Properties as Places

Sam Cowling
Western Michigan University

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Many familiar forms of property realism identify properties with *sui generis* ontological categories like universals or tropes and posit a fundamental *instantiation* relation that unifies objects with their properties. In this paper, I develop and defend *locationism*, which identifies properties with locations and holds that the occupation relation that unifies objects with their locations also unifies objects with their properties. Along with the theoretical parsimony that locationism enjoys, I argue that locationism resolves a puzzle for actualists regarding the ontological status of uninstantiated properties. I also note some promising applications of the locationist framework to the metaphysics of quantitative properties and possible worlds.

§1. Instantiation and Occupation

Property realism takes many forms. According to universal theory, a property like *redness* is a universal—a single abstract entity instantiated by distinct objects.[1] According to trope theory, *redness* is a set of tropes—particularized property-instances like *the redness of Mars* and *the redness of my blood*.[2] Although these and other versions of property realism disagree over the nature of properties, they agree that properties exist and play a significant analytic role in metaphysics.

Property realism is a thesis about the categorial structure of the world. This structure is determined by the nature and number of ontological categories like *object*, *event*, *abstracta,* and *property*. These categories carve the world at its deepest joints. They are the most general distinctions between entities, and the primary targets of metaphysical inquiry. So, while the property realist holds that the ontological category, *property*, marks a fundamental distinction between entities, the property anti-realist denies *property* a place within the world's categorial structure.

Disagreement regarding the ontological category of *property* is analogous to disagreement regarding the ontological category of *location*. In one guise, the latter disagreement involves *substantivalists*, who believe that spatiotemporal locations are self-subsisting entities that do not depend upon the existence of material objects, and *relationists*, who believe that locations are merely derivative complexes of relations that hold between material objects.[3] Setting aside which party is correct, it is important to note that, along with their commitment to the ontological category of *location*, almost all substantivalists take on a further commitment to a fundamental relation, *occupation*, holding between spatiotemporal locations and the objects that occupy them.[4]

The substantivalist's commitment to a fundamental occupation relation parallels the property realist's commitment to a fundamental *instantiation* relation. Each relation serves as

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[1] See Armstrong (1989) and Carmichael (2010) for a defense of universal theory.

[2] See Campbell (1990) and Ehring (2011) for defenses of trope theory.

[3] The nature of this disagreement is itself a matter of disagreement. See Field (1984) for discussion.

[4] As I discuss later, certain forms of monistic substantivalism avoid this additional commitment. On the general nature of the occupation and location, see Hudson (2005: 2-3) and Markosian (2000).

the metaphysical glue that holds distinct ontological categories together: instantiation unites objects with their properties just as occupation unites objects with their locations.

Close attention to this parallel suggests an alternative to familiar forms of property realism. This alternative, which we can call *locationism*, strives for ideological and ontological parsimony. It does away with a fundamental instantiation relation, and, in its place, holds that the occupation relation unites objects with both their locations and their properties. Intuitively, locationism holds that, in addition to spatiotemporal dimensions, there is a further dimension to the world that determines *how* an object is rather than *where* or *when* it is.

According to locationism, properties do not form a *sui generis* ontological category like *universal* or *trope*. Instead, they fall within the broader ontological category of *location*. Objects therefore have their properties by virtue of occupying locations rather than instantiating some trope or universal. An electron, Sparky, is therefore an electron by virtue of bearing the occupation relation to the location identified with *electronhood*.

Locationism has received short shrift in discussions regarding the metaphysics of properties.[5] In what follows, my aim is to motivate and defend locationism as an attractive alternative to universal theory, trope theory, and other extant forms of property realism. In Section Two, I briefly outline the general commitments of locationism. In Sections Three and Four, I present two arguments in defense of locationism. The first argument turns on considerations of parsimony; the second turns on the theoretical fertility that locationism enjoys by virtue of resolving a puzzle for actualists. I conclude in Section Six after noting some additional applications of locationism in Section Five—applications concerning and the metaphysics of quantities and possible worlds.

In what follows, I will assume property realism. While this is needed as a working assumption, I also believe locationism can help undermine certain familiar reasons for resisting property realism. Note, for example, that locationism allows for a kind of methodological unity with physics that universal theory and trope theory do not. While universals and tropes are ancient creatures of *a priori* metaphysical theorizing, appeal to the theoretical framework of locations and topological and metrical structure is pervasive in fundamental physics. In both statistical and quantum mechanics, phase or configuration spaces—geometric models of physical states—occupy crucial theoretical roles. Locationism, understood in this light, helps itself to the same kind of theoretical apparatus in order to explain phenomena like resemblance, change, and so on. In this way, locationism goes a small distance to meeting the worry that commitment to property realism guarantees commitment to inexorably spooky entities.[6]

Before proceeding, it will also be useful to distinguish my current project from a related but importantly distinct one. In what follows, I am interested in the nature of a fundamental instantiation relation typically held to unify objects with sparse properties (e.g., fundamental tropes or universals). I am not interested in what, if any, "instantiation" relation is held to unify objects with properties conceived of in the abundant sense (i.e., properties

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[5] See Stalnaker (1979) and van Fraassen (1967) for discussion of "lightweight locationism" examined in the next section. Sider and Hawthorne (2002) also consider a metaphysical picture on which properties are understood as forming a space, but such a view is importantly different from the view considered in what follows. Unlike the view that Sider and Hawthorne consider, the present proposal holds properties to be *sui generis* locations rather than identifying locations as mere sets of objects.

[6] To be clear, I do not claim that scientific practice is committed to locationism. I claim only that locationism enjoys a general methodological and theoretical unity with physical theory that universal and trope theory lack.

understood as the semantic values of any given predicates).[7] For this reason, the following assumes a robust distinction between genuine instantiation and instantiation *qua* mere predication as well as a correspondingly robust distinction between sparse and abundant properties. Furthermore, I take it that the project of analyzing the latter sense of "instantiation" as it concerns abundant properties is tantamount to the project of analyzing predication, and, following Lewis (1983), I believe the analysis of predication to be a doomed project. As such, my project here does not aim to offer a locationist analysis of all true instances of predication, but, rather, an account of what it is for objects to have sparse properties.[8]

§2. Locationism

Stalnaker (1979), drawing on van Fraassen (1967), describes a view that sounds much like locationism:

> Properties, on van Fraassen's account, are represented by regions of a logical space, or quality space. For example, the color spectrum might be a dimension of such a space; the color red would then be identified with a region defined by a segment of the color dimension. The temperature scale might be another dimension. The relation *warmer than* would be identified with a set of ordered pairs of points of the space defined by this dimension… The language [of the model] is interpreted by assigning to each one-place predicate a subset of the points in logical space. Such a predicate is satisfied by an individual just in case the location function locates the individual at one of the points included in the value assigned to the predicate. If the predicate is to mean *is red*, then its value will be the region of logical space defined by the relevant segment of the color dimension. The open sentence "*x* is red" will be satisfied by an individual just in case the individual is located somewhere in that region—just in case the location function colors it some shade of red. This account generalizes to cover *n*-place predicates and *n*-ary relations in the obvious way.

Stalnaker's remarks capture a general insight of locationism: properties are the sorts of things that entities occupy rather than instantiate. At the same time, Stalnaker's remarks also require us to distinguish two very different ways to interpret the thesis of locationism.

The first interpretation delivers what we can call *lightweight locationism*. While lightweight locationism holds that properties are locations, it also holds that locations are merely sets of entities that satisfy minimal structural requirements.[9] Properly understood, this kind of locationism requires only that properties be *represented* as locations, but says nothing about the nature of properties and their place in the world's categorial structure. And, while

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[7] On this distinction, see Lewis (1983).

[8] In what follows, I set aside discussion of set-theoretic forms of nominalism. On the one hand, such views are plausibly taken to be the denial of the robust realism I have assumed. On the other hand, my argument in Section Four assumes the truth of actualism and, granted this assumption, I hold set-theoretic nominalism to be inadequate: distinctions between properties conceived of set-theoretically require a commitment to possibilia.

[9] I take these minimal requirements to be derivative from standard topological ones, according to which a set, *S*, of entities and its subsets are locations within a space so long as: (i) *S* is open, (ii) the empty set is open, (iii) arbitrary unions of open sets are open, (iv) finite intersections of open sets are open.

lightweight locationism is very plausible, it is also very close to trivial. This is because its truth only requires that we use sets of individuals to define a space in terms of these sets. To see why this is near trivial, notice that we could easily define a space of dogs or Impressionist paintings merely by helping ourselves to the existence of sets of dogs and Impressionist paintings and placing minimal structural constraints on these sets.[10] While dogs, Impressionist paintings, and properties might, in this lightweight sense, count as locations in a space, this is metaphysically uninteresting, since it has no immediate implications for the world's categorial structure or the nature of properties.

The second kind of locationism—the subject of the following discussion—is not lightweight. It is not merely a thesis about whether we can represent properties as forming a space. Instead, it is a substantive metaphysical thesis. It holds that there is a fundamental ontological category, *location*, and that this category subsumes not merely the category, *spacetime* or *spatiotemporal location*, but also the category of *property*. In addition, locationism holds that the fundamental relation that unites objects with their properties is the very same occupation relation that unites objects with their locations in spacetime. The difference between lightweight locationism and locationism proper therefore rests on the fact that only the latter is a thesis about the world's categorial structure and the nature of properties. And, in what follows, I argue that our best theory of properties is one that holds properties to form a space.

Since locationism proper holds that the ontological category of *property* falls within the broader category of *location*, it entails certain similarities between spatiotemporal locations and the space of properties. Most notably, locationism requires that properties have an intrinsic structure in much the same way that spacetime has an intrinsic structure.[11] Indeed, it is precisely this intrinsic structure that we investigate when we consider whether spacetime is continuous, discrete, gunky, atomic, and so on. In a similar fashion, the structural features of the space of properties (e.g., its topological or metrical features) are also determined by its intrinsic structure rather than imposed upon it by mere stipulation. As a consequence, some of the most fundamental questions about properties are questions about the intrinsic structure of the space of properties.

Consider an example of how the intrinsic structure of the space of properties bears upon outstanding metaphysical issues: suppose that there are worlds that exhibit infinite qualitative descent. Within these "onion worlds" there are no absolutely fundamental properties.[12] There are only increasingly or decreasingly fundamental properties without a bottom level. It is a live metaphysical question whether onion worlds of this sort are possible. Notice, however, that if the space of properties is necessarily built up out of finitely many atomic regions rather infinitely many continuous regions, we can conclude—from the structure of the space of properties alone—that these onion worlds are indeed impossible. There simply won't be enough properties to accommodate the possibility of infinite qualitative descent. For reasons of this kind, the intrinsic structure of the space of properties has direct implications for our metaphysics and, in cases like this, our modal commitments.

Having noted the importance of the intrinsic structure of the space of properties, we can now develop the locationist framework by posing the question: What kind of properties are locations? Since locationism does not identify properties with spatiotemporal regions,

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[10] This is trivial insofar as we can specify a topological structure on these sets by stipulating that the set of all these things is open, that the empty set is open, and that there are no other open sets.

[11] See Bricker (1993) on the distinction between intrinsic and extrinsic structure.

[12] See Williams (2007) for discussion.

properties must be locations of another sort. For our purposes, we can introduce the term "quality-space" to pick out the mereological fusion of all these locations—locations that, when occupied, confer qualitative properties upon the individuals that occupy them. By doing so, we divide the ontological category of *location* into two sub-categories: spatiotemporal locations and qualitative locations, where the latter are locations within quality-space.

Having drawn a distinction between spatiotemporal locations and qualitative locations, two qualifications to the scope of locationism are now required. First, locationism, as developed here, is a thesis regarding the connection between individuals and qualitative properties. So, while the locationist holds that objects have qualitative properties like *redness*, or *electronhood* by virtue of occupying a location in quality-space, it denies that non-qualitative properties like *being Napoleon* or *being identical to Madonna* are to be analyzed along the same lines.[13] To be sure, one could posit locations in the space of properties to identify with non-qualitative properties; however, I assume here that quality-space includes only qualitative properties. And, since these non-qualitative properties are not properly viewed as sparse properties, this constraint squares with our present interest in a fundamental instantiation relation rather than an instantiation relation that involves properties abundantly conceived.

A second qualification to the locationist thesis concerns spatiotemporal properties and relations like *being round* or *having infinite duration*. While these properties are qualitative, they, too, should be excluded from the scope of the locationist thesis. Here, the rationale is simple: it seems as though objects have their spatiotemporal properties by virtue of occupying spatiotemporal locations rather than locations in quality-space, so, absent very good reason to think otherwise, we ought to restrict the scope of locationism. On the resulting view, the entire qualitative profile of an object—represented as the set of all of an object's spatiotemporal and qualitative properties—is wholly determined by the locations it occupies even while some of these locations are spatiotemporal and others are qualitative. In this respect, competing forms of property realism that appeal to instantiation lack a comparable degree of unity: an object's qualitative properties are determined by both the properties it instantiates and the properties it has by virtue of bearing the occupation relation to spacetime.[14]

Before offering a defense of locationism, it will be helpful to introduce some of the basic formal features of the locationist framework. This framework holds that there is a set of individuals, *D*, a set of all sub-regions of property-space, *R,* and an occupation relation, *F*, that can be represented as a set of ordered pairs including a member of *D* and a member of *R*. And, while this part of the framework is invariant across various versions of locationism, there are many options for filling out the relevant details.

To begin, we can inquire into how properties are to be identified with regions of quality-space. Here, two candidate views emerge, both of which are best understood with the background assumption that quality-space is composed out of point-sized regions.

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[13] The nature of the qualitative/non-qualitative distinction is a matter of some controversy. Typically, non-qualitative properties are distinguished by a dependence upon or modal tie to specific individuals.

[14] It is worth distinguishing locationism from *monadicism*, which inverts the locationist's identification of properties with locations. According to monadicism about spacetime, there is no fundamental category of locations. Instead of spatiotemporal locations, there is only a fundamental category of properties some of which are primitive monadic spatiotemporal properties like *being at such-and-such a position*. The monadicist therefore does away with spatiotemporal locations by positing a plurality of fundamental location properties. See Field (1984) and Horwich (1978) for discussion. See McDaniel (2006) for discussion of a similar proposal.

According to the first view, the points of quality space are sparse or fundamental properties. Following Lewis (1983), these properties can be singled out as *perfectly natural*, where perfect naturalness distinguishes metaphysically or physically "elite" intrinsic properties (e.g., *charge*, *mass*, or perhaps even *consciousness*) that figure into the world's basic causal-nomic structure.[15] On this view, the occupation relation is represented by a function that maps an individual onto an extended region of quality space, where the perfectly natural properties an individual is said to "instantiate" are just the point-sized sub-regions of the entire region an object occupies.

According to the version of locationism I will focus upon, the points of quality-space are not unique natural properties but are, instead, *qualitative profiles*—total qualitative ways for an individual to be. On this view, the occupation relation is represented by a function that maps each individual onto a single point of quality-space, which wholly determines the way that the object is qualitatively (in addition to their spatiotemporal location). Intuitively, this account of quality-space holds that the points of quality-space are the properties that determine the entire way that an individual is qualitatively.[16] Furthermore, I assume that only mereologically simple objects exactly occupy the points of quality-space. In doing so, the points of quality-space suffice to determine the qualitative intrinsic nature of whatever mereologically simple object that occupies them.

As should be clear, this version of locationism makes substantive assumptions about the nature of fundamentality and instantiation insofar as the fundamental location relation is the exact occupation relation that simples bear to points of quality-space. In doing so, this view encodes a broadly Humean worldview that rules out wildly emergent properties, holding, instead, that simple entities are the bearers of fundamental intrinsic properties. Perhaps one would prefer a version of locationism that takes pluralities of objects to occupy regions of quality-space. Or perhaps one would prefer to identify points of quality-space with unique sparse properties in the way suggested above. Here, my primary interest is in motivating locationism rather than settling an in-house dispute about how best to develop the view. I will therefore proceed with the just-presented view in mind, but I remain neutral about whether it is superior to all rival formulations.

That said, the present view enjoys a number of nice features. First, it allows us a simple way to introduce an attractive and familiar commitment: the primitive distinction between natural and non-natural properties defended in Lewis (1986). On the present view, a primitive concept of naturalness allows certain extended regions of quality-space to be distinguished as natural properties. Assuming *redness* and *greenness* to be natural properties, *redness* is just a region (or set of points) of quality-space—i.e., the regions whose occupants would be red. Granted this structure, familiar relations between properties are naturally modeled. Conjunctive properties like *being red and green* are the intersection of properties like *redness* and *greenness*; disjunctive properties like *being red or green* are the union of properties like *redness* and *greenness*. Furthermore, the statues of more or less natural properties are distinguished by their definability in terms of these natural properties. For example, gerrymandered, non-natural properties correspond to regions of quality-space that are not

[15] See Lewis (1983) and (1986) for discussion of perfectly natural properties. Here, I ignore complications about whether perfect naturalness should be taken as a theoretical primitive or, by employing the present framework, analyzed in terms of quality-space (e.g., by holding perfectly natural properties to be points of quality-space and perfectly natural relations as the fundamental spatiotemporal relations).

[16] I abstract away complications regarding time. On my preferred version of locationism, the points of quality-space are instantaneous qualitative profiles, so objects qualitative profiles over time are ordered pairs of times and points in quality-space. So understood, the locationist treats change as motion through quality-space.

readily definable in terms of the naturally distinguished regions (e.g., *being a green thing that weights five grams or a red thing that weights three thousand grams*).[17]

Structurally, this view runs in parallel to a possible-worlds based analysis of propositions. Just as points of logical space are possible worlds and elite sets of possible worlds correspond to natural propositions, so, too, points of quality-space are total intrinsic qualitative properties and elite sets of intrinsic qualitative properties correspond to natural properties.[18] Concomitantly, the status of more or less natural properties and propositions are both distinguished by the ease of their definability in terms of natural properties or propositions.

Before proceeding, let me address one natural objection to locationism as just presented. Consider a mereologically complex object with three simple parts. Suppose that one or more of these parts is an electron and is therefore located at the region, *electronhood*. Loosely speaking, if a simple part of the object is located at a region, the object itself will also be located at that region and its part occupy *electronhood* seems to guarantee that the object is itself an electron. Indeed, it would seem that any object will inherit all the properties of its parts by virtue of occupying the regions those parts occupy. This result would quickly reduce locationism to absurdity.

Fortunately, this problem can be resolved by some careful attention to the different kinds of location relations. Following Parsons (2007), we can distinguish several ways of being located. Let us say an object, A, is *weakly located* at a region, R, if and only if R is not entirely free of A. Let us say that A is *entirely located* at R if and only if A is located in R and there is no part of A located anywhere else. Let us say that A is *pervasively located* at R if and only if there is no part of R free of A. Finally, let us say that A is *exactly located* at R if and only if A is entirely and pervasively located at R.

In sharpening up the present version of locationism, we can distinguish one location relation as fundamental. Specifically, we can take the exact location relation that holds between simples and points of quality-space to be the fundamental location relation. Using this relation, we can analyze facts about the exact location of composite objects within quality-space even while such objects do not themselves enter into the fundamental location relation. On the corresponding view about spatiotemporal location, the fundamental location relation concerns regions of spacetime and mereological simples and, once these location facts are fixed, so, too, are facts about the location of composite objects within spacetime. Naturally, competing versions of locationism will provide alternative accounts of quality-space and the relevation location relation. Here, my aim is to present a workable version of locationism and consider the case for locationism at a fairly high level of generality. For this reason, we can rest content that the present version is not undermined by concerns regarding the inheritance of location.

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[17] The apparatus of quality-space also allows for an intuitive backdrop against which we can develop an analysis of notions like similarity. Leaving open what ultimately grounds qualitative similarity, comparative similarity claims can be analyzed by appeal to the metrical features of quality space (e.g., the claim that x is more similar to y than z will be true if and only if x is closer to y in quality-space than z). Similarly, duplication is straightforwardly analyzed as co-location in quality-space. In turn, a principle like the Identity of Indiscernibles is the denial of co-location in quality-space plus sameness of spatiotemporal properties and relations.

[18] Within the Lewisian framework, the extension of naturalness to propositions is straightforward. Properties are sets of possibilia. Furthermore, propositions are sets of possible worlds and possible worlds are themselves possibilia. Propositions are therefore properties of possible worlds. And, since naturalness applies to properties, it also applies to propositions. See Caplan (2011: 88) for discussion.

§3. Parsimony, Ontological and Ideological

With the general features of locationism made clear, we can now consider the case in favour of locationism. The first of these arguments turns on the theoretical virtues locationism exhibits.

Theoretical commitments are costly. If two theories achieve the same explanatory or predictive ends and one requires, on balance, fewer ontological commitments—commitments to the existence of entities—or fewer ideological commitments—commitments to fewer primitive concepts—we have *prima facie* reason to believe the cheaper theory preferable to its competitor.[19] Arguments from parsimony take their cue from this insight, and turn on parsimony's status as an indispensible and pervasive criterion for theory-evaluation.

Considerations of parsimony offer two distinct ways to motivate locationism: the first is ontological; the second is ideological. The Ontological Parsimony Argument is simple. Suppose that there is good reason to be a realist about spatiotemporal locations and hold that objects bear a fundamental occupation relation to spatiotemporal regions. Consider, now, that, since locationism holds that properties are locations, the fundamental relation that unifies objects with spatiotemporal regions and with properties is the very same relation. Notice, however, that competing forms of property realism are committed to a distinct fundamental relation, instantiation, which unifies properties and objects. This commitment to a second fundamental relation is, of course, an ontological commitment. So, to the extent that locationism avoids ontological commitment to both the occupation and instantiation relation, it enjoys a greater measure of ontological parsimony than competing forms of property realism by requiring commitment to only a single fundamental relation: occupation.[20]

We can now consider the Ideological Parsimony Argument, which builds upon the Ontological Parsimony Argument and a further assumption about fundamental ontology: the fundamental relations that hold between ontological categories are theoretical primitives. The idea here is that no substantive, reductive analysis of fundamental relations like instantiation or occupation is possible. And, insofar as no reductive analysis of this kind can be given, theories that posit fewer fundamental relations incur fewer ideological commitments. (Note that the relevant principle is that fundamental properties and relations require corresponding ideological primitives, but not vice versa.[21]) Since locationism, unlike other forms of property realism, avoids a commitment to a fundamental instantiation relation, locationism enjoys greater ideological parsimony than views that posit both occupation and instantiation. The Ideological Parsimony Argument therefore suggests that, since we are dealing with fundamental relations, the ontological benefits of dispensing with instantiation are compounded by the fact that we also dispense with the ideological cost of a primitive notion of instantiation.

Let me now consider two objections to the arguments from parsimony.[22] The first of these takes issue with the assumption that substantivalism is true. According to this

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[19] On parsimony, see Nolan (1998).

[20] See Schaffer (2009) for a parallel argument for monistic substantivalism.

[21] For example, I take the modalist view according to which the primitive modal operators resist analysis in terms of quantification over possible worlds to be intelligible albeit unattractive.

[22] A natural response to arguments from parsimony—in their form above and more generally—is to deny that parsimony is truth-conducive or provides epistemic reasons for belief. Although this response raises issues at

objection, the arguments from parsimony assume realism about spatiotemporal regions and the occupation relation, but this assumption is either untenable or unduly controversial.

In meeting this objection, I am content to simply mark substantivalism as an assumption of the preceding. That said, a more interesting way to develop this objection is by considering a cognate dispute between *dualist substantivalists*, who posit an occupation relation, and *monistic substantivalists* (alternatively, "supersubstantivalists"), who directly identify material objects with regions of spacetime.[23] If the monistic view is correct, substantivalism does not require a fundamental occupation relation. It is committed only to a fundamental instantiation relation, since instantiation alone connects spatiotemporal regions with their properties. Metaphorically, the monistic substantivalist opts for a view that "pins properties directly onto spacetime".

Since I am sympathetic to dualist substantivalism, I am content if the above argument delivers only the conditional conclusion: If one accepts dualist substantivalism, one ought to prefer locationism. There is, however, a more powerful response: even if one accepts monistic substantivalism, there is still reason to prefer locationism to universalism or tropism. This is because the monistic substantivalist still owes us an explanation of what unifies qualitative properties and spatiotemporal regions. And, here, the monistic substantivalist can keep her theoretical costs down by adopting a "locations-only" ontology, where both spatiotemporal regions and their properties ultimately fall within the category of location rather than some *sui generis* ontological category like *universal* or *trope*. Such a view would therefore sustain a measure of parsimony that universal or trope theorists who are realists about spacetime cannot match, and would leave the arguments from parsimony intact.

Let me now turn to a second objection to the parsimony arguments: Locationism does not reduce parsimony, since the occupation relation between spatiotemporal regions and regions in property-space cannot be one and the same. This objection holds that the locationist is mistaken in thinking that occupation can do the work of instantiation, since they are obviously distinct relations.

In meeting this objection, the locationist ought to draw upon an analogy. Suppose that, contrary to the deliverances of contemporary physics, our world is one with disjoint categories of spatial locations and temporal locations rather than a unified category of spatiotemporal location. One might then argue that an object must bear distinct occupation relations to spatial regions and temporal regions. That said, we seem well within our rights to maintain that one and the same occupation relation would hold between objects and spatial regions and temporal regions if they were distinct. It is therefore unclear what should force us to treat quality-space in a different fashion and deny that there is a single occupation relation that unites objects with the sub-categories of the ontological category of location.

Neither objection to the arguments from parsimony is compelling; however, parsimony is rarely the sole consideration in theory-choice. For this reason, we can now turn to a second argument for locationism, which aims to show that the benefits of the locationist framework make it more appealing than its competitors.

§4. Aliens and Actualism

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the core of epistemology and philosophical methodology, I set them aside given the scope of the present discussion.

[23] For discussion of monistic substantivalism, see Schaffer (2009) and Sider (2001).

Considerations of parsimony are only one of many considerations relevant to theory choice. An additional consideration is fertility, where a theory is fertile to the extent that it provides attractive explanations or models for novel target phenomena. In this section, I develop the case for locationism by focusing upon one notable instance of the fertility of locationism: the accommodation of alien properties.

Alien properties—properties that are not actually instantiated—pose problems for most forms of property realism. We can suppose, for example, that *schmass* is a property that is possibly instantiated, but is not had by anything in the actual world. Although some reject the intuition that there could be a property like *schmass* that is not actually instantiated, most philosophers aim to accommodate two intuitions: first, that our world is not a remarkably rich one that includes every possible fundamental property and, second, that alien properties are possibly instantiated. In trying to accommodate these intuitions, many philosophers find themselves in the difficult position of explaining how we might represent in thought or talk the possibility that there be alien properties like *schmass*.

For the possibilist, who holds that merely possible individuals and properties exist even while they do not actually exist, this task is simple. Since alien properties exist, but are not actually instantiated, merely possible worlds either exist as *sui generis* entities—perhaps in the form of concrete possible worlds *a la* Lewis's modal realism—or can be "constructed" by simply describing all the ways in which merely possible individuals and properties are arranged.

For the actualist, matters are far more challenging. The field of play also differs considerably depending on whether one accepts a Platonic or Aristotelian view of properties.[24] For the Platonist, properties are transcendent entities that exist outside of spacetime. For the Aristotelian, properties are immanent entities that exist in spacetime, whenever and wherever they are instantiated.

Unsurprisingly, these competing views typically treat alien properties differently. For the Platonist, it is natural to hold that all properties, including alien ones, actually exist. The rationale here is that, since all actually instantiated properties enjoy a transcendent (i.e., non-spatiotemporal) existence, it is no further cost to hold that alien properties also exist along with actually instantiated properties. After all, since the Platonist holds that properties are non-spatiotemporal, the existence of properties would seem to be a matter independent of how the concrete, spatiotemporal world is. On the resulting Platonist view, all properties are in fact necessary existents.

For the Aristotelian, who holds that properties are located within the spatiotemporal world, alien properties have no toehold in the world since the existence of properties turns on their being somewhere within spacetime. Without being instantiated, there is, however, no way for alien properties, understood along Aristotelian lines, to be plausibly viewed as actual existents. As a result, Aristotelians are forced to deny that alien properties actually exist. In this respect, the challenge of accommodating thought and talk about alien properties is most acute for the Aristotelian.

If we assume the truth of actualism, a dilemma arises for those who take the possibility of alien properties seriously. According to the Platonist horn of the dilemma, a problem arises in explaining why exactly alien properties are genuinely actual rather than merely possible entities. Notice that the Platonist actualist will hold that *schmass* actually exists, but is uninstantiated. But, when asked "In virtue of what is *schmass* actual rather than merely possible?" there is, however, no obviously satisfactory response. While actually

[24] See Armstrong (1989).

instantiated properties can be deemed actual by virtue of being instantiated, the Platonist cannot offer the same story regarding *schmass*. It is therefore unclear what, if anything, distinguishes the Platonist actualist who posits alien properties from a possibilist who holds that alien properties exist, but are merely possible. Absent a satisfactory explanation of what unifies alien properties with the actual world and accounts for these properties being actual rather than covert possibilia, the Platonist seems to be a thinly-disguised possibilist who has flouted our initial actualist assumption.

According to the Aristotelian horn of the dilemma, the actualist lacks the resources to describe all the ways the world could be, since she denies alien properties exist. Although the actualist is able to describe possible worlds and alien properties using the apparatus of quantification and identity, certain distinctions between possible worlds will invariably be eroded.[25] Perhaps most notably, the Aristotelian actualist will be unable to capture *quiddistic differences* between possible worlds.[26] These sorts of differences divide worlds that are alike yet differ regarding the role that alien properties play within those worlds' causal-nomic structure. For instance, it is this sort of difference that separates our actual world, where *mass* plays the role it actually does, from a distinct world where *schmass* occupies the same role in that world's causal-nomic structure. Since the Aristotelian actualist cannot represent the entire range of possible worlds, her view is impoverished insofar as it is blind to the existence of certain quiddistic differences.

The present dilemma for the actualist amounts to this: If one accepts Platonism about properties, it is unclear whether one maintains a genuine commitment to actualism, and, if one accepts Aristotelianism, one is unable to represent in thought and talk the entire space of possibilities. It is noteworthy, then, that the locationist is well-positioned to overcome this dilemma.

According to locationism, quality-space includes all possible properties. For this reason, the locationist avoids the Aristotelian actualist's problems with representing various possibilities involving *mass* and *schmass*, since both properties are actual. The locationist therefore grasps the Platonist horn of the dilemma and takes on the burden of showing why alien properties are actual rather than merely possible existents. Here, the locationist's explanation—an explanation that improves upon the Platonist's—turns on its metaphysical analogies with spacetime.

Like spacetime, quality-space has an intrinsic structure; its regions are unified by metrical and topological relations. And, insofar as these relations suffice to unify spacetime and insure that any spatiotemporal regions thus related are actual, the relations of quality-space are similarly related and therefore similarly actual. In this way, the intrinsic structure that unifies properties on the locationist framework is what allows it to overcome the worries of covert possibilism faced by the Platonist. Properly understood, the locationist's metaphysics of properties explains the actuality of uninstantiated properties in the same fashion that the substantivalist explains the actuality of topologically connected spatiotemporal regions. So, unless one is willing to impute the actuality of unoccupied regions of spacetime, the locationist has furnished us with a satisfactory response to the question, "In virtue of what is *schmass* actual rather than merely possible?"

§5. Worlds and Quantities

[25] For discussion of these differences, see Adams (1981) and Schaffer (2005).
[26] On quidditism, see Locke (2011).

Prior to concluding, I want to note two additional applications of the locationist framework. The first concerns the metaphysics of possible worlds; the second concerns the metaphysics of quantitative properties.

5.1. Worlds

The metaphysics of properties and the metaphysics of possible worlds are importantly connected. On certain views, possible worlds are either *sui generis* properties or constructions out of properties.[27] On other views, properties are sets of possibilia drawn from a plurality of worlds. Here, it is worth noting two ways we might go about developing a metaphysics of possible worlds within the framework of locationism. The first proposal requires a significant divergence from the version of locationism presented above. Rather than identifying the points of quality-space with the total intrinsic qualitative profiles of mereologically simple individuals, it holds the points of quality-space to be maximal properties—properties borne by entire worlds. On this proposal, each point of quality-space represents an alternative way for the world to be and, as a consequence, the points are naturally identified with possible worlds. A second proposal—one that retains the view that the points of quality-space are total intrinsic qualitative profiles—helps itself to a plurality of ways of mapping objects into the points of quality-space. On the resulting view, the plurality of functions that map individuals into quality-space are naturally identified with possible worlds. While only one of these functions will accurately represent the state of actuality, the functions from individuals to points of quality-space that represent possible but non-actual world-states are natural candidates for playing the role of ersatz worlds within the locationist framework.

Like other forms of ersatzism, both of these proposals face challenges. In the former case, possible worlds are maximal properties of the universe, so how are we to make sense of the modal properties of non-maximal individuals—individuals smaller than the entire universe? In the latter case, since possible worlds are ways of mapping objects into quality-space, how are we to represent possibilities regarding alien individuals?[28] While these are genuine challenges, the crucial point to note is that these challenges are equally pressing for other leading views of possible worlds: the former challenge arises for any view on which possible worlds are maximal properties, while the latter challenge arises for any form of actualism.[29] The point to note here, then, is that locationism provides ample conceptual room within which one can develop an attractive metaphysics of ersatz worlds and, in this regard, does at least as well as rival views of the nature of properties.

5.2. Quantities

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[27] Stalnaker (1987) is sometimes attributed the former view. I am unsure whether this correct, but it is clear enough the view has taken on a life of its own. See, for example, the discussion in Lewis (1986) of magical ersatzism. Forrest (1983) defends a view along the lines of the latter.

[28] This problem proves especially pressing if one holds quidditism and haecceitism on par and believes the lone motivation for locationism is the accommodation of alien quiddistic differences. For my part, the puzzles regarding alien properties are more general than those regarding alien quidditistic differences, but, in the present context, there is considerable pressure on the locationist to provide some account of haecceitistic differences involving alien individuals as well as quiddistic differences regarding properties. That said, if locationism can improve our account of the quiddistism case, it is not thereby incumbent on the view that it readily handle the haecceitism case as well.

[29] See Lewis (1986) on the puzzles and problems of this kind that arise for hardworking ersatzists.

A further application of locationism is its extension to the metaphysics of quantitative properties like *mass* and *charge* which admit of varying degrees.[30] Quantitative properties present challenges for traditional forms of property realism like universal and trope theory. While these forms of property realism owe an explanation of what it is that two things share by virtue of *being massive*, they have largely ignored the challenge of explaining what what they fail to share insofar as they have different masses.

As Eddon (2007) has argued, one of the best-developed treatment of quantitative properties within the framework of universals—offered in Armstrong (1989)—is inadequate. The primary difficulty arises because quantitative properties like *mass* obey a structure determined by a metric function. This metric function allows us to discern the distance or "how far apart" instances of a quantitative property are. For instance, this metric function is what furnishes us with an explanation of why *having two grams mass* is "closer to" or more similar to *having twenty grams mass* than *having two million grams mass*.

For Armstrong, mass universals are structural universals built up out of other constituent mass universals. Accordingly, the differences between mass properties are to be explained by different mass universals having different constituent mass universals. Given the structure of mass properties, Armstrong requires each mass universal to have infinitely many constituent mass universals. In particular, any arbitrary mass property, *n*, will have all *n-m* (where $0 \leq m < n$) mass properties as constituents. As a consequence, *having two grams mass* will have *having one gram of mass* and *having .5 grams mass* and so on as constituents. Furthermore, *having two grams mass* will lack constituents that *having three grams mass* does, but *having three grams mass* will have all the constituent universals that *having two grams mass* does. As Eddon points out, this ordering does not provide sufficient structure to define a metric function. Since every instance of mass has infinitely many mass universals as constituents, any instance of mass will have an infinite number in common and fail to have an infinite number in common. Given this, the facts about the constituents of mass universals alone cannot furnish us with a suitable metric over the range of mass properties.

This problem regarding quantitative properties is metaphysical: in virtue of what do properties have the quantitative structures (e.g., metric structures) that they do? The appeal of locationism in answering this question is straightforward. According to locationism, properties form a space with an intrinsic topological and metrical structure. So, rather than attempting to analyzing metrical relations in terms of constituency as Armstrong proposes, the metric structure of quantitative properties comes for free with our realism about quality-space. For example, the extended region *being massive* will have a plurality of sub-regions corresponding to the various quantitative mass properties. In turn, these sub-regions (e.g., *having five grams mass* and *having ten grams mass*) will bear intrinsic metric and topological relations to one another.

This sketch of how locationism accommodates quantitative properties has broad implications: the resources of a location-driven metaphysics of properties allow for a natural way to treat quantitative properties and accommodate the metrical structure of quantities. In contrast, universal and trope theory have no comparably straightforward account of what

[30] We might also include vectorial properties like electric field strength, force, and momentum under the heading of quantitative properties. Such properties raise even more pressing issues for traditional forms of property realism than scalar properties like mass and charge. If, however, the locationist is better-positioned to deal with quantitative properties, this would suggest they are also better-positioned to provide a suitable metaphysics of vectors. See Leuenberger and Keller (2009).

determines the metric structure of quantities when conceived of along the lines of universals or tropes.

§6. Conclusion

Locationism has notable applications. And, while some of these applications have been briefly sketched here, the view shows promise disproportionate to the attention it receives. It allows for intuitive treatments of property-related phenomena. It also enjoys virtues of parsimony and fertility. Although these virtues do not show locationism's competitors to be inadequate or incoherent, they do suffice to show that an inquiry into the metaphysics of properties cannot plausibly ignore the locationist alternative.

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