May 2017

Self-Colocation

Justin Mooney
University of Wisconsin-Milwaukee

SELF-COLOCATION

by

Justin Mooney

A Thesis Submitted in

Partial Fulfillment of the

Requirements for the Degree of

Master of Arts

in Philosophy

at

The University of Wisconsin-Milwaukee

May 2017

SELF-COLOCATION

by

Justin Mooney

The University of Wisconsin-Milwaukee, 2017
Under the Supervision of Professor Joshua Spencer

Some accounts of location leave conceptual space for a variety of unusual relations between objects and the regions they occupy, including the relations of multilocation and interpenetration. In this paper I show that countenancing both of these possibilities leads to a puzzle about whether an object can be colocated with itself. After teasing out the puzzle, I consider candidate solutions, and draw out some implications.

TABLE OF CONTENTS

Introduction

Few people seriously wonder whether an object could be located in more than one place at the same time, or whether multiple objects could be in exactly the same place at once. But precisely these ideas and others like them have enjoyed increased attention in recent analytic metaphysics,[1] where some authors maintain that the notion of location leaves conceptual space for such exotica. Could a single object be multilocated—i.e. exactly located at multiple disjoint spacetime regions? Could two or more distinct objects be colocated—i.e. exactly located at the very same spacetime region? Can distinct objects interpenetrate—i.e. exactly occupy overlapping regions without sharing parts?[2] It turns out that a number of venerable metaphysical theses, including classical mereology,[3] have a stake in these issues, so they warrant serious consideration. What follows is a modest contribution to the project of assessing candidate answers to these questions. I begin by motivating the possibility of both multilocation and a certain kind of colocation, namely, colocation by interpenetration. Then I show that if both are possible, we face a puzzle about whether an object can be colocated with itself. After teasing out the puzzle, I consider potential solutions, and draw out some implications.

Throughout the paper I presuppose the account of location defended in Hudson (2005) and (2008a-b). Location is a primitive and fundamental relation that objects bear

[1] For discussion of these and related issues see Barker and Dowe (2003), Gilmore (2007) and (2014), Hawthorne (2008), Hudson (2005 pp.4-5; ch. 4) and (2008a-b), Kleinschmidt (2011) and (2014), McDaniel (2003) and (2007), Parsons (2007) and (2008), Saucedo (2011), Sider (2000) and (2002), and Zimmerman (1996) and (2002), among others.
[2] These are rough definitions, based on definitions that appear in the literature (e.g. Gilmore 2014).
[3] Cf. Kleinshmidt (2011).

to regions of substantival space, and the proposition that an object *a* is located at a region R has no conceptual implications regarding whether *a* is also located at other regions, including subregions of R, superregions of R, regions which partially overlap R, and regions disjoint from R. Nor does it have any conceptual implications about the location of any objects distinct from it. By following Hudson, we clear conceptual space for oddities like multilocation and interpenetrative colocation, but establishing their metaphysical possibility is another matter. So let's begin by briefly surveying reasons to think that these relations are possible.

On Multilocation

Consider multilocation first. Some roads to the conclusion that multilocation is possible proceed via general theses about modality or modal epistemology, such as the thesis that conceivability is evidence of possibility.[4] Multilocation is conceivable, not only in the sense that it is conceptually possible, but also in the sense that it is imaginable. After all, our imaginations often wander in the world of science fiction, where backward time-travelers have been known to meet their past selves.[5] So if conceivability—construed as either conceptual possibility or as imaginability—is evidence of possibility, then we have at least a defeasible reason to countenance multilocation. Alternatively, one could appeal to Humean recombination.[6] For example, Kris McDaniel (2007b) appeals to the following recombination principle in an argument for the possibility of extended simples:

[4] For a classic defense of this view, see Yablo (1993).
[5] See Lewis (1976) for argument that at least some such stories are perfectly consistent.
[6] On recombination principles, see Wilson (2010).

> (NNC): Let F and G be accidental, intrinsic properties; let R be a fundamental relation; let x and y be contingently existing non-overlapping entities. Then it is not the case that, necessarily, Rxy only if (Fx if and only if Gy). (135)

McDaniel argues that the mereological structure of an entity—whether a region or a material object—is an intrinsic, accidental feature of that entity. If he is right, then, by (NNC), there can be no necessary connections between the mereological structure of material objects and the regions they occupy (137). Though McDaniel's interest is extended simples, this result also provides an argument for multilocation. For given the absence of such necessary connections, it seems that the whole (improper part) of an object, O, could be located at each of two or more disjoint proper subregions, r and r*, of a region, R.[7]

Other roads to multilocation proceed by generalizing from specific, motivated cases. For example, suppose you take the side of the endurantist on the nature of persistence. Drawing on Mark Johnston and David Armstrong, Lewis (1986) famously carves out the conceptual terrain of the debate about persistence this way:

> Let us say that something *persists* iff, somehow or other, it exists at various times; this is the neutral word. Something *perdures* iff it persists by having different temporal parts, or stages, at different times, though no one part of it is wholly present at more than one time; whereas it *endures* iff it persists by being wholly present at more than one time (202).

So enduring objects are wholly located at each time through which they persist. On one way of filling out this view it follows that, if we live in a four-dimensional spacetime block, ordinary enduring objects like hippos are wholly located at multiple disjoint spacetime regions. Moreover, those persuaded by the formidable defenses of time travel

[7] See also the recombination argument for multilocation sketched (and then criticized) by Gilmore (2014), which is based on McDaniel's (2007a p. 240-241) parallel argument for interpenetration.

in the literature (e.g. Lewis 1976, Smeenk and Wuthrich 2011) can derive multilocation at a single time from the possibility that an enduring object travels into the past to rejoin its past self.

Or maybe you are a fan of immanent universals. We are sometimes told that immanent universals are wholly located wherever they occur (e.g. Hoffman and Rosenkrantz 2003 p. 54), so, e.g., greenness is over here in that evergreen and it is also over there in that emerald tree boa. Thus at least one venerable theory of universals entails multilocation.

A handful of other candidate cases of multilocation have been suggested: fission products (Dainton 2008), transworld individuals (McDaniel 2004), works of music (Tillman 2011 and Spencer and Tillman 2012), and divine omnipresence (Cross 2016; Hudson 2009 and 2014 ch. 7; Inman forthcoming; Pruss 2013) as well as various other applications in philosophical theology.[8] There are many roads to multilocation.

On Interpenetrative Colocation

Turn now to (interpenetrative) colocation. If the puzzle I present below concerned itself with colocation generally, then it would be appropriate at this point to consider the literature on material constitution, where colocation is frequently called upon to solve puzzles about apparently coincident objects like statues and lumps of clay, cats and heaps of cat tissue, and so on.[9] But material constitution invariably involves colocation by sharing of parts or matter, and it is said that objects of the same kind cannot colocate in

[8] The Eucharist (Pruss 2009), the Trinity (Effingham 2015 and forthcoming), mind-body dualism (Effingham 2015), and resurrection (Hudson 2010)

[9] This is discussed in Bennet (2004), Doepke (1982), Johnston (1992), Korman (2015 ch. 11), and Wiggins (1968), to name just a few.

this way.[10] If that claim is correct, then colocation in cases of material coincidence is not relevant to the puzzle I sketch below, which involves an object colocating with itself.[11] We should turn our attention instead to other kinds of colocation that have been discussed in the literature—cases of colocation by interpenetration rather than by sharing matter, where interpenetration is roughly the notion of objects 'passing through' each other, like a ghost gliding through a wall. (Zimmerman (2002) adopts the moniker 'ectoplasm' for ghostly, ethereal stuff that can interpenetrate ordinary matter.) More carefully, distinct objects interpenetrate if they occupy overlapping religions without themselves overlapping (sharing parts).[12]

As with multilocation, there are two kinds of road to the conclusion that colocation by interpenetration is possible: roads that proceed via general theses about modality or modal epistemology, and roads that proceed via specific candidate cases. With respect to the former, we can run arguments parallel to those we considered in favor of multilocation. Thus we might take the prevalence of ghosts and their ilk in works of fiction to indicate that interpenetration is imaginable, and that might be regarded as a defeasible reason for thinking it is possible. Or we could appeal to McDaniel's (2007b) recombination principle again, which, recall, has the result that there are no necessary connections between the mereological structure of an object and the mereological structure of the region it occupies. If this is right, then diversity of parthood between a pair of objects, O and O*, does not necessitate a corresponding diversity of subregions in

[10] Cf. Wiggins (1968/1997) and Sanford (1970).
[11] Thanks to a referee for pressing this point.
[12] Gilmore (2014).

the region that O and O* occupy.[13] Broadly recombinatorial reasoning about the laws of nature can also get us to interpenetration. Gilmore (2014) points out that the impenetrability of ordinary material objects is presumably due to repulsive physical forces. If the laws of nature are contingent (a widely accepted thesis), then it is reasonable to suppose that there could have been laws that allowed those forces to be overridden. So the contingency of the laws of nature provides a further reason to think that interpenetration is possible.

There are also candidate cases of colocation by interpenetration. Consider a round, green table. If the friend of immanent universals thinks that universals are literally located where they occur, then it seems she will have to say that roundness and greenness interpenetrate at the location of the table. Similarly, if the friend of tropes thinks that tropes literally occupy regions, she will have to say is that a roundness trope and a greenness trope interpenetrate at the location of the table. There may be cases of interpenetrating concrete particulars too, for there is some reason to think that bosons can interpenetrate (see Gilmore 2014). Like mulilocation, there are many roads to interpenetrative colocation.

A Puzzle

So there is a case for the possibility of multilocation and a case for the possibility of interpenetrative colocation.[14] But if both are metaphysically possible, then, very plausibly, so is the following story. The main character of our story is a multilocated sphere that I will call Sam. Although I will officially reject this kind of talk below, for

[13] See also McDaniel (2007a) and Saucedo (2011).
[14] The forgoing discussion of motivation for multilocation and interpenetration is heavily indebted to Gilmore (2014), and also to helpful discussions with Joshua Spencer.

ease of exposition I will speak of Sam as having different 'versions' of itself located at different regions (just as we might talk of older and younger 'versions' of a multilocated time traveler). It will also make for smoother going if we assume a Newtonian manifold, but nothing of substance hangs on this. With those stipulations in place, suppose there is a sphere, Sam, at a time t1, and that Sam is exactly located at a region R1 and also at a disjoint region R2. As time passes, the version of Sam located at R2 leaves R2 and traces a continuous path through space until, at a later time t2, it comes to occupy R1, the same region that is (still) occupied by the other version of Sam. At this point it is tempting to think that Sam has become colocated with itself at R1. This temptation is especially acute if we imagine some obvious difference between the versions of Sam, e.g. that one is green and the other blue, for then it seems that at t2 a green thing and a blue thing are colocated, and yet in some sense both are Sam. If this story is possible, then, generalizing, we get:

(1) It is possible that there exists an object that is colocated with itself.[15]

An object that is colocated with itself (let's call this relation *self-colocation*) would be unusual. We don't think that the objects in our everyday experience are colocated with themselves. Neither do we think that they are multilocated. Rather, we take the ordinary objects in our experience to be exactly located at a single region, and that's it. No multilocation, no interpenetration, and certainly no self-colocation. A world just like ours in all respects except that all hippopotami are self-colocated would be a relationally different world. Similarly, there is a metaphysical difference between Sam's world at t2

[15] Although I haven't seen self-colocation discussed in print, others have thought about it. Thought experiments involving self-colocating time travelling ghosts seem to crop up every now and then in metaphysics circles.

as described in our story and a world where Sam is exactly located at R1 at t2 and is not multilocated or self-colocated. Let's say that such an object is *singularly located*. Given the forgoing, it looks like the following is true:

(2) If it is possible that there exists an object that is colocated with itself, then there is a metaphysical difference between an object's being self-colocated and that same object's being singularly located.

Very well. But if (2) is true, then what is the metaphysical difference between Sam's being self-colocated and Sam's being singularly located? This turns out to be a very difficult question to answer. Intuitively, if an object is multilocated at R1 and R2, then this is true in virtue of the fact that it is located *simpliciter* at R1 and the fact that it is located *simpliciter* at R2. Similarly, if two objects *a* and *b* are colocated at R1, this is true in virtue of the fact that *a* is located *simpliciter* at R1 and the fact that *b* is located *simpliciter* at R1. Facts about multilocation and colocation hold in virtue of facts about location *simpliciter*. Therefore, if an object like Sam is colocated with itself at R1, this holds in virtue of facts about the location *simpliciter* of an object or objects. What facts are these? The fact that Sam is located at R1 and the fact that… Sam is located at R1. But those are the same fact, so all we really have is the fact that Sam is located at R1. And surely that is what it is for Sam to be *singularly* located at R1. So it seems as though

(3) There is no metaphysical difference between an object's being self-colocated, and that same object's being singularly located.

And now we have a problem. (1) and (2) clearly entail the negation of (3), so we have an inconsistent triad. But all three propositions in the triad seem, prima facie, to be true. So which one should we give up?

Denying (3)

Let's take them in reverse order. My use of 'version' language above suggests an initially tempting way to reject (3). There is a metaphysical difference between singular location and self-colocation, one might insist, because in singular location there is just one version of Sam located at R1, whereas in self-colocation there are two. An immediate question here is what to make of 'versions.' What exactly are they? Obviously it will not help to think of them as region-indexed objects (Sam-at-R1; Sam-at-R2), since both versions of Sam occupy the same region when Sam is self-colocated. But can we construe them as temporal parts or stages? Theodore Sider has argued[16] that the perdurantist ontology of persistence nicely explains the multilocation of backward time travelers by identifying the younger and older versions of the time traveler with distinct temporal parts or person-stages of the same individual.[17] Perhaps this also gives us a way to make sense of the suggestion that there are two versions of Sam that colocate at t2. For if we suppose that Sam is a backward time-traveler, then there can be more than one temporal part or stage of Sam at a given moment of external time,[18] and we can construe Sam's being self-colocated at t2 as Sam's having distinct but colocated temporal parts or stages at t2.

We might worry that temporal parts or stages amount to nothing more than unusual spatial parts when they exist simultaneously, and that a case of colocated spatial parts seems to be a case of 'ordinary' colocation rather than self-colocation. While this might be cause for concern, I will not make much of this worry because I think the

[16] Sider (2001) pp. 101-109. See also Markosian's (2004) critical discussion of this argument (pp. 665-673).
[17] Sider (2001 p. 101) prefers person stages, partly because his definition of temporal parts rules out an object having more than one non-overlapping temporal part at the same time.
[18] The term comes from Lewis (1976).

perdurantist can push back by emphasizing the temporal, causal, and similarity relations of such would-be temporal parts to earlier and later temporal parts/stages. In other words, these are not your ordinary spatial parts—they are much better candidates for genuine versions of a single object than 'ordinary' spatial parts like arms and legs.

There are more pressing concerns. For example, if multilocation is metaphysically possible, then it is far from obvious, even doubtful, that it requires time travel, for as we have seen, there are lots of candidate cases of multilocation aside from backward time travelers. If multilocation does not require time travel, then perdurantism cannot give us a fully general solution to our puzzle about self-colocation.

The most serious problem with the perdurantist solution, however, is perdurantism itself.[19] Although this theory of persistence has able defenders,[20] it is deeply counterintuitive. Our commonsense view of persistence has it that ordinary objects exist wholly—not just partly—at each time through which they persist. Moreover, perdurantism doesn't seem to capture the dynamic nature of change. Change over time for the perdurantist is closely analogous to the static notion of variation across space. For example, growing taller is, on the perdurantist view, a matter of having increasingly tall parts or stages along the temporal dimension. A hypothesis with such counterintuitive consequences requires robust motivation, but perdurantism falls short in this regard too.[21] Prima facie, some of the strongest arguments for perdurantism highlight its ability to solve metaphysical puzzles about coincidence and vagueness, but it turns out that these

[19] The following criticisms of perdurantism are fairly standard; I make no claims to originality. For another interesting critique that I do not mention in the text, see van Inwagen (1981).
[20] E.g., Heller (1984), Hudson (2005), Lewis (1986) pp. 202-204, and Sider (2001).
[21] Cf Rea (1998).

puzzles have variants that are immune to the usual perdurantist solutions.[22] For all of these reasons, temporal parts will not be our salvation.

How else might we cash out versions? On some metaphysical views, colocation is the rule rather than the exception; objects are regularly colocated with other, similar objects that might be natural candidates to play the role of versions. For example, consider Jeffrey Brower's (2010) neo-Aristotelian solution to the problem of temporary intrinsics.[23] To explain how a changing object can have apparently incompatible properties at different times, Brower proposes that, e.g., seated Socrates and standing Socrates are in fact different objects fixed at different times, while Socrates himself persists by successively entering into (and colocating with) these objects. Maybe we could say that persisting Socrates and seated Socrates each qualify as versions of Socrates, and that Socrates is located wherever his versions are located. Then, when Socrates is sitting, he is self-colocated.[24]

One problem with this kind of strategy is that it makes self-colocation too common and humdrum, whereas singular location becomes a rare beast. On the account just sketched, having a temporary intrinsic property is sufficient for being self-colocated, and so it becomes difficult to imagine a situation in which an ordinary object would *not* be self-colocated. Even in our story about Sam, provided that it has at least one temporary intrinsic property, Sam is self-colocated *before* its versions come together at

[22] For a recent (albeit brief) discussion of vagueness puzzles that are not conducive to perdurantist solutions, see Korman (2015) pp. 166-167. On puzzles of coincidence, in addition to cases where coincident objects share all of their temporal as well as spatial parts, Gilmore (2007) argues that some possible cases can be solved only by the endurantist. For further discussion, see Eagle (2010a-b) and Gilmore (2010).
[23] For a helpful overview of this problem, see Haslanger (2003).
[24] Other views like Hawthorne (2008) and Fine (2010) could perhaps be developed in a similar ways.

R1 at t2. Singular location, on the other hand, turns out to be a fairly remote possibility if it is possible at all, which seems to get things backwards. A related problem is that we end up with too many versions. At the end of our story about Sam, we thought we had just two colocated versions of Sam, but on the account of versions sketched in the previous paragraph, there will be at least as many colocated versions of Sam at t2 as there are temporary intrinsics instantiated by Sam at t2. It seems the only hope for solving these problems is a principled distinction that allows only a select few of these objects to qualify as versions, but it is not obvious that there is any such distinction to be had. Still another problem with the present suggestion is that, if self-colocation occurs only when an object like Socrates takes on a temporary intrinsic property by colocating with some appropriate, intrinsically different object like seated Socrates, then no case of colocation will involve colocation of objects that are intrinsically exactly alike. But we could easily stipulate that the versions of Sam in our story, instead of being different colors, are in fact instrinsic duplicates. So this account of versions will not do.

Furthermore, there is a sense in which all of these attempts to spell out the notion of versions cheat: on all of these views, versions are distinct (non-identical) objects, so when they colocate the result is not self-colocation in the most literal, full-blooded sense, but rather a variety of 'ordinary' colocation. This criticism betrays my more general suspicion that appealing to versions is fundamentally misguided. Version talk is sometimes useful and maybe even practically indispensable in certain contexts, but it is also false: there are no such things as versions. To see this, consider Sam at t1, when Sam is multilocated. Prima facie, to say that Sam is multilocated at t1 is not to say that there is a version of Sam at R1 and another version of Sam at R2. It is rather to say that *Sam* is

located at R1 and that *Sam* is located at R2. That's what multilocation *means*. To reify talk of versions of objects in contexts like these is just confused. Versions, therefore, do not solve our puzzle.

Here is a different attempt to deny (3). We could postulate tropes[25] or particular instances of the location relation, and then claim that in singular location, there is just one trope (or instance) of the *located at* relation uniting Sam to R1, but in the case of self-colocation there are two tropes (or instances) of the *located at* relation uniting Sam to R1. An obvious drawback of this proposal is its metaphysical commitments. If we are not happy being tied to tropes/instances of the location relation, then we ought to look elsewhere for a solution to our puzzle. A further problem is how to make sense of the idea that two location tropes unite a single object and region. What distinguishes these two tropes from each other? We cannot distinguish them by appealing to their locations, since they are colocated, and we cannot distinguish them by appealing to the relata they unite, since they unite exactly the same relata. Therefore, taking this road might commit us not only to tropes of the location relation, but also to a primitivist account of their individuation. Although many trope theorists bite this bullet,[26] this ought to make the present strategy even less attractive.

Still another attempt to reject (3) appeals to Sam's history. Sam would be merely singularly located at R1 at time t2, but for the fact that at t1 Sam was multilocated, and subsequently moved in the way detailed in our story. It is this prior history in virtue of which Sam is self-colocated rather than singularly located at R1 at t2. There are at least

[25] For an extended defense of trope theory, see Ehring (2011).

[26] Cf. the discussion of trope individuation in Maurin (2014).

two problems with this suggestion, however. The first is that, intuitively, what makes it the case that Sam is self-colocated at R1 at t2 are facts about Sam and Sam's location *at t2*. Appealing to an object's history to account for the difference between singular location and self-colocation seems to be looking for an explanation in the wrong place. A second problem is that our story about Sam can simply be revised to circumvent this objection. For if self-colocation is possible, then it is plausible that Sam could have been self-colocated for as long as it has existed, and there is no history to distinguish this from a case where Sam has been singularly located for as long as it has existed.

Denying (2)

Perhaps the time has come to reconsider (2). A radical way out of our puzzle would be to deny that there is any difference at all between singular location and self-colocation. But unless this is intended as the claim that self-colocation is impossible because it collapses into singular location—which I take to be a rejection of (1) rather than (2)—it is obviously false. The fire hydrant on the sidewalk outside is singularly located. It is not self-colocated. So singular location is not self-colocation. And it is equally obvious that the difference between the two relations, whatever exactly it amounts to, is a robustly metaphysical difference—it is not, e.g., mind-dependent. So we cannot deny that there is a difference between singular location and self-colocation, and we cannot say that the difference is non-metaphysical. It follows that there is a metaphysical difference between singular location and self-colocation. Therefore (2) is true.

Maybe some will be willing to say that it is a brute fact that a self-colocated object is self-colocated rather than singularly located, but this is costly. For self-

colocation is a special case of colocation, and, intuitively, facts about colocation hold in virtue of facts about location *simpliciter*. It would be odd if self-colocation were an exception to this general point. For that reason, the fact that a self-colocated object is self-colocated is not likely a brute fact. So I can see no viable way out of (2).

Denying (1)

That leaves (1). At this point, (1) is under serious pressure, for it is starting to look like self-colocation is just incoherent; colocation seems to collapse into singular location when the colocated objects are numerically identical. And yet, if multilocation is possible, then there seems to be nothing wrong with the initial setup of our story about Sam, and if interpenetration is possible as well, it is hard to see what could, of metaphysical necessity, keep Sam from moving from R2 to R1.

One option remains. Although it is not impossible for Sam to move from R2 to R1, we were mistaken to think that when the 'versions' of Sam converge in our story, Sam self-colocates. Instead of self-colocating, when the R2 version arrives at R1, we should suppose that Sam simply 'un-multilocates' and becomes singularly located. In fact, I suspect that any temptation to think otherwise is the result of tacitly reifying versions. For when we think of there being a version of Sam at R1 and another version of Sam at R2, it is natural to suppose that when the R2 version travels to the location of the R1 version, 'they' (the versions) become colocated at R1. But when we take seriously the fact that it is just Sam at R1 and it is just Sam at R2 (not distinct versions or aspects or whatever), then it is no longer tempting to say that, when Sam moves in such a way as to be located only at R1, there is any kind of colocation going on at all. So (1) is, on reflection, false. Problem solved.

Unfortunately, we have solved one puzzle only to stumble into another. For suppose once again that at t1 Sam is green at R1 and blue at R2. What color will Sam be when the green and blue versions converge and unmultilocate? Presumably, a singularly located sphere cannot be both green all over and blue all over, so it looks like we will have to say that it ceases to be one of those colors, and which one it ceases to be is just a brute fact. If we are uncomfortable with this sort of bruteness (and no doubt some will be), the other option is to deny that this kind of situation can even arise, which probably means denying either that multilocation is possible, or that interpenetration is possible, or both—something we have so far managed to avoid.[27] Of course, both multilocation and interpenetration are controversial and clash with pre-philosophical commonsense. But still, we have already seen that denying them has its costs, for there are a priori reasons to take them seriously, and venerable metaphysical theories—and perhaps also physical theories—that seem to entail them. Denying either or both comes at a price. So our original puzzle is solvable, but it leaves us with a difficult choice. And perhaps we should have expected nothing less, for rarely in philosophy do we get everything we want.[28]

[27] Perhaps another possible solution is to deny that multilocated objects can have different intrinsic properties at their disjoint exact locations (as Joshua Spencer pointed out to me, this is issue is very similar to the debate about whether extended simples can be heterogeneous). This would create problems for some of the candidate cases of multilocation listed in the text, such as backward time-travelers.

[28] Thanks to Joshua Spencer, who helped to develop the colocation puzzle and served as a mentor throughout this project. His suggestions show up throughout the paper in too many places to tag individually. Thanks also to Cody Gilmore, Stan Husi, William Wainwright, Blain Neufeld, and the participants in Blain's 2016 writing workshop for helpful discussion. And thanks to various referees for comments on the manuscript.

BIBLIOGRAPHY

Barker and Dowe (2003). “Paradoxes of Multi Location.” *Analysis* 63: 106-14.

Bennett, Karen (2004). “Spatio-temporal Coincidence and the Grounding Problem.” *Philosophical Studies* 118: 339-371.

Brower, Jeffrey E. (2010). “Aristotelian Endurantism: A New Solution to the Problem of Temporary Intrinsics.” *Mind* 119 (476): 883-905.

Cross, Richard (2016). “Duns Scotus on Divine Immensity” in *Faith and Philosophy* 33(4): 389-413.

Dainton, Barry (2008). *The Phenomenal Self*. Oxford: Oxford University Press.

Deopke, Frederick (1982). “Spatially Coinciding Objects.” *Ratio* 24: 45-60.

Eagle, Antony (2010a). “Location and Perdurance” in Dean Zimmerman, Ed. *Oxford Studies in Metaphysics Vol. 5*. Oxford: Oxford University Press.

--------- (2010b). “Duration in Relativistic Spacetime” in Dean Zimmerman, Ed. *Oxford Studies in Metaphysics Vol. 5*. Oxford: Oxford University Press, 2010.

Effingham, Nikk (2015). “Multiple Location and Christian Philosophical Theology,” *Faith and Philosophy* 32: 25-44.

---------- (forthcoming) “The Philosophy of Filioque,” *Religious Studies*.

Ehring, Douglas (2011). *Tropes: Properties, Objects, and Mental Causation*. New York: Oxford University Press.

Fine, Kit (2010). “Toward a Theory of Part.” *Journal of Philosophy* 107(11): 559-589.

Gilmore, Cody (2007). “Time Travel, Coinciding Objects, and Persistence” in Dean Zimmerman, Ed. *Oxford Studies in Metaphysics Vol. 3*. Oxford: Oxford University Press, pp. 177-198.

---------- (2010). “Coinciding Objects and Duration Properties: Reply to Eagle” in Dean Zimmerman, Ed. *Oxford Studies in Metaphysics Vol. 5*. Oxford: Oxford University Press, pp.

---------- (2014). "Location and Mereology", *The Stanford Encyclopedia of Philosophy* (Fall 2014 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/fall2014/entries/location-mereology/>.

Haslanger, Sally. (2003). "Persistence Through Time." *The Oxford Handbook of Metaphysics* (Michael J. Loux and Dean W. Zimmerman, Eds.) Oxford: Oxford University Press, pp. 315-354.

Hawthorne, Jonathan (2008). "Three-Dimensionalism vs. Four-Dimensionalism" in Theodore Sider, John Hawthorne & Dean W. Zimmerman (eds.), *Contemporary Debates in Metaphysics*. Blackwell Publishing pp. 263--282.

Heller, Mark (1984). "Temporal Parts of Four-Dimensional Objects" *Philosophical Studies* 46: 323-334.

Hoffman, Joshua and Gary S. Rosenkrantz (2003). "Platonistic Theories of Universals" in *The Oxford Handbook of Metaphysics* (Michael J. Loux and Dean Zimmerman, Eds.) Oxford: Oxford University Press.

Hudson, Hud (2005). *The Metaphysics of Hyperspace*. Oxford: Oxford University Pess.

---------- (2009). "Omnipresence." *The Oxford Handbook of Philosophical Theology* (Thomas P. Flint and Michael C. Rea, eds.) Oxford: Oxford University Press.

---------- (2008a) "Précis of The Metaphysics of Hyperspace." *Philosophy and Phenomenological Research* 76(2): 422-426.

---------- (2008b) "Reply to Parsons, Reply to Heller, and Reply to Rea" *Philosophy and Phenomenological Research* 76(2) 452-470.

---------- (2010). "Multiple Location and Single Location Resurrection" in *How Do We Survive Our Death? Personal Identity and Resurrection* (George Gasser, ed.) Ashgate Publishing: 87-101.

---------- (2014). *The Fall and Hypertime*. Oxford: Oxford University Press.

Inman, Ross D. (forthcoming) "Omnipresence and the Location of the Immaterial." *Oxford Studies in Philosophy of Religion*.

Kleinschmidt, Shieva (2011). "Multilocation and Mereology." *Philosopical Perspectives* 25(1): 253-276.

---------- (2014). *Mereology and Location*. Oxford: Oxford University Press.

Korman, Daniel Z. (2015). *Objects: Nothing Out of the Ordinary*. Oxford: Oxford University Press.

Johnston, Mark (1992). "Constitution Is Not Identity." *Mind* 101: 89-95.

Lewis, David K. (1986). *On the Plurality of Worlds*. Oxford: Basil Blackwell.

--------- (1976). “The Paradoxes of Time Travel.” *American Philosophical Quarterly* 13(2): 145-152.

Markosian, Ned (2004). “On Two Arguments from Sider’s Four-Dimensionalism.” *Philosophy and Phenomenological Research* 68**:** 665-673.

Maurin, Anna-Sofia (2014). "Tropes", *The Stanford Encyclopedia of Philosophy* (Fall 2014 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/fall2014/entries/tropes/>.

McDaniel, Kris (2003). “No Paradox of Multi-Location.” Analysis 63(4): 309-311.

---------. “Modal Realism with Overlap,” *Australasian Journal of Philosophy* 82: 137-152.

---------. (2007). “Brutal Simples,” in *Oxford Studies in Metaphysics Vol. 3* (Dean Zimmerman, Editor). Oxford: Oxford University Press.

---------. (2007). “Extended Simples” in *Philosophical Studies* 133:131-141.

Parsons, Josh (2008). “Review: Hudson on Location.” *Philosophy and Phenomenological Research* 76(2): 427-435.

Pruss, Alexander R. (2013). “Omnipresence, Multilocation, the Real Presence, and Time Travel.” *Journal of Analytic Theology* vol. 1: 60-73

---------. (2009). “The Eucharist: Real Presence and Real Absence.” *The Oxford Handbook of Philosophical Theology* (Thomas P. Flint and Michael C. Rea, eds.) Oxford: Oxford University Press.

Rea, Michael C. (1997). *Material Constitution: A Reader*. Lanham, Maryland: Rowman and Littlefield Publishers Inc.

----------. (1998). “Temporal Parts Unmotivated.” *The Philosophical Review* 107(2): 225-260.

Sanford, David (1970). “Locke, Leibniz, and Wiggins on Being in the Same Place at the Same Time.” *The Philosophical Review* 79(1): pp. 75-82.

Saucedo, Raul (2011). “Parthood and Location” in *Oxford Studies in Metaphysics Vol. 6* (Karen Bennett and Dean Zimmerman, Eds.) Oxford: Oxford University Press 2011, pp. 125-284.

Sider, Theodore (2000). “Simply Possible.” *Philosophy and Phenomenological Research* 60: 585-590.

--------- (2001). *Four-Dimensionalism: An Ontology of Persistence and Time*. Oxford: Oxford University Press.

--------- (2002). "Review of Lynne Rudder Baker, *Persons and Bodies*." *Journal of Philosophy* 99: 45-48.

Smeenk, Chris and Christian Wuthrich (2011). "Time Travel and Time Machines." *The Oxford Handbook of Philosophy of Time* (Ed. Craig Callender) Oxford: Oxford University Press.

Tillman, Chris (2011). "Musical Materialism." *British Journal of Aesthetics* 51: 13-29.

Tillman, Chris and Joshua Spencer (2012). "Musical Materialism and the Inheritance Problem." *Analysis* 72(2): 252-259.

van Inwagen, Peter (1981). "The Doctrine of Arbitrary Undetached Parts." *Pacific Philosophical Quarterly* 62: 123-137.

Wiggins, David (1968). "On Being in the Same Place at the Same Time." *The Philosophical Review* 77, pp. 90-95; reprinted with postscript in Rea (1997).

Wilson, Jessica (2010). "What is Hume's Dictum, and Why Believe It?" *Philosophy and Phenomenological Research* 80(3): 595-637.

Yablo, Stephen (1993). "Is Conceivability a Guide to Possibility?" Philosophy and Phenomenological Research 53(1): 1-42.

Zimmerman, Dean (1996). "Could Extended Objects Be Made Out of Simple Parts? An Argument for Atomless Gunk." *Philosophy and Phenomenological Research* 56(1): 1-29.

--------- (2002). "The Constitution of Persons by Bodies: a Critique of Lynne Rudder Baker's Theory of Material Constitution." *Philosophical Topics* 30 (1): 295-338.