. An object ontology like Cartwright's or Chappell's would take the referents of English mass expressions to be quantities_o. Thus, the pressing question is this: are there non-arbitrary grounds for distinguishing quantities_n from quantities_o? Much is riding on the response to it. If proponents of the stuff (inclusive) ontology cannot provide a principled grounds for this distinction, it would not serve as a means for eliminating coincidence at all; instead, what I have been calling "co-located stuff and things" would just be coincident objects – a quantity_o and a conventional object – and Burke and McKay have given us an account of when coincidence is acceptable, not an alternative to it.

The fundamental difference between the singular existential statement $(\exists x)(Fx)$ and its mass counterpart $(\exists \alpha)(F\alpha)$ is drawn by analogy to plural logic. Elsewhere, McKay expresses his confidence in this line of thought, arguing that "a development of the logic of mass terms should prove to be very much an analogue of our consideration of the logic of plurals"⁸⁴. A plural variable, as noted above, stands for more than one thing. The discreteness and unity of the plural variable do not mean that what it represents *shares* this unity⁸⁵. Likewise, the argument goes, referring to some stuff with the use of a single variable does not commit us to individuated stuff, and quantities_n need not be quantities_o.

The analogy between the mass and the plural comes apart, however, because mass expressions carry ontological commitment, whereas plural expressions do not. Although certain predicates can only be ascribed to more than one thing, demanding irreducibly plural expressions, the existence of these things can always be asserted by means of statements about individuals. So long as each of the individuals comprising a group of which a plural property is predicated exists independently of the others – which they must if they are to be genuinely more than one thing – it

⁸⁴ McKay (2006), 177

⁸⁵ See footnote 39 above.

must be possible to assert their existence through singular expressions. Thus, true statements featuring plural variables are ontologically redundant. All of their existential entailments are coextensive with those of statements about individuals, and the logical machinery accommodating plural expressions does not imply a non-individual category of being. Since talk of pluralities has no existential entailments⁸⁶, it is clear that pluralities don't exist. The ontological implications of statements about stuff, on the other hand, are not exhausted by statements about individuals. Existential quantification over individual water molecules, puddles, or lakes will not entail the existence of water, provided that we can grasp the difference between a puddle and its contents, and that we are unwilling to call a single H₂O molecule "water". But, since it would be completely bizarre to claim that it is impossible to assert the existence of water, this existential claim must be made *without* individuals. Since we cannot deny that certain kinds of stuff, like water, wine, or butter, exist, certain existential statements about stuff will, unlike any existential statements about plurals, imply a new ontological category.

Plural quantification, therefore, is nothing but a pragmatic means of facilitating the rendering of certain everyday expressions coherently into logically perspicuous notation. It is not a fundamentally necessary logical tool for concept-clarification and establishing our ontological

⁸⁶ One could argue that talk of pluralities does have ontological implications. For example, if it is true that "refugees are flooding across the border", we are compelled to acknowledge the existence of a certain process – flooding. But no statements about individuals entail the existence of a flood, since none of the individual refugees in question can appropriately be described as "flooding", suggesting that the plural expression is *not* ontologically redundant. It is undeniable that there really is a flood of refugees, and equally certain that "refugees" functions as a grammatical subject. But it need not always be the case that the grammatical subject of an ordinary language expression indicate a philosophical or conceptual subject. If there are no such things as pluralities, "flooding across the border" cannot be a predicate attributable to any coherent *subject*, even though "refugees" are the grammatical subject of the English description "flooding across the border". This suggests that, if we are to preserve the subject-predicate distinction, floods must be subjects of true existential statements. The problem with doing so, however, is that it is bizarre to attribute independent existence to such a purported *thing* as a flood, given that, in this example, the flood's existence depends strictly on the individual refugees who are doing the flooding. This puzzling example does much to undermine the well-entrenched subject-predicate distinction, which, apparently, leaves us unable to properly analyze this perfectly understandable expression and others like it. Although this thought has profound implications for ontology, they are at best tangential to the question at hand: I'd prefer, if possible, to move forward, qualifying the claim about the ontological neutrality of plural expressions to assert only that their *subjects* – "pluralities" – have no consequences for ontology.

commitments. Since the subjects of plural expressions are, by definition, the same ones as the referents of certain singular expressions, there must be a difference between them *in thought*. If there weren't, to say that "what expressions about 'A and B' refer to is precisely what expressions about 'A' and expressions about 'B' refer to" would be tautological or incomprehensible. The definition of the referents of plural expressions guarantees that there must be a difference between them and singular expressions. But, according to Burke and McKay, the referents of expressions about quantities_n are thoroughly distinct from the referents of expressions about quantities_o: the former, *not* the latter, are necessary to make obvious existential claims about water, wine, and butter. Therefore, simply asserting that quantities_n are different from quantities_o because plurals are different from individuals will not be enough to respond to the question at issue because of the significant difference between the two types of reference. I cannot accept McKay's argument by analogy, because the analogy does not hold.

Another reason to be suspicious of the (purported) distinction between quantities_n and quantities_o comes to light upon a cursory consideration of the phenomenon of reference. Since the mass-enriched logical language quantifies over stuff just as it does over individuals (with the existential quantifier), it is reasonable to conclude that, with it, we refer to stuff in the same way as we refer to things. In any act of reference, we presuppose the existence of some "it" to which we are pointing by our speech, and which can be "picked out" by our interlocutor⁸⁷. What, then, is "picked out" in referring to stuff? The standard understanding⁸⁸ of the persistence of stuff is that it remains identical so long as all of it survives – we can say that the same copper is in the workshop today as was yesterday if, and only if, *all* of it remains in the workshop. Thus, whatever "it" we refer to in referring to stuff has strictly built-in constraints of size or amount, ceasing to be itself upon loss of some of it. For the interlocutor to successfully identify "this

⁸⁷ Strawson, 16

⁸⁸ Perhaps it is not the only one, but the one which has been most popular. See footnote 44 for other examples.

copper” is for her to identify precisely all of the copper to which we are pointing. It is almost impossible to paraphrase the current position without stating outright that it appears as though referring to copper (provided this referring is understood to be the same type of action as referring to non-stuffs) just *is* referring to a quantity_o of copper, not a quantity_n. Only a quantity_o can constitute an “it”, something to be singled out, pointed to, and identified.

Perhaps this brief analysis of language is uncharitable to the stuff (inclusive) ontology; perhaps there are other grounds on which quantities_n can be distinguished from quantities_o. The simplest way to show that two philosophical concepts differ is to produce a counter-example to which only one of them applies. For example, were we to find some mental state with no corresponding brain state, we would be forced to acknowledge a general difference between mental states and brain states. In this case, however, this avenue is blocked. The definition of quantities_o is such that the concept applies anytime there is some stuff, guaranteeing that anytime we are faced with a quantity_n of stuff, we can also conjure up a quantity_o in the same place. Thus, we can produce no example of a quantity_n which cannot also be described as a quantity_o. We must look for the difference elsewhere.

It is futile at this point to persevere in the hope of differentiating the two types of quantity on the basis of some distinguishing feature of them: there are none. Both quantities_o and quantities_n have but one feature. Any quantity is essentially the absolute amount that it is, and, although we can ascribe many different properties, like colour, temperature, or location, to stuff, nothing can be said of a *quantity* other than that a certain measure – a certain value expressed in millilitres, grams, or what have you – applies to it. Since they have only essential properties and no accidental ones, the only features of either kind of quantity are their persistence conditions. There is nothing to either quantities_n or quantities_o other than their essential identity criteria. Therefore, distinguishing the two concepts on these grounds is also impossible: a quantity_n is, just like a quantity_o, essentially the amount that it is, and survives any change but decrease in amount.

It seems as though we cannot produce a principled grounding for the distinction between persisting stuff, as Burke and McKay have described it, and things. Although I cannot definitively conclude that there are *no possible* grounds to distinguish them, I cannot think of what they could possibly be. Of course, one can defend the difference by sticking to one's guns and maintaining that the intuitive and grammatical distinctions between notions like "the copper" and "the *piece* of copper" are sufficient. This argument's dogmatic tone ("quantities_n and quantities_o just *are* different, and there's no more to say on the matter") makes it strongly unappealing. Although this would be the simplest means of evading the worry of slipping into talk of objects by talking about persisting quantities_n of stuff, it has little to stand on but a thorough commitment to a difference. I have criticized Quine for rigging the contest in favour of objects before giving an honest consideration of the concept of stuff. In arguing that stuff (as described by Burke and McKay) simply *does* differ from things, without giving other reasons – or relying solely on evidence from semantics which cannot be further analyzed – we would be committing the same type of intellectual dishonesty (or, perhaps in more charitable terms, pragmatic investigation) as Quine. Extensive additional argumentation is required if the stuff (inclusive) view is to be the appropriate evasion of coincident objects which we set out to articulate. In the final section, I present two tentative means of doing so.

4.2 A New Understanding of Quantity and Identity

Zimmerman sees the apparently inevitable collapse of Burke's persisting stuff into persisting objects as evidence that quantities_n are incoherent, and, thus, to be jettisoned⁸⁹. In Section 3.1, I responded to this objection that stuff has certain features – modal or historical properties, arrangement, rather than shape – which conventional objects lack and which can differentiate quantities_n from conventional objects. However, if we replace Zimmerman's talk of

⁸⁹ Zimmerman (1997), 23

conventional objects with Cartwright's technical quantities_o, this avenue is blocked because quantities_o differ from conventional objects in the same way as quantities_n do. But the first possible defense of the stuff (inclusive) ontology is to, in effect, turn the tables on Zimmerman's argument: the indistinguishability of the two kinds of quantity can also mean that it is quantities_o which are incoherent. The collapse might not be of quantities_n into quantities_o, but the reverse. In Section 4.1, I set up the problem in such a way that, unless the defender of the stuff (inclusive) ontology provides grounds for the distinction, her argument will be *for* coinciding things and quantities_o. The present suggestion is to shift the burden of proof onto the defender of quantities_o: since these technical "objects" cannot be distinguished from mere stuff, it is not obvious that they *are* objects. Perhaps Cartwright has modified the concept of object-hood to permit talk of identities between quantities to the point of having created totally inconceivable objects, and it is *her* argument which presents a clear articulation of co-located stuff and things, rather than of coincident objects. Surely, "a quantity_o" is unlike anything we would acknowledge as a bona fide object, having no spatial unity or built-in form, unstable, flowing, and somewhat abstractly identifiable. It is reasonable to consider it to be, like "a plurality", a systematically misleading, empty expression with no ontological significance.

If purported quantities_o are, more properly, just stuff, a stuff (inclusive) ontology would necessarily exclude *objects* like quantities_o. On the present suggestion, whatever is a quantity of stuff is not an object, but a persisting and self-identical non-thing. If this manoeuvre is permitted, it is to Burke and McKay's credit that they cannot draw a fictional distinction, and we have arrived at a coherent, principled and non-dogmatic articulation of the stuff (inclusive) ontology, and can reap its rewards in explaining substantial change.

There is, however, something untoward about conferring identity criteria on quantities_n, while at the same time refraining from calling them objects, since identity criteria are features of

objects specifically⁹⁰. Burke's need to account for dominant sortals arises because sortals are what determine identity criteria. In ordinary language, any expression can be a sortal, including those designating many things or stuff. But, if we adhere to the standard logical picture of sortal concepts ranging over individuals, the only *logical* sortals are those which apply to unified, discrete, and re-identifiable objects, and we can only ascribe identity conditions provided that whatever they are ascribed to is *something* of a certain sort. Of course, to be "something of a certain sort" is to be an individual object. It is thus apparent why talk of quantities_n with identity criteria slips into talk of objects.

Since conferring persistence conditions on stuff demands treating it as things, if we are to preserve the distinction between quantities_n and quantities_o, we must disavow the persistence of stuff as presented here. The problem cannot be solved so simply as proposing alternative identity criteria to those given in McKay's axioms. The reification of quantities_n is not the result of specific identity criteria, but of identity criteria in general. In other words, it is the product of considering stuff self-identical, and distinct from some other stuff. To describe stuff as having the feature of self-identity, as Burke and McKay do, is to treat it as if there were criteria on the basis of which it can be identified as such. But this, some have argued, is sufficient to treat stuff as an object (or objects). According to Laycock, stuff lacks any "built-in structure or integrity of 'form', in virtue of which there is a guarantee that we will be able to pick out and distinguish some of it from some more of it. And to lack such built-in form or structure is to lack essential or intrinsic distinctness – it is to lack the traditional *criteria* of distinctness or identification"⁹¹.

The reification of stuff resulting from its treatment as subject to identity claims is an obvious consequence of applying *numerical* identity and distinctness, which necessarily hold true of countable individuals, to stuff. To assert an identity, at least in the conventional sense

⁹⁰ This is the conclusion arrived at in Lowe, (1995a), 511.

⁹¹ Laycock (1979), 114

represented by the “=” symbol is, as Cartwright rightly observes, to claim something like “this one is that one” or “this and that are the same one”. To do so is necessarily to speak of individual objects. But none of these could possibly make sense when talking of stuff, where there isn’t *one* at all. It follows, therefore, that to defend the stuff ontology, we must adopt the narrow understanding of the NEWIP mentioned above. If “entity” serves as a synonym for “thing” or “object”, the principle makes only the narrow claim that *anything* must have identity conditions, but it remains mute on whether *whatever exists* is self-identical. With this understanding, we can begin to make sense of the persistence of matter postulated by the intuitive Principle A without speaking of numerical identity, thereby reifying stuff.

Since identity criteria cannot but imply numerical identity, we must come to terms not only with the fact that stuff isn’t diachronically self-identical – thus that there are no *persisting* (understood in a conventional sense) quantities_n of stuff – but also that it is not synchronically so. It is never true, for any stuff α , that $\alpha=\alpha$. Now the force of Quine’s call to reduce stuff to things becomes apparent. As mentioned above, it is notoriously difficult to wrap one’s head around a statement asserting the failure of self-identity. If, not being a thing, stuff cannot have identity criteria, and, thereby, cannot be *self-identical*, some might become enticed to dismiss the category of stuff as outright incoherent, and surrender any benefits the stuff ontology might bring, happily escaping the metaphysical morass with the universality of identity intact.

The story is not so simple, however. To say that identity *does not apply* to stuff is not to say that stuff is, paradoxically, distinct from itself. To withhold a certain type of description in a certain context is not to assert its negation. For example, if moral descriptions apply only to specific sorts of things – persons, or their actions, perhaps – to withhold a moral description from, say, a brick is not to call a brick *immoral*, but to say that the brick is neither moral *nor* immoral. Thus, to withhold claims about identity and distinctness from stuff is not to say that stuff is distinct from itself in the way Plato is distinct from Socrates. It is to say that, for any stuff α , $\sim(\alpha$

= α), and *also* $\sim (\alpha \neq \alpha)$. But, if “=” and “ \neq ” are understood in the conventional sense of numerical identity, these statements do not contradict each other (although, since numerical identity does not apply to α , they are probably not well-formed).

Thus, the stuff (inclusive) ontology might distinguish quantities_n from quantities_o by eschewing the applicability of (diachronic and synchronic) identity and distinctness to the former. This suggestion is not as far-fetched as Cartwright or Quine would want us to think. Recalling the impracticality worry of Section 3.3, we can see that stuff’s extremely rare adherence to the persistence conditions for quantities_n does not prevent us from having a clear notion of “the same as” different from numerical identity and applicable to stuff. We can re-define sameness of stuff as different from numerical identity while preserving the intuitive Principle A (the persistence of matter). I continue to refer to these as persistence conditions, although they are no longer identity criteria – I am unsure if I do great injustice to the term “persistence” by using it as a synonym for “continued existence” rather than “*identity* over time”, which, I hope, are now distinguishable.

So, what else can “the same as” mean, if not “the same *one* as”? It would be incoherent, or at least strongly counter-intuitive, to denounce sameness of matter, and with it, the intuitions which led me to formulate Principle A, and many others to adopt the doctrine of coincident objects, as deep conceptual confusion. To do so would be to undermine the notion of substantial change wholesale. If there is no matter (or non-Aristotelian substance) which continues to exist despite the creation and destruction of objects, we couldn’t even make sense of some copper becoming a statue, or having the same coffee as was in the pot in our glass. Without some sort of “sameness” applicable to stuff, our picture of the world becomes *completely* foreign to common sense. As Quine observed that we talk inveterately of objects, I am inclined to suggest that our talk of persisting stuff is equally inveterate. It appears, therefore, that in order to explain these intuitions, we have to make sense of “sameness” understood otherwise than numerical identity.

Here are two tentative proposals for accommodating to intuitions about sameness of stuff, neither of which is sufficiently elaborated to stand up to much critical scrutiny. However, they serve as illustrations of perfectly coherent and acceptable senses of sameness not involving numerical identity⁹².

First, stuff might still merit the designation of being “the same” not on the basis of numerical self-identity, but causal relations: any stuff α is the same as some stuff β iff the existence of β is caused in some significant way by the existence of α . With this definition, we can say that the coffee in my mug is the same coffee as was in the mug a minute ago, regardless of whether any of it has evaporated, because some process undergone by the previous coffee – evaporation – gave rise to the coffee now. Likewise, a compound produced by a chemical reaction of vinegar and baking soda bears a similar sameness relation to the two reactants, whose combination *caused* the existence of the present compound. Suspicions about describing the pre-reaction and post-reaction stuff as “the same” might be assuaged if we consider the unacceptable alternative of calling them “distinct”. Surely, matter is *subject to* chemical change, but there is no new, original matter, distinct from its predecessors, *created* by chemical change. Since the reactants and the product cannot be distinct, it might not be entirely wrong-headed to settle on “causal identity” as a means of talking about the sameness of stuff, while avoiding numerical identity criteria. If we adopt this understanding of sameness of stuff, it can still be the case that the copper which constitutes the statue is the same copper as was in the workshop before the artist began her work, as the copper *caused* the existence of the present copper, but is not numerically identical to it, thereby preserving Principle A.

A second means of talking about stuff’s continued existence without applying numerical identity to it is to say that stuff can be qualitatively, rather than quantitatively the same. Some

⁹² I suppose some would reserve the term “identity” exclusively for the numerical sense, represented by the “=” symbol in logic and mathematics. I, in referring to “causal identity” or “qualitative identity”, mean no association with their numerical counterpart.

stuff is the same as itself over time so long as it is some stuff of the same kind. This is one of the ways in which we apply the notion of sameness to stuff in everyday expressions like “the stuff in Lake Ontario is the same stuff as the stuff in Lake Eire”. Such expressions assert identities between substances – in a non-Aristotelian sense – which *can* act as subjects: “water”, *qua* H₂O, is *not* a name for some stuff, but the name for a kind of substance. In employing sameness of *kind* of stuff as the criterion of sameness, we can still say that stuff remains itself so long as it does not undergo significant change: any water is water (so long as it does not freeze and become ice, for example), and the copper of which the statue is made is still the same stuff – it is still copper – from before the sculpting.

A possible drawback of this strategy is that qualitative sameness holds between a myriad of stuff which few would want to call “the same” – in the case of the statue, for example, the pre-statue copper is “the same” as the copper constituting the statue and *also* as any distant, unrelated copper. However, like any qualitative description, qualitative sameness admits of a variation of degrees. Perhaps the stuff in Lake Ontario has more qualities in common – a similar temperature, pH level, or amount of pollutants – with the stuff in Lake Eire than with the stuff in Lake Baikal. On these grounds, it would be sensible to call all the stuff in all three lakes “same”, to some extent, but some of it – that which shares more common features – “more same”. Thus, “qualitative identity” differs from sameness of kind, which I understand to be an “all-or-nothing” property: some stuff might either belong to the same kind as some other stuff, or it might not, and those are the only two options. Any lake-bound water will belong to the same kind, regardless of whether it constitutes a single contiguous system, or is scattered into various landlocked reservoirs. But, while all of it will be qualitatively identical *to a degree*, more proximate, chemically similar, or interconnected sub-portions of it will be qualitatively identical to a *greater* degree. The lakes example, I believe, demonstrates that sameness of kind will not do as a plausible replacement for identity conditions of stuff, but qualitative identity might.

Of course, applying either of these proposals (or others like them) to the statue problem, which has guided us through this investigation, might look like a violation of our wish-list's Principle C. Accepting either "causal identity" or "qualitative identity" into our metaphysical picture fragments identity into two distinct notions (since there are infinite degrees of qualitative identity, this suggestion features an even greater amount of ways in which stuff can be identical). Thus, although revising our understanding of identity is the most promising method of evading the stuff (inclusive) ontology's inadvertent reification of quantities_n, it comes at a cost in intuitive appeal. The other possible options – asserting a difference between quantities_n and quantities_o on the basis of semantic analysis or denying the existence of quantities_o outright – offer no concessions in modifications of identity, although they are more open to objections.

However, the intuitive Principle C states merely that identity ought not to be modified such that it becomes foreign to our everyday talk, but not necessarily that it remain as a single, univocal concept. There is little suspicious or extra-normal in the suggestion that there are many ways in which we use the notion of identity or sameness.

A familiar type of objection can be re-iterated against my present suggestion. Namely: "so, you've presented a difference between quantities_n and quantities_o, that the latter are numerically self-identical, and the former are not; but this sounds more like stipulation than explanation or argument; what allows you to make this move? Aren't you doomed to the dogmatism of saying that they *do* just differ, and there's nothing more to be said about it?" Perhaps this is right, but, at this point, I do not think it is as pernicious to invoke a supposed distinction existing "in thought" as it was at an earlier stage. Either of my suggestions is an example of how the concept of sameness, differing from numerical identity, can be applied to uncountable matter coherently. Whereas (what I rejected as) the dogmatic suggestion was just that the two concepts differ, the present suggestion adds an additional step, taking into account how we use the expression "the same as" to discern a specific feature of the persistence of stuff.

This feature of language serves as the basis of differentiating stuff from (technical) things.

Without the same kind of persistence conditions as quantities_o, quantities_n do not collapse the (stuff) inclusive ontology into one with objects only.

As it looks now, Burke and McKay face serious issues. All things considered, the stuff (exclusive) ontologies from section 2.1 are not as unappealing as they had initially appeared. If we reject *all* talk of things, it becomes impossible for “quantity” to refer to anything at all, including quantities_o. The downfall of the stuff (exclusive) ontologies was their inability to adequately describe the co-location of wholes and parts. Considering the problems encountered by the stuff (inclusive) ontology – at least at this point, without a clear picture of non-numerical-identity sameness – the stuff (exclusive) ontology looks more appealing. But, despite their problems, either proposal offers an at least plausible alternative to the account of coincident objects. If supplemented by a more rigorous consideration of how we can apply the notion of sameness to everyday substances, it looks as if explaining substantial change in adherence to Principles A-C is possible.

4.3 Conclusion

I have considered how a stuff ontology – inclusive or exclusive – might present a novel explanation of substantial change. I began by establishing what kind of answer intuitions suggest we should look for, settling on three principles: the identity of matter over time, no more than one thing per place, and no modification of the intuitive notion of identity. Evaluating the ontological category of stuff as a solution, I found the best ontology to be a stuff (inclusive) one, including both stuff and things, as opposed to the stuff (exclusive) one, including only stuff, since the latter failed to provide appropriate and useful analyses of space-sharing between, for example, wholes and parts. I defended the stuff (inclusive) ontology as internally coherent, more appealing than four-dimensionalism, philosophically interesting despite its limited applicability to everyday talk, and against a reduction of stuff to things.

However, the stuff (inclusive) ontology, by stipulating identity conditions for stuff and operating within a logical system aimed at discussing individuals, risks replacing talk of uncountable stuff with talk of technical “quantities” – countable objects. Although some might be willing to accept the difference between quantities of stuff and stuff on the basis of the strength of the semantic and intuitive evidence, I would prefer a more rigorously grounded argument. To this end, one might argue that technical objects like quantities or parcels are not objects at all, since they cannot be distinguished from stuff. The problem with this line is that persistence conditions, which are implied by Burke and McKay’s formulations of the persistence of stuff, are essential features of objects specifically. For this reason, I must reject their arguments for the persistence of stuff, which, I have argued, treat it as a specific type of thing. The most promising defense of the stuff (inclusive) ontology as a means of avoiding coincidence in explaining substantial change demands a thorough investigation of “sameness”, and how non-numerical identity could apply to stuff.

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