

## Bare Objects, Ordinary Objects, and Mereological Essentialism

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### Abstract:

From five plausible premises about ordinary objects it follows that ordinary objects are either functions, fictions or processes. Assuming that the function and fiction accounts of ordinary objects are not plausible, in this paper I develop and defend a (non-Whiteheadian) process account of ordinary objects. I first offer an extended deduction that argues for mereological essentialism for masses or quantities, and then offer an inductive argument in favor of interpreting ordinary objects as processes. The ontology has two main types of entities, masses of matter and processes. A cat, for instance, is shown to be a ‘catting’ process that migrates through distinct portions of matter, much like how a wave passes through distinct portions of water. I also show how the account solves the paradox of coincidence, the Ship of Theseus, fusion cases (e.g. Tib/Tibbles), and answers the Special Composition Question.

Suppose you hold the following five theses:

- (1) There are ‘bare objects,’<sup>1</sup> ‘masses,’<sup>2</sup> or mere hunks of stuff/matter which (somehow) constitute ordinary objects (I leave it open here whether they constitute non-ordinary objects as well). That is, there are objects whose only persistence conditions are that all their minimal elements persist.<sup>3</sup> Also, these masses of matter are particulars, or classical *substances*, rather than non-particular entities.<sup>4</sup>
- (2) Coincidence, or co-location, is impossible. That is, it is impossible for two distinct objects made up of the same matter to be in the same place at the same time.<sup>5</sup>
- (3) Identity is absolute. (i.e., relative, temporary, and contingent identity theses etc. are all false).
- (4) Four dimensionalism is false—ordinary objects do not have temporal parts.
- (5) There are, in some sense at least, ordinary objects.

If so, how should you conceive of ordinary objects, such as tables and chairs and rocks and rabbits?

As Dean Zimmerman argues, anyone embracing these five theses “has little choice but to regard

[ordinary objects] as processes, functions, or even mere fictions.”<sup>6</sup> Why is this? Well, suppose we

have a sum of matter, call it ‘Matt,’ which intuitively constitutes a statue, call it ‘Stan.’ If (1) is true,

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<sup>1</sup> I use the phrase ‘bare object’ to connote the sheer minimalness of such objects’ persistence conditions, as well as the extreme generality of these types of entities.

<sup>2</sup> The term ‘masses’ comes from Zimmerman 1995. ‘Hunks of matter’, from Heller 1990. These entities are also called ‘aggregates-’ (Burge 1977), ‘parcels-’ (Locke’s *Essay*), ‘fusions-’, ‘collections-’, ‘consignments-’ (Karmo 1977), ‘quantities-’ (Cartwright 1974 and 1979), and ‘portions-’ (Markosian 2004)—of matter.

<sup>3</sup> Or, if we allow gunk, that all their gunky parts persist. I believe David Lewis coined ‘gunk’, in 1991, p. 20. Gunk, if there is any, is stuff such that any bit of it has proper parts which in turn have proper parts, *ad infinitum*.

<sup>4</sup> Some stuff and process ontologists hold that *stuff* can be non-particular, such as Laycock 1975 and 2005, Markosian 2005, and Seibt 1997 and 2000. I reject these views of stuff, but I will not argue against them here.

<sup>5</sup> For a good discussion of coincidence, see Zimmerman 1995 pp. 85-94.

<sup>6</sup> Zimmerman 1995, p. 110. Well, this isn’t *exactly* how he argues his case, which is more complicated. But, this stays pretty close to his overall argument form.

then we take Matt's existence seriously. Matt is a mass of matter, with clear persistence conditions. But, if (2) is true, there cannot be a numerically distinct *object* (I leave it open whether there could be two or more *entities* in distinct ontological categories in the same place at the same time) where Matt is. Matt would 'crowd out' Stan from sharing its place and constituting matter.<sup>7</sup> But, if (3) is true, we also cannot find a place for Stan by supposing that Stan is temporarily, contingently, or occasionally identical to Matt.<sup>8</sup> And, if (4) is also true, we furthermore cannot employ standard four dimensional tools to find a place for Stan (namely, sharing temporal parts with Matt). But, lastly, if we believe (5), until we offer some theory that fits ordinary objects back into the world, then Stan, and, by generalization, *all* ordinary constituted objects, have no place to call their home. As Zimmerman argues, the only options left are to treat ordinary objects as some novel or bizarre kind of entities, e.g., functions (i.e., sets of ordered pairs of times and hunks of matter), logical 'fictions' *a la* Chisholm, or, as processes which 'pass through' distinct masses of matter. Ordinary objects need a place to hang their hat, but, if (1)-(5) are true, it's most likely in an odd place.

I will not evaluate the options of treating ordinary objects as functions or fictions. It just seems too problematic to regard tables as either fictional entities or sets.<sup>9</sup> And, with the exception of (1), I will not argue for (1)-(5).<sup>10</sup> Instead, I wish to examine the viability of an account that identifies ordinary objects with processes, which does not treat processes as events or four dimensional entities. With a few notable exceptions, this strategy has not been attempted by analytic philosophers.<sup>11</sup> But, if Zimmerman is right in his argumentation, then this is a strategy we ought to take seriously. The following is my attempt to motivate and develop an account of material constitution which has two main types of entities—masses of matter and processes. The account solves various problems of material constitution just as well as, if not better than, its rivals, and is an appealing and

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<sup>7</sup> I believe this phrase 'crowds out' comes from Zimmerman, but I cannot find where.

<sup>8</sup> For a defender of 'occasional identity', see Gallois 1998.

<sup>9</sup> But, for treatments that do support the function or fiction approach, see Zimmerman 1995 and 1997, Chisholm 1976, and Grandy 1975.

<sup>10</sup> Although I believe (1)-(5) are well supported, or intuitively obvious. For support of (1) and (2), see Zimmerman *loc cit.*. For support of (3), see especially Wiggins 1980. For support of (4), see Geach 1966. (5) doesn't really need support in lieu of an astounding challenge, since intuition is so strongly in its favor. But, I am assuming the falsity of nihilism about composition, which should be acceptable for our purposes here.

<sup>11</sup> See Chisholm 1986, Karmo 1977 and 1978, Rescher 1996, and Seibt 1997 and 2000. Also, see Stout 1996, 1997, and 2000, and Mourelatos 1978 for some interesting work on processes which does not construe objects as processes.

comprehensive ontology. I call the account, somewhat regrettably, ‘Process Hyleism,’ since it is a combination of stuff- and process-ontological views.<sup>12</sup>

This paper presents one main deduction which establishes a form of mereological essentialism (§1), followed by an inference to the best explanation that supports construing ordinary objects as processes (§2). I have some premises which I cannot adequately defend in the space provided here. My assumption of a particular form of three dimensionalism will seem particularly odious to four dimensionalists.<sup>13</sup> Such readers can read this instead then as a conditional proof. (If four dimensionalism is to be rejected, then...) I am more interested here in pointing out how a three dimensionalist should answer some questions, and what follows from these answers, rather than defending this version of three dimensionalism against all comers.

### § 1 Temporally Restricted Mereology and Mereological Essentialism

The first step in the deduction is to lay out the assumption of what is called ‘Extensional Mereology’ (EM). Extensional Mereology is the following doctrine: for any  $x$  and  $y$ ,  $x$  and  $y$  are identical if  $x$  and  $y$  have all the same (proper) parts. Why would one hold this? The short answer is given by the following argument:

- 1) If EM is false then coincidence is possible.
  - 2) Coincidence is impossible.
- ∴ EM is true.

The negation of EM is the proposition that there can be two objects with all of the same proper parts which are distinct. This is just coincidence. But, as has been argued elsewhere, convincingly, I believe—coincidence is impossible.<sup>14</sup> I’ll just assume here that it is. If coincidence is impossible, then

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<sup>12</sup> Pron.—‘hi-lism’. *Hyle* is Greek for *matter*. The phrase ‘stuff ontology’ is rather ambiguous in the literature, as there are two main kinds. There is the ‘stuff-not-things’ variety of Laycock 2005, Markosian 2005, and Sidelle 1991. And, there is also the strictly speaking ‘things only’ stuff ontologists who merely advert to stuff in order to reinterpret the ontological status of ordinary objects, as something like modes, properties or processes of mere (particular) hunks of stuff. For examples of the latter, see Chisholm 1986, Jubien 1993, and Karmo 1977, respectively.

<sup>13</sup> Three-dimensionalists believe that objects persist by being “wholly present” whenever they exist, and “sweep through” time, one and the same, now wholly present at  $t_1$ , now wholly present at  $t_2$ . Three-dimensionalists reject that objects have what are called “temporal parts”. Four-dimensionalists hold that objects persist over time by having distinct temporal parts wholly present at distinct times. They believe in what are called “space-time worms”, namely, four-dimensional objects which are smeared across time as well as space, and have momentary (or instantaneous) “slices” or “stages” as constituent parts. Four-dimensionalists hold that our talk of common sense persisting objects latches onto either space-time worms, or to their stages. For worm views, see Lewis 1986, pp. 202-204, and Heller 1990. For the stage view, see Sider 2001.

<sup>14</sup> See Zimmerman 1995.

EM must be true. Independently of the coincidence debate, EM is quite intuitive. What more could it take for objects  $x$  and  $y$  to be one except for the sharing of all their material parts? Accepting EM entails denying coincidence, but it does not explain the appearance of coincidence away. That task has to wait until we have all the proper machinery in place.

I will also assume that there are some metaphysically fundamental entities, ‘simples’<sup>15</sup> which have no other entities as proper parts. According to the picture where simples (of a certain variety) exist, every composite object inevitably has a decomposition into determinate fundamental entities, such as quarks, electrons, neutrinos, perhaps ‘super-strings,’ and so on. If science hasn’t reached rock-bottom yet, then simples will just be whatever the rock-bottom entities are, if there are any.

I would like to establish the following thesis of temporally restricted mereology, or ‘TREM’ for short:

(TREM)  $(\forall Y:SY)(\forall z: Fz) [(C(Y,z)) \equiv (\exists x: Ix)(\exists w: R_w) E@RT(Y,x,w)]])$

Which should read: For all  $Y$ ’s, such that the  $Y$ ’s are simples, and for all  $z$ , such that  $z$  is a fusion, the  $Y$ ’s will compose  $z$  just in case there exists an  $x$  such that  $x$  is a temporal interval (an instant being the limiting case), and there exists a  $w$  such that  $w$  is a reference frame, such that the  $Y$ ’s exist-at  $x$  relative to  $w$ . (Note: the first quantifier is plural, ‘ $C$ ’ is the two-place relation ‘compose’ which holds between a single item and a plurality, and ‘ $E@RT$ ’ is a three-place relation ‘\_\_\_exists-at-\_\_\_-relative-to\_\_\_’.)<sup>16</sup>

TREM has been formulated to allow us to understand how composition is relative to a time without embracing Presentism, and is made to work with Special Relativity Theory.<sup>17</sup> However, since I will not deal with any special problems regarding Relativity, I can work with a simpler version of TREM, TREM\*:

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<sup>15</sup> Classically, they are called ‘atoms’, though not to be confused with the atoms of modern atomic theory. Some hold that there are no simples, only atomless infinitely divisible ‘gunk’. I have no commitments to whether there is or could be gunk. I believe the view sketched below could work on the supposition of gunk, but it is simpler for my purposes to assume that there is none. The simples I am envisaging will be either ‘pointy’ entities or metaphysically indivisible entities with some non-zero extension, rather than maximally continuous extended ones with non-particular but metaphysically separable parts, such as Markosian’s simples. See Markosian 1998a and 2005 for details.

<sup>16</sup> Note that the  $Y$ ’s exist-at  $x$  relative to  $w$  iff every instant  $i$  of  $x$  is such that the  $Y$ ’s are not time-like separated at  $i$ , relative to  $w$ . To say what exactly it takes to be non-time-like separated would take us on a regrettable and unnecessary detour into Relativity Theory. Suffice it to say that what it is to be non-time-like separated in Relativity Theory is well understood.

<sup>17</sup> Presentism is the view that the only time that exists is the present time, and the only things which exist are those things which are in the present time. For an attempted reconciliation of Presentism and (Special) Relativity, see Hinchliff 2000.

(TREM\*)  $(\forall Y: SY)(\forall z: Fz)[ C(Y,z) \equiv (\exists x: Ix)[E@(Y,x)] ]$

Which should read: for all Y's, such that the Y's are simples, and for all z, such that z is a fusion, the Y's will compose z just in case there exists a temporal interval x such that the Y's exist-at x. (From this point on, I will avoid the asterisk and use 'TREM' to mean TREM\*. It should be understood that I can fallback to TREM *proper* if any problems of Relativity arise.)

More straightforwardly, TREM says that a group of simples will compose a fusion (and hence a fusion exists) if and only if there exists a time such that they exist at that time. TREM states, in part, that composition of physical objects is relative to a time, and if there is no time when a fusion exists then that fusion will not exist *simpliciter*. Let us now look at the arguments for it in order to understand the rationale for TREM.

*Argument for the left to right embedded conditional of TREM:*

The short version of this argument is simple, although some complex clarification and defense of a premise is needed:

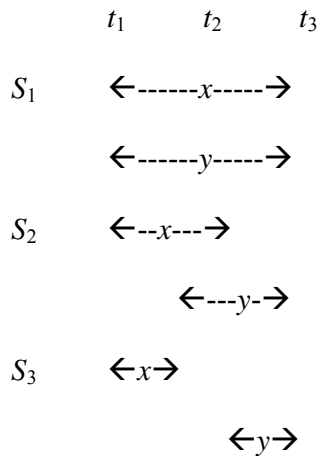
- (1) Assume, for *reductio*, that some simples (the Y's) compose a fusion z, yet there exists no time x such that the Y's exist at x.
- (2) So, there is a fusion z which can exist even though there is no time at which all of its parts exist.
- (3) (2) is impossible.
- (4) So, (1) must be false.
- (5) So, if some simples (the Y's) compose a fusion z then there will exist a time x such that the Y's exist-at x.

To motivate this argument and defend premise (3), I should present my rationale for rejecting Unrestricted Mereology (UM). UM, also called 'Collectivism' or 'Universalism', is the thesis that for any distinct x and y, they compose a 'third' object or fusion z, regardless of x and y's spatial or temporal distance.

My reasons against UM are more appealing to three- rather than four-dimensionalists. As I explained earlier, I am going to assume that three-dimensionalism is true and trace out an account of objects, their relations to their constituting matter and the events and processes that they figure in, in such a way that the overall account is amenable to the three-dimensionalist. The strength of four-dimensionalism is inductive (or perhaps abductive), and is due to its power in explaining, or explaining away, various metaphysical puzzles. It is exactly my contention that the three-dimensional position that I am trying to formulate solves the puzzles in a more explanatorily satisfying and

plausible manner, when combined with the stuff-process ontological machinery. I believe that Process Hyleism also solves all the same puzzles, without giving up on (a precisification of) the more common sense three-dimensional notion of persistence. In any case, it is time to see what else is wrong with Unrestricted Mereology, on the assumption that three-dimensionalism is true.

One argument against UM is that, if it is true alongside three-dimensionalism, then the individuation of fusions comes out incorrectly. Let me first advert to the following chart:



Let me assume for simplicity that absolute simultaneity occurs. The ‘ $S$ ’s represent situations, the ‘ $t$ ’s’ times, and ‘ $x$ ’ and ‘ $y$ ’ name particles, and the arrow tips represent their creation and annihilation. In  $S_1$   $x$  and  $y$  are created and annihilated at the same time, in  $S_2$  they overlap at  $t_2$ , but only  $x$  exists at  $t_1$ , and only  $y$  at  $t_3$ . In  $S_3$  they do not overlap at all. According to TREM,  $x$  and  $y$  compose a fusion  $z$  for the whole of their careers in  $S_1$ , in  $S_2$   $x$  and  $y$  fuse at  $t_2$  but not at  $t_1$  or  $t_3$ , and in  $S_3$   $x$  and  $y$  never fuse.

This goes along well with a three-dimensional understanding of persistence. Since in  $S_2$ , the object  $z$  is just the fusion of  $x$  and  $y$ ; and fusions are just composite objects; and objects persist by being wholly present;  $z$  is wholly present when and only when all of its parts are. In no sense could we understand the fusion  $z$  to be wholly present at  $t_3$ . If  $z$  just *is* (said with a particular earnestness)  $x$  and  $y$ , then how can *it* (said with a shrillish raising of the voice) be wholly present at  $t_3$ , when one of its parts,  $x$ , no longer exists? A similar treatment goes along with  $S_3$ . If fusions are objects, and three-dimensionalism is true, and a fusion can be wholly present only when all of its parts are, then there just cannot be a fusion  $z$  which is composed of  $x$  and  $y$ , since at no time are  $x$  and  $y$  both wholly present. One who adheres to a completely Unrestricted Mereology holds that both in  $S_2$  and in  $S_3$  there

is a fusion  $z$  composed of  $x$  and  $y$  which has only one of those two parts present at  $t_1$ . However, if we adhere to an understanding of fusions in combination with an intuitive understanding of what the three-dimensionalist would say about them, we can see why the three-dimensionalist ought to deny the existence of such fusions.<sup>18</sup> Three-dimensionalists ought to think that objects exist at a time only if they are wholly present at a time, and persist throughout an interval only if they are wholly present throughout the interval. This means that the three dimensionalist should accept the following definitions and principle:

- (WP-S)  $x$  is wholly present at an instant  $t =_{df}$  every part that is ever a part of  $x$  exists at  $t$  and is part of  $x$  at  $t$ .
- (WP-D)  $x$  is wholly present throughout an interval  $I =_{df}$  everything that is at any instant  $t$  of  $I$  part of  $x$ , exists at every instant of  $I$  and is part of  $x$  at every instant of  $I$ .<sup>19</sup>
- (WP) Things exist at a time by being wholly present at a time (according to WP-S), and persist across an interval by being wholly present throughout that interval (according to WP-D).

(WP-S) defines what it means to be “wholly present” *synchronically*; at a time, whereas (WP-D) is the definition of being wholly present *diachronically*; across time. Admittedly, WP represents a very hard-nosed approach to the understanding of what ‘wholly present’ means. (I say ‘hard nosed’ because these principles entail mereological essentialism; I will say more on this below). Yet, it is also the clearest and most straightforward answer to the question of what it means for an entity to be wholly present that also spells out the relation of an entity to its parts. (No views that I am aware of that embrace both endurantism and the notion of a temporary part have managed to avoid a host of objections that arise against them). I will deal with objections to entailments of WP below.

We should see that TREM, in combination with WP, entails that a fusion ceases to exist if any of its parts either gets completely annihilated or no longer exists simultaneously with the rest of the

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<sup>18</sup> Restricting fusions temporally is also a straightforward way of dissolving the “paradox of endurance” alleged by Stephen Barker and Phil Dowe in 2003. Irem Kurtsal Steen brought this to my attention.

<sup>19</sup> This is essentially the same as the definition of ‘strongly wholly present’ in Sider 2001, p. 64. Sider resists formulating three-dimensionalism in terms of this definition, because it entails mereological essentialism, which he thinks “should not be *built into* the statement of three-dimensionalism, for most three-dimensionalists reject it.” I respond that I am not building it into three-dimensionalism *simpliciter*, but I recommend that the three-dimensionalist try a mereological essentialist version to see where it leads rather than rejecting it *tout court*, which has usually been the case. I don’t think that ‘wholly present’, as it has been used, unproblematically *means* (WP-D) + (WP-S). I merely think that this is one candidate to be meant, and I will argue that it is the best one to be meant. Thanks to Mark Heller for some helpful points here.

fusion. This is because TREM entails that a group of simples will compose a fusion if they exist simultaneously. And WP entails that that fusion will persist just so long as all of its parts remain in existence.

The joint entailments of TREM and WP represent a plausible alternative answer (when compared to its rivals) to van Inwagen's Special Composition Question (SCQ): When is it true that there exists something such that some distinct things compose it?<sup>20</sup> Some rivals of TREM/WP answer: *always*<sup>21</sup> (Universalism), *never*<sup>22</sup> (Nihilism), *when they compose a life*<sup>23</sup> (Organicism), *it is a brute, unexplained fact when they do*<sup>24</sup> (Brutalism). None of these answers provides us with the intuitively right number of composite objects *and* appropriately balances respect and mistrust towards the composite objects countenanced by commonsense.<sup>25</sup> TREM plus WP is clear, non-trivial, and non-arbitrary (arguably, simultaneity according to a reference frame is a significant natural property). TREM, like UM, also allows more objects than commonsense does, but I will show below why this is permissible. Also, TREM is more parsimonious than Universalism, and tracks commonsense better than Organicism or Nihilism. TREM is also less slavish to common sense than 'Intuitivism,' and offers an explanation for composition, unlike Brutalism.

The most plausible rival of the TREM and WP picture is Unrestricted Mereology (UM). But, there is a problem with UM which I can show by considering the following situation. Suppose, for simplicity, that throughout my life I do not lose or gain any parts. Neither did Winston Churchill, let's suppose. Now, imagine that all the matter that used to make up Churchill persisted after his death and somehow ended up composing me. This matter is the fusion of stuff that makes me up. Is it the same as or distinct from whatever is referred to by the phrase 'the fusion of Mark and Churchill'? Given EM, the answer seems to be that they are the same thing. But the UM'ist counts three fusions in this

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<sup>20</sup> van Inwagen 1990 pp. 21-33

<sup>21</sup> see Sider 2001 chapter 9

<sup>22</sup> Dorr 2002

<sup>23</sup> Van Inwagen 1990

<sup>24</sup> Markosian 1998

<sup>25</sup> Perhaps there is one more option, tacitly assumed by many such as Wiggins 1980: Compositions exist whenever we intuitively think they do. This position has no name, but we can call it 'Intuitivism'. Of course, intuitivism gives intuitively correct results in the count of composite objects, and the fusions it countenances are common-sensical. As is usually the case in philosophical matters, this intuitive appeal comes with the price of lacking in principle.



situation: the one that makes up Churchill, the one that makes up Mark, and the one that makes up the sum of Churchill and Mark. In fact, there is only one fusion.

Or maybe he doesn't; maybe the UM'ist could say that this is merely a situation where one fusion persists, first as identical to Churchill, later as identical to Mark, and throughout as identical to Churchill-plus-Mark. (Let us also ignore the time elapsed between Churchill's death and my birth.) What could be wrong with that?<sup>26</sup> The problem is this: assuming the falsity of temporary identity, the only way the UM'ist can cash this out is if he also assumes four-dimensionalism. Without recourse to temporal parts, the response I am considering is easily defeated: it entails that Churchill is identical to me. Surely he is not.<sup>27</sup> Therefore, there is little sense in this response. Unless, of course, temporal parts come to the rescue: the fusion of Churchill and Mark is one elongated object, spread across time. It has a segment located at Churchill's life span, and a distinct segment located at mine. (On the worm view, these segments are, respectively, Churchill, and I. On the stage view, they more or less are, respectively, Churchill's life, and my life.) With the resources of four-dimensionalism, the UM'ist can demarcate both a sense in which there is only one sum of stuff throughout, and a sense in which two distinct people are involved in the situation. Furthermore, the one thing is related to the two people in just the way that UM requires: they are its parts.

It is, however, unwise to make four-dimensionalism a crutch for UM in this way for two reasons. First, if UM requires four-dimensionalism to account for our Churchill-Mark case, then those arguments for four-dimensionalism which rely on UM<sup>28</sup> become circular. Second, if UM has four-dimensionalism built into it, then there is no reason for the three-dimensionalist to accept it as a logical law of mereology. Mereology alone does not tell us that temporal parts exist. It tells us the laws/logic of parts and wholes, and composition, not which base level components actually exist and obey those laws.

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<sup>26</sup> Thanks to Tom McKay for some helpful comments on this section.

<sup>27</sup> It might be thought that this cuts against TREM as well. This would be true, if not for the added process-ontological machinery which will follow.

<sup>28</sup> E.g., 'the argument from vagueness' in Sider 2001, pp. 120-140. On p. 133 we also see the assumption of the falsity of ME.

To repeat, many philosophers who hold UM suppose either that it has four-dimensionalism built into it,<sup>29</sup> or that given UM, four-dimensionalism follows from a few plausible premises.<sup>30</sup> If these positions are correct, then, if the three-dimensionalist wants to hold his position, he must deny unrestricted mereology. But, they are most likely not correct. UM does not have four-dimensionalism built into it. Even if it does not, however, the three-dimensionalist ought to deny even a completely unrestricted mereology without temporal parts, since this would allow fusions whose parts are temporally disjoint, and such fusions could not be wholly present at every time they exist. TREM allows us to respect the strictures of non-arbitrariness, since being non-time-like-separated is not arbitrary. It also supplies us with much of what is useful in UM, without committing us to four-dimensionalism.

Now I can summarize why we must reject (2) on page five—“there is a fusion  $z$  which can exist even though there is no time at which all of its parts exist..” An object can be wholly present at a time, and wholly present across an interval, only if all of its parts are. Nothing (physical) can exist without existing at a time, and fusions exist at a time, and over time, only by being wholly present at that time or throughout an interval. After all, ‘fusion’ is just a fancy general term for any composite object. Whenever there is a fusion of some things, at that time all the parts that fusion will ever have must exist and be wholly present.

*Argument for the right to left embedded conditional of TREM:*

Due to space constraints, I will have to very briefly defend the right to left embedded conditional of TREM. (This is based largely on an argument Sider gives for UM<sup>31</sup>):

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<sup>29</sup> See Jubien 1993, p. 6 & Quine 1960, p.1. The above claim needs to be qualified, though. They don’t so much assume that UM and four-dimensionalism go hand-in-hand, but they stipulate the base-level individuals to be portions of space-time and help themselves to UM at the same time. But these two views, which are separable, are often run together.

<sup>30</sup> Sider, *loc. cit.*

<sup>31</sup> *op cit.*, pp. 120-140

- (1) Assume, for *reductio*, that there exists a time interval  $x$  such that some simples  $Y$  exist-at  $x$ , yet the  $Y$ 's do not compose a fusion  $z$ .
  - (2) Composition is definite. That is, it is definite whether or not any fusion exists (according to some reference frame or other).
  - (3) It is possible that the  $Y$ 's compose a fusion.<sup>32</sup>
  - (4) If (1) and (3) are true, then there is a possible temporal series where the  $Y$ 's compose a fusion  $z$  at  $t_1$  (of some  $I_1$ ), go through a series of minute changes and definitely do not compose a fusion at  $t_3$ .<sup>33</sup>
  - (5) But, given (2), there would be a precise moment  $t_2$ , where a fusion  $z$  of the  $Y$ 's exist, where instantaneously after this,  $z$  does not, while the differences in the  $x$ 's is astoundingly minute (suppose, one electron of  $z$  becoming one Planck length ( $10^{-33}$  cm.) further away from the nucleus it orbits).
  - (6) But, (5) is impossible. Since (2), (3) and (4) are blameless, it must be that (1) is false.
- So, since there is nothing special about  $I_1$ , [by Universal Generalization from the negation of (1)]:
- (7) If there exists a time interval  $x$  such that some simples  $Y$  exist-at  $x$ , then the  $Y$ 's will compose a fusion  $z$ .

Since I have established both the left to right and right to left embedded conditionals of the biconditional TREM, from this point on I will presume that TREM is established; any  $Y$ 's will compose a fusion  $z$  just in case there is a time that those  $Y$ 's exist at.

WP and TREM entail Mereological Essentialism (ME):

(ME) For any  $x$ , if  $y$  is ever a part of  $x$ , then  $y$  is always a part of  $x$ , provided  $x$  exists.

Another way of stating ME is: objects have all their parts essentially. ME is entailed for any fusion  $f$ :

Suppose that objects persist over time by being wholly present at each moment as defined by (WP-D) above. Then,  $f$ 's simple parts will continue to compose  $f$  only if they all persist. Furthermore,  $f$  cannot gain a part either: According to WP-D, anything which is ever a part of  $f$  is a part of it at any time  $f$  exists. This could not be if  $f$  could at some time gain a part that it didn't have at an earlier time.

So,  $f$  can neither gain nor lose parts. So, ME is true of any fusion  $f$ . TREM is not a spinning wheel here. We need TREM in order to get fusions which will adhere to WP-D, since WP-D is consistent with composite object nihilism.

Mereological Essentialism raises hackles. But, as I argued elsewhere, it shouldn't.<sup>34</sup> The most common reactions against ME are rooted in the intuitive truth of the following: an object can gain a part and persist, an object can lose a part and persist, an object could have had different parts than it in fact had, has, or will have. If these intuitions were indeed right, then ME would be false. However,

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<sup>32</sup> I am assuming here that nihilism is false.

<sup>33</sup> Where we assume all the  $x$ 's exist simultaneously throughout the interval.

<sup>34</sup> Steen 2005, chapter III. For more readily available (and better!) defenses, see Zimmerman 1995, Chisholm 1973, 1975 and 1976.

they can safely be rejected. The mereological essentialist, especially one who has a less restricted mereology than the early Chisholm, can cash out all talk of part change in terms of interrelations between distinct fusions, or, changes in the arrangement the fusion which contains the before- and after-change fusions as proper parts.<sup>35</sup>

Three-dimensionalists of a certain variety should especially *welcome* mereological essentialism. As I mentioned in the introduction, if you accept bare objects then you must accept mereological essentialism.<sup>36</sup> This is because, if you accept bare objects, you are accepting that there are hunks of matter that have all of their parts essentially. If you deny coincidence, then the hunks of matter will “crowd out” commonsense objects with which to coincide. If you reject temporary, contingent, or relative identity, then the hunk of clay cannot be temporarily, contingently, or relatively identical to the statue. If you reject four-dimensionalism, you cannot say that the clay and the statue share temporal parts. You must cleave to ME, if you hold the above four positions, and do it proudly.

Now I will bring together all the theses I established previously, in the form of a single thesis, TOOSOFT. (The Only Objects are Simple Or Fusions Thereof)

(TOOSOFT) For any (physical) object  $x$ ,  $x$  is either a simple or a fusion, and, if  $x$  is a simple,  $x$  persists across an interval  $I$  just in case it is wholly present across  $I$ , or, if  $x$  is a fusion, then  $x$  persists across  $I$  just so long as all of its simple parts are wholly present across  $I$ . This is true regardless of which sortals  $x$  falls under.<sup>37, 38</sup>

TOOSOFT is entailed, trivially and somewhat redundantly, by all that I have established so far because the following conditional is true: (TREM & EM & ME  $\supset$  TOOSOFT). Let me explain how. If TREM is true, then if there is a time where some simples  $x_1 \dots x_n$  exist at it, they will compose a fusion  $f$ . If EM is true, then  $f$  is identical to an object  $o$  if  $o$  has  $x_1 \dots x_n$  as parts, regardless of how spatially scattered  $o$  is and which sortals it falls under. Furthermore, if ME is true, then  $f$  cannot lose or gain any parts and persist. Generalized, we get TOOSOFT. (Since simples have no proper parts, they

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<sup>35</sup> See Steen *ibid.* Cf. Chisholm *ibid.*

<sup>36</sup> Cf. Zimmerman 1995.

<sup>37</sup> Except: sortals like ‘fusion’, or substance sortals for simples, e.g. ‘electron.’

<sup>38</sup> This is similar to what Sider 2001 p. 181 calls the ‘Nothing but 3D sums’ view. According to Sider, “the persistence of 3D sums best matches a kind of pre-analytic picture we have of the nature of persistence—a kind of ‘ideal of persistence’.” (p. 185) Of course, he argues against this view.

trivially obey TOOSOFT according to WP.) Since TOOSOFT applies to all (physical) objects, then all objects are either simples or fusions, and they persist iff all of their parts persist, regardless of what sortals they fall under.

Embracing bare fusions (or collections of matter) while rejecting coincidence forces us to accept TOOSOFT. If there are bare fusions, then they persist just so long as all of their parts do, regardless of whether they compose any object of common sense. Now, suppose that a mass of gold molecules constitutes a ring. If coincidence is impossible, then that mass would “crowd out” any objectual entity with the distinct persistence conditions of the ring. Hence, there cannot be any object with the persistence conditions of the ring. This is exactly what TOOSOFT expresses; the only (genuine) composite objects are the mere masses, parcels, quantities, or fusions.

As we can see, TOOSOFT has some troubling consequences, which strain the bounds of credulity. For instance, according to TOOSOFT, if you shatter a vase, you have not destroyed anything. Nor do you create anything if you glue it back together. Furthermore, if my car was just a fusion, then you could destroy it by annihilating one of its electrons. But, I will now show how we can save common sense from TOOSOFT, and render it compatible (but not painlessly so) with many of our common sense intuitions. In the next section I will explain how the resultant theory is able to solve various metaphysical puzzles and how we can defend it against certain objections. In particular, I want to establish that if we identify commonsense macroscopic and complex microscopic objects with processes, then we can accept TOOSOFT and assuage the counterintuitive concerns raised above.

## **§2 Objects as Processes**

Just what are processes? Roughly speaking, processes are relatively homogenous activities that are usually referred to by gerundival phrases (i.e., imperfect nominals) in sentences with progressive verb aspect. Compare the following sets of sentences:

- (1) Ted ran to the store.
  - (2) The water will evaporate.
  - (3) The policeman fell into the ditch.
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- (1') Ted was running to the store.
  - (2') The water will be evaporating.
  - (3') The policeman was falling into the ditch.

The grammatical features of (1) and (1'), (2) and (2'), etc. are identical except in regards to verb aspect; sentences (1)-(3) have perfective form, (1')-(3') have imperfective verb aspect, i.e., progressive form. I will contrast the perfective with the progressive rather than the imperfective in what follows, to avoid confusing verb aspect with tense. (Note that all the pairs share the same tense.) We use the progressive form to speak of things that are/will be/have been in progress (more colloquially, 'going on'), while the perfective refers to things which have been/are/will be completed, or 'gone-over'.<sup>39</sup> To distinguish processes from events, in the sense I am doing here, is to distinguish, for instance, Ted's run to the store, from the running he is doing while he is running to it; the forest fire, from the burning the forest underwent; or a ball's completed roll from the rolling it is doing while it is in motion.

Most of the relevant semantics literature distinguishes processes from states. States too are often indicated by gerundival phrases in progressive sentences. Look at the following:

- (4) The deck was sloping.
- (5) The object was occupying space.
- (6) The pincushion is bristling.<sup>40</sup>

These are stative predications, or, 'pseudo-occurrences'<sup>41</sup> or 'unchanges'<sup>42</sup> which can be true even at an instant when no change occurs. The bristling of a pincushion or the occupying of space by an object is not usually thought of as an activity or process which is going on or happening but rather a state that obtains. But, in the particular way I shall define processes and identify them with objects, states shall not be differentiated. Dummy "states" like (5) can be safely ignored, while (4) and (6) are treated as limiting cases of processes. The parsimonious value of this shall become apparent later.

Process nominal phrases, just like object and event nominal phrases, are ambiguous between types and tokens. Just as we can speak of each particular whale being an instance of the type *whale*, or a tree frog as a token of the type *frog*, so can a particular decaying of a particular cesium-23 atom be

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<sup>39</sup> These phrasings are from Stout 2003.

<sup>40</sup> These examples are from Karmo 1978.

<sup>41</sup> This phrasing is from Karmo 1978.

<sup>42</sup> Dean Zimmerman tells me that somewhere Chisholm credits Cardinal Mercier with the invention of this phrase, but I cannot find the source.

an instance of the type of activity *decaying*, or the sleeping of John be an instance of the activity type *sleeping*. The processes with which I will identify (particular) ordinary objects will of course be process-tokens, not types.<sup>43</sup> In the dissertation, I had the space to give a limited taxonomy of processes, such as, telic versus atelic, natural versus intentional, and so on. But, I do not have the space for that here. To just summarize—the token processes to which I will reduce common sense objects are atelic, non-intentional, reified token activities that are (usually) referred to by gerunds or gerundival phrases in sentences with progressive verb aspect.

I also don't have the space here to say why processes should be considered distinct from events, and how in fact events reduce to processes. Suffice it to say that events are best understood as either properties of spatio-temporal regions, object-property-time triples, or entire contents of portions of space-time. Processes, however, cannot be treated as any of these things. Processes are not properties, they are concrete goings-on. Processes are not object-property-time triples, they are the activities that objects are undergoing. Lastly, they are not complete contents of portions of space-time, since different particles could be constituents of the very same token process. Furthermore, I argued that processes are best understood as three-dimensional dynamic entities which endure through time, rather than four-dimensional summations of stages or states. The motivation for this is that processes will not be able to reduce to summations of states. This is rather controversial. Our philosophical reductionistic instincts make us prefer to see processes as a series of states, which resemble in certain qualitative respects, each state causing its successor. Holding that processes are distinct from events is ontologically profligate, you might think, and processes are just redundant entities, derivative from successions of events or instantaneous states. I think this reaction is mistaken.

It is more reasonable to reduce events (and states) to processes, because events appear to be just alterations in, continuations of, cessations of, startings of, completions of, or interactions between processes. Non-conclusive but strong support for this contention can be found by examining some

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<sup>43</sup> Two other distinctions related to notions of particularity and counting have been made between processes and events, in order to show that processes are not particulars or individuals. (1) That processes are (relatively) homoeomerous, or, 'like-parted', and cumulative, while events are not (See Seibt 2000, esp. pp 244-250, and Seibt 1997, pp. 167-177 ). (2) That process-term-occurrences are mass-terms/phrases, whereas event nominals are count-terms/phrases (See Mourelatos 1978). I will not argue further against these views but rather just stipulate that the reified processes to which I will reduce common sense objects to are particular entities.

interesting features of the progressive and perfective. Terence Parsons has given good arguments for the irreducibility of sentences in progressive form to those in perfective form,<sup>44</sup> while more recently Zoltan Gendler Szabó has given what I believe are conclusive reasons for this.<sup>45</sup>

Take the two following sentences:

(A) The ball rolled across the street.

(B) The ball was rolling across the street.

(A) is perfective, (B) progressive. Many attempts<sup>46</sup> have been made to analyze the progressive in terms of the perfective, but all of them have failed. This failure has been named the ‘imperfective paradox.’ The paradox is that any analysis of the progressive in terms of the perfective always entails that a perfective sentence is true if its progressive counterpart is. For instance, accounts that attempt to analyze the truth conditions for (B) in terms of (A) always entail that if (B) is true then (A) will be true at some time or other. But this, of course, is wrong. A ball can be rolling across the street without ever having rolled across it, e.g. if it rolls into an open manhole.

Gendler Szabó, after meticulously detailing how all these accounts fail, shows how the problem is systematic. Any attempt to analyze the progressive in terms of the perfective entails, or “almost entails”<sup>47</sup> the following schema:  $Prog[\Phi] \Rightarrow Possibly[\Phi]$ , which is invalid. But Gendler Szabó notes how we can, and should, *reverse* the direction of analysis.

This is because the following schema *is* valid:  $Perf[\Phi] \Rightarrow Prog[\Phi]$ . That is, whenever perfective sentences are true, their progressive correlates are true as well. Gendler Szabó notes that thinking that the perfective is somehow more basic or ‘default’ is (mostly) due to the contingent lack of a blatant perfective marker in English (unlike e.g. Russian).<sup>48</sup> I would add that it is also due to philosophers’ discomfort with dynamism, which we feel must be analyzed away. Parsons noted the irreducibility of the progressive to the perfective as well, and instead modeled the two types of aspectual sentences by introducing two primitive predicates, the ‘Hold’ and ‘Culminate’ (‘Cul’)

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<sup>44</sup> Parsons 1990 chapter 9

<sup>45</sup> Gendler Szabó 2004

<sup>46</sup> see Gendler Szabo pp. 29-39

<sup>47</sup> Gendler Szabó p. 38

<sup>48</sup> And the mistaken belief that uninflected clauses are perfective, Gendler Szabó pp. 50-52



predicates. ‘The ball was rolling across the street’ is treated as a particular rolling event’s ‘holding,’ while ‘the ball rolled across the street’ is a rolling event’s culminating. But Gendler Szabó rightly criticizes Parsons’ account for two interrelated reasons. The first is that Parsons’ theory “makes the meaning connections between progressive sentences and their perfective correlates a matter of *lexical semantics*, that it leaves the predicates ‘*Cul(x,y)*’ and ‘*Hold(x,y)*’ unanalyzed.”<sup>49</sup> Also, Parsons’ account does not predict the right kind of inferential relations between progressive, perfective, and stative sentences.<sup>50</sup> Gendler Szabó shows how we can reduce the ‘Cul’ predicate to the ‘Hold’ predicate, and predict the right inferential connections, by treating progressive sentences as reports about events ‘holding’, while perfective sentences are reports about events holding which cause target states (e.g., being across the street).<sup>51</sup>

So, both progressive and perfective sentences reduce (in part) to an ‘event’s holding’, which is more basic than an event’s being completed. This makes sense. To understand that a ball rolled across the street is to understand both that it was rolling and that it achieved a target state, which contains the more basic progressive notion of the ball’s rolling. And what are these event-holdings? They are what we have been calling processes. Of course, Gendler Szabó was not trying to make a metaphysical point, just a semantic one. But, I think it is obvious that this gives (non-conclusive) support to the notion that perfective events are just processes which have ceased or caused some target state. We can quibble about whether or not these processes should be called ‘events’, but so long as it is noticed that these processes, or events which hold, are not reducible or identical to events which have been completed, yet the reverse is true, the point remains.

Also, there are convincing arguments by Arntzenius and Tooley that instantaneous velocity is best understood as a genuine intrinsic feature of objects at instants, versus, say, the relational treatment instantaneous velocity receives on the ‘at-at’ theory of motion and other alternatives.<sup>52</sup> This allows us to understand how it is that we can say that something is irreducibly (and non-relationally) occurring

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<sup>49</sup> Ibid

<sup>50</sup> Ibid

<sup>51</sup> Ibid

<sup>52</sup> See Arntzenius, Tooley 1988.

at an instant (such as, ‘*x* is moving in that direction’). This, in turn, allows us to say either that occurings/processes do not reduce to non-dynamic instantaneous states, or, that occurings/processes do reduce to states, but that such states are irreducibly dynamic. Generalized, in the latter case *processes* versus *states* can be seen to be a distinction without a difference, or, if the former holds, that there aren’t any non-dynamic states for processes to reduce to. Unfortunately, I do not have the space to go over these arguments here.<sup>53</sup>

But, I do not suppose that any of the above give us conclusive reasons to believe in processes, or to believe that objects are best understood as processes. But, the foregoing concerns give us some *prima facie* reasons to be patient with the notion of treating objects as processes, and entertaining processes to be genuine entities. I believe the best reason to believe my main thesis, that commonsense objects are processes, is shown by arguing that inference to the best explanation supports it, and it is to such arguments that we now turn.

If TOOSOFT is correct, then there are no part-changers. But processes can play the role as referents for our commonsense putatively part-changing object terms. The ‘best candidate’ theory of reference and content can be used to make sense of this.

Let me illustrate ‘best candidate’ theory with a stock example.<sup>54</sup> Suppose that by ‘contact’ we thought we meant a relation of touching between (at least two) things such that there is no space in between at least one part of each of them (which we could call ‘perfect contact’). But physical science taught us that no objects are related in this way. Should we then conclude that contact never occurs in our world? Of course not. We reasonably conclude that ‘contact,’ rather than referring to ‘perfect contact,’ instead, in our world, refers to macroscopically observed closeness to the point of inter-impenetrative resistance (or to certain chemical bonds).<sup>55</sup> Meaning supervenes on our use *and* the way the world is, and reference for a certain term and its cognates latches on to the most perfect candidate, even if it is not perfectly deserving.<sup>56</sup> So, TOOSOFT warrants our being nihilists about common sense

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<sup>53</sup> See Steen 2005, chapter 5, section 5.5.3.3.2.

<sup>54</sup> To my knowledge this idea was first laid out in Lewis 1983 and 1984.

<sup>55</sup> I believe this example was in Sider 2001 or Lewis 1983.

<sup>56</sup> Lewis 1983 & 1984.

objects only if there are no suitable candidates to play the part-changing object role. But there are such candidates—processes.

Commonsense objects are processes that exist and behave in the same way as the more obvious processual items that I discussed above. Just as runs are ‘runnings,’ and waves are ‘wavings’, so a tree is a ‘treeing’, and a dog a ‘dogging’. Commonsense objects are the joint activities of the simple particles which compose fusions. The fusions persist so long as all their parts do, regardless of how they behave or what commonsense items they constitute.

This is a naturalistic view, and it is a variation on the common philosophical theme that the macroscopic supervenes on the microphysical. Take a very simple object, a beaded drop of water on a leaf. The many H<sub>2</sub>O molecules that compose the drop are connected to each other by weak hydrogen bonds which result from the polar covalent bonds between each water molecule’s oxygen molecule and its two hydrogen molecules. H<sub>2</sub>O molecules will slip back and forth over each other, bonding non-instantaneously, and then unbonding and moving on to bond with others many times per second. Within each H<sub>2</sub>O molecule itself is a bundle of activity (e.g. valence-shell electron-sharing), and in each nucleus, within each proton itself, there is constant activity, of the type modeled by quark chromodynamics. If string theory is correct, then putatively fundamental particles such as electrons or quarks are at ground level all the same type of thing, ‘strings.’ The apparent differences between them result from their different vibratory patterns. So, even a modest entity like a small drop of water is a complex, non-stop, dizzying dance of a swarm of particles—the drop’s activity being a function of the activities of its constituent simples. These kinds of envisaged supervenience relations between macro-activities and irreducible micro-activities are plausible and non-ontologically stratified.

Standard philosophical views about the relation of the droplet to its constituent matter are: (a) they are identical; (b) the drop is distinct from and coincides with or is constituted by a fusion of matter; or (c) one of them does not exist. The first is straightforwardly false, since the fusion has properties the drop does not have (e.g., the ability to survive evaporation).<sup>57</sup> The second, coincidence,

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<sup>57</sup> For problems with the counterpart-theoretic reply to this, see Chapter Three of Steen 2005.

brings in a host of well-known problems.<sup>58</sup> Also, constitution theorists (a sub-set of the coincidentalists) keep the constituted and constituting items in the same general ontological category (object), while trying to ameliorate coincidence. But they either leave constitution undefined, or they define it but coincidence reemerges again in an otiose form. Nihilism as a conclusion should continue to be regarded as a *reductio* of its premises until we have good reasons to find Ockham's razor, 'causal-redundancy' premises, and compositional skepticism more intuitive (or argued for by premises that are all more obviously true) than the proposition that there are composite objects.<sup>59</sup> Nihilism is unsatisfactory since it takes away good Moorean meat about composite objects with one hand, while returning you an empty collection of simples arranged platewise with the other hand, upon which there is only a useful, but fictional—meal.<sup>60</sup>

I offer an alternative. There is the fusion of particles which compose the drop, and there is the drop, but the drop is just an activity that the fusion is temporarily engaged in, similar to the relation we ordinarily think of between a group of soldiers and their battling. The annihilation of the drop is nothing but the cessation of that behavior, just as the battle ends when the fighting stops. When the drop loses or gains some parts, but intuitively persists, a different but overlapping fusion is now engaging in the same (token) activity as the first fusion was. Similarly, even if some soldiers die during the battle, and some reinforcements arrive, we still say the same battle is occurring. But we do not mean, when the battle goes on, that the same *object* is persisting. Rather the same (token) activity is ongoing. It is the same with the drop, and according to the theory, with all (composite) objects that can change parts yet intuitively persist.

Let me now clarify the relation between the objects of this theory and processes. We already have a rough idea of what it is for an object to engage in a certain activity, or an object  $O$  to  $\Phi$ . While particular  $\Phi$ -ings can be analyzed in terms of their sub-processes, in general we cannot analyze schematically and reductively what it is to  $\Phi$  for all possible processes, nor for primitive ones. We can

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<sup>58</sup> See Zimmerman 1995.

<sup>59</sup> For 'causal redundancy' (partial) eliminativist arguments, see Merricks 2001. For compositional skeptical arguments in favor of (partial) eliminativism, see van Inwagen 1990.

<sup>60</sup> Dorr 2002, Dorr and Rosen, 2002

say nothing informative about what it is for an electron to spin, for instance. Let us call the general relation between any object (simple or fusion) and any process it undergoes *containment*.<sup>61</sup>

Containment is a primitive asymmetric relation. An object O contains a process  $\Phi$  ( $CO\Phi$ ) just in case O  $\Phi$ 's. When an object O contains a process  $\Phi$  (at t) we can call O a *host* of  $\Phi$  (at t), and  $\Phi$  a *parasite* of O. If an object O' is a proper part of an object O which contains a process  $\Phi$ , we will call O' a *partial host* of  $\Phi$ . In this technical sense of the term, 'containment' is not a mereological notion. Objects do not have processes as parts. Processes are just what bare objects are *doing*.

Another important relation to note between processes and objects is that of *process migration*.<sup>62</sup> Processes can change their hosts, such as when a wave passes through various portions of water. Since the genuine objects (simples and fusions) cannot change parts, processes single themselves out as the reference magnets for our talk of commonsense items which can change parts.<sup>63</sup> For a simple illustration of process-migration, let's use the vivid example of a wave. Let us call a particular waving-process  $\Phi$ . Suppose that the wave moves through discrete but contiguous portions of water-molecule fusions named Armistad, Bumpkin, and Chucky. For the wave to move through the water is nothing more than for  $\Phi$  to migrate in the form of certain conserved quantities and structure to adjacent portions of water, such that we would say, Armistad is  $\Phi$ -ing at  $t_1$ , Bumpkin is  $\Phi$ -ing at  $t_2$ , Chucky is  $\Phi$ -ing at  $t_3$ , etc., *and*, the one waving-process token  $\Phi$  is wholly present throughout. By extension, whenever a commonsense object seems to persist through a part change, what is actually occurring is that a process changes its host. So, in the same way as a waving persists by moving through contiguous but distinct water-portions, a person (properly speaking, a personing process), for instance, persists by migrating through various distinct portions of flesh, which is what happens when we eat and excrete. (Not all processes change their hosts, however.)<sup>64</sup>

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<sup>61</sup> I recently became aware of some similarities between my containment relation and the following 'migration' relation and the relation of 'participation' as laid out in Grenon, Smith, and Goldberg, 2003, p. 6.

<sup>62</sup> This usage comes from Zimmerman, 1995, p. 91, and the same action type is pointed out in Karmo 1977.

<sup>63</sup> Dean Zimmerman, in correspondence, suggests other reasons to think that processes would be reference magnets for our part-changing object-talk (if I'm right that there are no part-changing objects); (1) the processes are in the right places at the right times to suck up the reference of object talk, and (2) if I'm right about what I say elsewhere, they'll suck up the reference for our causation talk involving objects.

<sup>64</sup> A particular hydrogening, for instance, could in principle have the same host fusion indefinitely.

We reidentify a non-gappy process as the same process over time when we observe salient qualitative and spatio-temporal continuity. We identify a spatio-temporally gappy process as one and the same when there is causal continuity. Below I offer the diachronic identity conditions of a process, somewhat similar to Eli Hirsch's analysis of object persistence as spatio-temporal continuity under a substance sortal, as follows.<sup>65</sup> This is intended to work for macroscopic ordinary objects when construed as processes, not processes such as recessions or globalization. Note also that the variables in the following range only over simples and fusions:

'Maximally Spatio-Temporally Contiguous' (MSC) =df Fusions  $x$  and  $y$  are maximally spatio-temporally contiguous just in case:  $x$  and  $y$  overlap all their parts with the exception of exactly one simple  $z$ , which either  $x$  or  $y$  has as a part.<sup>66</sup>

(P=) Process  $\Phi$  at  $t_1$  = Process  $\Psi$  at  $t_2$  just in case:

1. There exists an  $x$  and a  $y$  and,
2.  $Cx\Phi$  at  $t_1$  and,
3.  $Cy\Psi$  at  $t_2$ , and,
4.  $\Phi$  and  $\Psi$  are the same type of process, and,
5. (a)  $x = y$ , and  $Cx\Phi$  continuously from  $t_1$  to  $t_2$ , or,
  - (b)  $x \neq y$ , but, either  $x$  is 'maximally spatio-temporally contiguous' (MSC) with  $y$ , or, there exist some  $z_1 \dots z_n$ 's such that,  $x$  is MSC with  $z_1$ ,  $y$  is MSC with  $z_n$ , and each successive  $z_1 \dots z_n$  are MSC with their successor, and, it is true of each  $z$  that  $Cz\Phi$ , or
  - (c) ( $x \ll y$ ) or ( $y \ll x$ ), and  $x$  and  $y$  have a product<sup>67</sup>  $z$  whose behavior from  $t_1$  to  $t_2$  is such that: if the difference  $w$  of  $x$  and  $y$  did not exist, then  $z$  would be  $\Phi$ -ing from  $t_1$  to  $t_2$ , or,
  - (d)  $x \upharpoonright y$ , and the  $\Psi$ -ing of  $y$  is caused by the  $\Phi$ -ing of  $x$ , in such a way that there is a conserved physical quantity  $Q$  of  $x$  which is exchanged with  $y$ .<sup>68</sup>

(5a) is intended to account for process persistence when the host does not change, (5b) for gradual fusion-replacement, and (5c) for gross host changes. (5d) is intended for cases of *complete* part-change, which I wouldn't want to rule out *a priori* (such as when a wave continues but changes its host completely and instantaneously from  $t_1$  to  $t_2$ , or, if some kind of 'tele-transportation' is possible which preserves identity). As an example, with gradual part changes, when a snake (now understood as a snaking) sheds its skin, some snaking which was once contained in a particular fusion is now contained only in the parts that remain snaking. The sloughed off skin is no longer a partial host of that process. Since there was snaking throughout, in successive distinct but largely overlapping

<sup>65</sup> Hirsch 1971.

<sup>66</sup> TREM is being assumed as background here.

<sup>67</sup> The mereological analogue of the set-theoretic intersection.

<sup>68</sup> ' $x \upharpoonright y$ ' means ' $x$  is disjoint from  $y$ ', which means that  $x$  and  $y$  share no parts in common. In regards to conserved physical quantities and causation, see Dowe 1992.

fusions, we identify it as one and the same snaking.<sup>69</sup> For more gross part-changes, such as the loss of a finger, we track the same process of personing from the fusion which included ‘fingering’ to the one which does not, since the presence or absence of the fingering is inessential for the process to persist.<sup>70</sup>

Some processes are gappy, however. Consider a rotting apple thrown in the freezer for a month, and then taken back out. Some, myself included, would be tempted to say that the same (token) rotting process continues to occur upon leaving the freezer.<sup>71</sup> If it is indeed the same, then the rotting is a gappy process. Some processes such as erosion seem inherently gappy.<sup>72</sup> A process can persist, even when retarded or stopped, just so long as its host remains relatively stable and disposed to  $\Phi$  in the same manner when the retarding force is diminished. For instance, if someone dies in the emergency room from a heart attack, but gets revived after being brain dead for a few minutes, we correctly track this personing process as the same process, since the host remained relatively stable and disposed to ‘person’ once the retarding force (e.g., lack of oxygen supply) was removed.<sup>73</sup>

This process account can solve many gripping metaphysical puzzles, and not in a piecemeal manner. The only other account I have seen that can solve as many problems with as few counterintuitive results is Theodore Sider’s stage theoretic four-dimensionalism.<sup>74</sup> My account, I think, is the best three-dimensionalistic game in town.

Here is a stock argument for coincidence.<sup>75</sup> Suppose you have an amorphous piece of clay, call it ‘Piece’. Shape it into a statue of Ray Charles, and call the statue ‘Ray’. Since Piece pre-existed Ray, they must be distinct. But, since Piece is not destroyed by fashioning it into Ray, Piece and Ray now coincide. Furthermore, if you flatten Ray, Piece will survive. Some contend that there is yet another entity that coincides with Ray and Piece, namely, the clay itself. If you rip apart Ray into pieces, the

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<sup>69</sup> Note that ‘the problem of the many’ (Unger, 1980) applies to processes. I won’t try to solve that here.

<sup>70</sup> For some interesting thoughts on organic entity persistence and counterfactual identity of the events the entity is involved with, see Van Inwagen 1990, pp. 161-168.

<sup>71</sup> The example of the apple, and the continuity of the process comes from Stout, 1997.

<sup>72</sup> Stout discusses gappy processes as well in Stout 2003.

<sup>73</sup> For some similar ideas about gappy lives, see van Inwagen 1990, pp 145-146.

<sup>74</sup> Sider 2001.

<sup>75</sup> For references to defenders of colocation, see Burke 1992 pp. 12-17, esp. notes 1 & 2.

clay will survive past the destruction of both Ray and Piece. Analogous problems will arise for most macroscopic objects.

According to Process Hyleism, there is never more than one genuine object involved here. We just have the same fusion throughout, constituting the piece and statue. The fusion's simples are always fused when co-existent and contemporaneous, even when scattered. First the fusion is Piecing, then it is both Piecing and Statueing, and, when its parts are scattered, it is behaving in a way for which no name comes to mind. No paradox of coincidence arises.

An immediate objection comes to mind: the process account just pushes the problem back one step, since now we have an analogous paradox of coinciding processes. After Piece is fashioned into Statue, do we not have Piecing coinciding with Statueing? If so, how is this an improvement?

Yes, we do have coinciding processes in cases such as the above, but this is an improvement over standard coincidentalism since the phenomenon of coinciding processes is not counterintuitive. Something can be spinning and heating up at the same time. A person can be singing and dancing, laughing and crying, and a hunk of matter can be both Piecing and Statueing. Part of the queerness of regular object coincidence is that we believe that distinct material objects cannot (completely) interpenetrate and overlap. Also, coincidence is counterintuitive in that 'two' objects would be made up of all the same matter, with exactly the same properties, and it is hard to see how the 'two' items could differ in sort. But, if we have a (partial) replacement ontology and construe commonsense objects as processes which can coincide, none of the aforementioned queerness of coincidence applies. Distinct processes are not material objects which cannot interpenetrate. Rather, two different things can be said to be going on in the same region, or, one and the same bare object can be doing two things. That a single hunk of matter is engaged in two actions which differ in sort is much easier to swallow than the notion that there are two distinct objects made up of all the same stuff. For example, that some matter is both 'tabling' and 'wooding' is not as puzzling as there being a table and some distinct wood which it is made of.

So, coincidence of processes is to be embraced, and is part and parcel of solving, or rather, dissolving, the paradox of coincidence. Coincidence as a paradox is dissolved since entities which



cannot coincide (i.e., objects) have been seen to be entities which can (i.e., processes and processes, and, processes and bare objects). But, while I have assuaged some of the problems of coincidence, there is still a problem of process-object coincidence. The worry here is with regards to overdetermination and causal division of labor. If, say, a coffee mug coincides with a certain hunk of matter, is only one of these entities holding the coffee, or both? How do we decide? This relates to a general worry about ontological profligacy of agents or acting entities. If a person-process sits down for a meal, does the bare object eat too? A more general way of construing this worry is as follows: If objects are processes, then processes will in fact be doing what we think objects do. But, the processes are performing these actions in virtue of the actions that the bare objects are performing. If this is so, it seems like at least *two* things are doing the same action.

The correct response is to say either that (a) while a process and its host are not identical, their actions *are* (when a process and a bare object coincide), or, that (b) processes are causal agents/actors, whereas bare objects are not. Either response seems available to the Process Hyleist, and can defuse the problem, and there are intuitions that support both options. I myself am not sure how to choose, but am confident that, if pressed hard enough, I could.

In support of (a), what can be said for the idea that a process and a fusion can be said to be engaging in the same token action? One reason is that we have not been presented with a problem by supposing so, and there seems to be no reason to ‘double count’ actions in this case. The mug is ‘a mugging,’ and is hence holding coffee, and the bare object is ‘mugging’, and, in doing so, also holding the coffee. What reason do we have to suppose that these actions are not one and the same? The only reason I can think of is that something along the lines of the following principle is acting as an enthymeme in the mind of my possible interlocutor:

(P) If there are two entities, they cannot be doing the same (token) action in the same place at the same time.

But, note that, if by ‘entities’, the interlocutor means genuine objects, i.e.—bare objects, then I would agree, but that is not the phenomenon in question. It is the phenomenon of a bare object and a process each doing the same (token) action in the same place at the same time that is in question. And, nothing

has been said against the idea that two entities in different ontological categories can do the same thing in the same place at the same time. So, in lieu of a clear objection, then the proponent of (a) has no objection to ward off. So, perhaps (a) is acceptable.

Nevertheless, I must admit that there does seem *something* dubious about (a), and perhaps there is a problem that I have not been fastidious enough to find. In this case, the Process Hyleist could accept (b), i.e., embrace the idea that only the process is an agent or actor.

There are several reasons for holding that processes have causal effects, but not bare objects. For starters, (single) bare objects don't jointly act together long enough to do what genuine objects (i.e., processes) can do, such as, anything that involves part-changes. A bare object cannot be eating, since this involves intake that a bare object cannot be the subject of. Even a more stable process such as 'mugging', where we suppose that the bare object which is the host of the mugging does not change over an interval, is not itself holding the coffee, since to explain *why* the mug holds coffee is to refer to all kinds of electro-static forces, reactions, and activities which, properly speaking, must be part of the process. Bare objects, in and of themselves, apart from processes, don't *do* anything at all.

There is an analogy here of Process Hyleism, which we could also call *hyloenergeism*, and Aristotelian *hylomorphism*. For Aristotle, a commonsense object is a composite of form and matter, or, rather, an enmattered form. Prime matter, or, *materia prima*, apart from any form, would be featureless. But, no matter is truly featureless, according to Aristotle, and always has some-form-or-other (but not necessarily the form that it does in fact have). Similarly, a bare object, stripped of any activity it is undergoing, would, while not being featureless,<sup>76</sup> not have much in the way of causal powers. Even an object such as a piece of gold is not a true bare object, rather, it is 'a golding' which the matter is performing. The same matter could be re-arranged to make water, plutonium, or unobtainium. So, the Process Hyleist conceives of commonsense objects not as enmattered forms, but rather, processes-in-some-matter-or-other (but not necessarily in the matter that is in fact its host).

I already gave arguments above for saying that, in most cases, bare objects are not the subject of predication. If this is so, they are not the subject of predications of causal powers either. So, while I

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<sup>76</sup> And hence not as mysterious as *materia prima*—bare objects, would, for example, have a mass.

remain mostly neutral in regards to choosing between options (a) and (b), option (b) is slightly favored. The programmatic nature of the foregoing is not in and of itself an objection to Process Hyleism, just so long as nothing seems to point to this being an irreconcilable problem.

Process Hyleism deals with cases of undetached parts/fusion in the following way.<sup>77</sup> Let us take the classic Tib/Tibbles case<sup>78</sup>. Here is how Sider presents the puzzle:

We begin with a cat, Tibbles, and a certain proper part of Tibbles, Tib, which consists of all of Tibbles except for the tail. Tibbles and Tib are obviously numerically distinct. But suppose now that Tibbles loses her tail; it seems that both Tibbles and Tib survive: Tib because nothing has happened to it beyond having something external to it detached, and Tibbles because cats, like trees, can survive the loss of certain parts... Tibbles and Tib are distinct; but they coincide after detachment.<sup>79</sup>

Crucial to the generation of the puzzle is the premise that Tib survives because it undergoes no intrinsic change. But this is true only if 'Tib' names a fusion, not a process, and if 'Tib' picks out a fusion then Process Hyleism can resolve the puzzle.

If Tib is a process then it does not survive the tail severance. Tib undergoes radical intrinsic change. 'Tibbing' includes blood flow between itself and the tail, the travel of nerve impulses between itself and the tail, and when Tibbing goes on it prevents the coagulation of blood and scab-formation at the base of the tail. When the tail is severed Tibbing ceases, and does not become the process of Tibbling.

The only candidate that could be identified with Tib and survive the tail severance is the mere fusion which made up all of Tibbles except its tail. In that case, there is no problem according to Process Hyleism. First, one fusion contained 'Tibbing', and now, after the tail is severed, only a proper part of it contains 'Tibbing'. This intuition is accounted for by condition (5c) of (P=) above. Two things did not become one, nor did they come to coincide. One object, a part of another one, just started behaving in a relevantly similar way as the whole used to. Or, to put it another way, a partial host of Tibbing became the host *simpliciter* of Tibbing.

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<sup>77</sup> In the dissertation, I also showed how Process Hyleism can solve the Ship of Theseus puzzle. But, space constraints, together with the fact that the solution did not hinge on central components of the theory led me to redact this passage.

<sup>78</sup> This example, which is based on the Stoic problem of Deon and Theon, was first brought up in recent times in Wiggins' *Sameness and Substance*, (1980) p. 209. For more on this puzzle see Rea 1997, p. xviii.

<sup>79</sup> Sider 2001 p. 142

Process Hyleism can also be employed profitably to deal with problems of personal identity, the ‘paradox of increase,’<sup>80</sup> the bundle/substratum debate, non-existent individuals,<sup>81</sup> and more. It does not, however, help solve problems of vagueness, and suffers from a version of the ‘Problem of the Many.’<sup>82</sup> But, we can apply the usual supervaluationistic or many-valued patches in a process domain as well. While I have tried to remain theory-neutral on properties, Process Hyleism fits well with trope theory, and, in regards to philosophy of mind, certain adverbial forms of cognition, representation, and perception. It can help give interesting answers to some questions of modality, in much the same way as Michael Jubien’s theory does.<sup>83</sup> Process Hyleism also has an advantage in that it does not replace bona-fide absolute identity with anything like relative identity, temporary identity, or some weakened ‘temporal counterpart relation’ surrogate. I shall not cover these issues here, however.

I have not tried to argue conclusively for Process Hyleism. Rather, I hoped to show that it is a viable candidate in the logical space of possible solutions to a variety of metaphysical puzzles. The fact that it solves a large number of problems gives it some support, in the form of an inference to the best explanation. In particular, Process Hyleism is appealing in that it is custom-tailored to cohere well with naturalistic scientific theses about matter and microprocesses, and quantum modeling of supervenient macro-phenomena. Also, it is thoroughly three-dimensionalist about the persistence of commonsense objects and bare fusions (although it would be a stretch to call Process Hyleism commonsensical). The genuine objects are just the simple, non-composite objects, whatever they are, and fusions of them. These bare objects will persist just so long as all of their parts do, and exist contemporaneously. Commonsense objects, however—tables and chairs, people and rocks—will persist just so long as some host fusion or other continues undergoing a certain processes. This is all commonsense objects are—relatively coherent, stable, ongoing activities of a constantly changing, interlocking swarm of particles, a seething sea of quantum-foam fluctuations and processes.<sup>84</sup>

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<sup>80</sup> See Chisholm 1976, Appendix C.

<sup>81</sup> See Rescher, 1996, Appendix.

<sup>82</sup> Unger 1980.

<sup>83</sup> In Jubien 2001

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