

Quality and Structure

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‘Is the world ... constituted by purely qualitative facts?’ So asked Adams (1979, p. 5). He was inclined to think not, and many share his view.¹ In contrast, I am inclined to think that it is. Here I explain why I think this (section 2), explore what kinds of qualitative facts constitute the world (section 3), discuss how other facts emerge from this qualitative basis (section 4), and outline applications of this view in the philosophy of physics (section 5).

1. Qualitativism vs Individualism

The issue is whether ‘the world’ is ‘constituted by purely qualitative facts’. By ‘the world’, let us restrict ourselves to *material reality*, putting aside numbers and spirits and other intangibles. So the issue is whether *it* is constituted by purely qualitative facts. But what is a *qualitative fact*? And what does it mean for the world to be *constituted* by such things?

Start with qualitative facts. In contrast to individualistic facts, which concern particular individuals, qualitative facts make no mention of any particular individual. A little more precisely, a fact is *individualistic* iff whether it obtains depends on how things stand with a particular individual (or individuals), and *qualitative* otherwise.² By “individuals” I mean what in ordinary English we call “things”—e.g. apples, alligators, atoms, and so on.

We express individualistic facts with directly referring expressions, e.g.:

That (pointing at a particular apple) is juicy.

Obama is the president.

And in first-order logic we regiment our talk of individualistic facts with constants, e.g.:

Fa

Rab

a≠b

¹ This claim—that his view is widely shared—is hard to substantiate without lengthy exegetical discussion. But it will become apparent once we see what is involved in thinking that the world is constituted by purely qualitative facts.

² To be clear on scope, F is individualistic iff there is an *x* (or there are some Xs) such that whether F obtains depends on how things stand with *x* (or with the Xs).

In contrast, examples of qualitative facts include:

Someone is the president.

Orange is more similar to red than to blue.

Redness and roundness are co-instantiated.

since whether these obtain does not depend on how things stand with any particular individual. Perhaps the first depends on there being *someone individual or other* who is the president, but it is qualitative because it does not depend on any particular person being the president. Likewise with the third.³

We can express some qualitative facts with quantifiers, e.g.

$(\exists x)Fx$

$(\exists x)(Px \ \& \ (\forall y)(Py \supset x = y))$

so long as the predicates F and P are understood to express qualitative properties. And what is a qualitative property? Roughly, one that does not concern any particular individual. The property of being juicy is qualitative. In contrast, the property of being Kripke, and the property of being Obama's sister, are both non-qualitative.

This is not to say that all qualitative facts are expressed with quantifiers. We will encounter other kinds of qualitative facts in due course. Indeed some think that the example above concerning orange is one.

Adams' question was whether the world is *constituted by* qualitative facts. What does this mean? An affirmative answer presumably yields the following picture: that at rock bottom there are purely qualitative facts, and the individualistic facts are somehow "fixed" or "determined" by, and are "nothing over and above", that qualitative basis. As the metaphor goes, all God had to do when making the world is fix the qualitative facts, and then Her work was done.

But how should these metaphors and pictures be understood? There are a number of approaches, but the one I use here focuses on whether individualistic facts *hold in virtue of* qualitative facts.⁴

³ This is just a rough characterization of the distinction between qualitative and individualistic facts, not a reductive definition. Still, the distinction is clear enough to work with.

⁴ A different approach uses the notion of *structure* (Sider 2011), saying that only qualitative notions are structural. Yet another uses the notion of *dependence* (Fine 1995, Koslicki forthcoming), saying that individuals depend on qualities. And yet another uses the notion of *truth-making* (Armstrong 2004, Cameron 2010), saying that all truths are made true by some qualitative fact. And there are other approaches too; see Bennett (manuscript).

The notion of one fact's holding in virtue of others sometimes goes by the name of "ground". To say that X holds in virtue of Y (or is "grounded in" Y) is to say that Y explains X, in a particular sense of the word "explains". To illustrate, imagine going to a cricket match and asking why there is a cricket match occurring. A causal answer might describe a sequence of events that led up to the match: two teams agreed to play, arrangements were made, etc. But another answer explains what it is about the event that makes it count as a cricket match in the first place. Presumably the answer is that it is a cricket match *in virtue of* what various people are doing, e.g. throwing and hitting a ball in accordance with various laws, and so on. Explanations of this second sort are called "grounding" or "in virtue of" or "constitutive" explanations. This is only the briefest of illustrations; for more clarification of the notion see Fine (2001) and (2012), Rosen (2010), Schaffer (2009), and Trogon (forthcoming).

So I interpret Adams' question to be one of grounds, of whether individualistic facts are grounded in qualitative ones. Let *qualitativism* be the view that they are. And let *individualism* be the view that the order of explanation goes the other way: that qualitative facts are grounded in individualistic ones.⁵

Thus according to individualism, the fundamental facts of the world are facts about how various *individuals* are propertied and related. Perhaps they include the fact that a particular individual *A* is red and round. No doubt a variety of qualitative facts also obtain in this situation, e.g. that *something* is red and round, and perhaps that redness and roundness are co-instantiated. But the individualist says that they hold in virtue of the individualistic fact. In contrast, the qualitativist says that the fundamental facts about the situation are various qualitative facts, and *they* explain why the individual *A* is both red and round. On this view, the fundamental facts themselves make no mention of the individual *A*.

It is important not to confuse qualitativism with *anti-haecceitism*, the modal thesis that there can be no individualistic differences between possible worlds without a qualitative difference.⁶ To be sure, qualitativism does *imply* anti-haecceitism, and does so thanks to the general principle that grounds necessitate what they ground. More precisely, this principle (which I assume here) is:

Necessitation: If some facts, the Xs, ground Y, then necessarily if the Xs obtain then Y obtains too.⁷

⁵ This formulation of the issue slurs over a number of difficulties. For one, suppose there is an infinite descending chain of ground that alternates between individualistic and qualitative facts. Then both views *as defined* in the text are true, yet the situation violates the intuitive picture behind both. But fixing these subtleties would distract from the core idea, which I trust is clear enough.

⁶ This thesis can be precisified in a number of ways, some with modal operators and others with quantification over worlds. These details will not matter here.

⁷ This principle is widely endorsed by grounding theorists. See in particular Fine (2012), Rosen (2010), and Trogon (forthcoming). For dissent, see Leuenberger (2014) and Schaffer (2010).

But the reverse is not the case: anti-haecceitism does not imply qualitativism. If you are an anti-haecceitist this might be because you are a qualitativist, but it might instead be because you are an individualist with independent views about the workings of *de re* modality (such as counterpart theory) that imply anti-haecceitism—Lewis (1986) was arguably an anti-haecceitist of this latter type. Or it might even be because you are an individualist who also holds the Spinozistic view that all truths are necessary, so that anti-haecceitism is trivially true!

2. Why Qualitativism?

Individualism is (at least initially) a seductive view: it is natural to think that the most fundamental facts of the world concern how a variety of individuals are propertied and related. But I favor qualitativism. Why?

Some argue that qualitativism is the simpler and more parsimonious view. Thus Paul (2012) says that her own version of qualitativism allows us to “characterize the structure of reality *while maximizing ontological parsimony*” (p. 241, my emphasis). There may be merits to parsimony, but I will not lean on this consideration here.

Instead, I reject individualism because if there were individualistic facts with no qualitative grounds, the individuals they involve—call them “primitive individuals”—would be *undetectable* and *physically redundant*. What does this mean? Let me outline the rough idea here (though see Dasgupta (2009) for more details).

Starting with the charge of undetectability, the idea is that a primitive individual is “hidden” behind its qualities. We can detect those qualities and come to know that *something or other* has them, but according to individualism there is a *further fact of the matter* as to which individual it is, and I claim that this further fact is epistemically inaccessible. After all, if two situations were qualitative duplicates—that is, if they contained the same number of primitive individuals propertied and related in *exactly* the same way, so that they differed *only* in which primitive individuals lie behind the qualities—you would never tell them apart. This idea that primitive individuals are “hidden” extends at least back to Locke—who described them as ‘unknown support of those qualities’—and through Russell—who called them an ‘unknown something’ and said that they ‘cannot be defined or recognized or known’.⁸

What about the charge of physical redundancy? Well, imagine a closed physical system composed of primitive individuals propertied and related in various ways. How it behaves over time depends *only* on qualitative facts about it, not on those further facts about which primitive individuals lie behind those properties and relations. To see this, note that a different closed system that starts off as a qualitative duplicate—i.e. differing *only* in which primitive individuals it contains—would behave identically. So the particular primitive individuals that populate the system make no difference to how it

⁸ These quotations are, respectively, from Locke (1997, II xxiii 2); Russell (1948a); and Russell (1948b).

evolves. As it might be put, the physics is “blind” to the primitive individuals themselves and “cares” only about the qualitative facts about the system.

The reasoning here is designed to emulate reasoning from physics, in which it is commonplace to reject undetectable and redundant structure. The paradigm example of such reasoning concerns velocity. Start by distinguishing *absolute* from *relative* velocity: your relative velocity is your velocity relative to another material body—e.g. 30 mph *relative to the road*—while your absolute velocity (if there is such a thing) is how fast you are “really” going, independent of any material reference point.

It is orthodoxy amongst physicists and philosophers of physics to think that there is no such thing as absolute velocity, precisely because if there were it would be undetectable and physically redundant. To see (roughly) why it would be undetectable, consider an isolated physical system of material bodies in motion. And consider a “boosted” system that differs *only* in that the entire system is unfolding while in smooth motion relative to the first—say, 5 mph to the north. By construction, the only differences between the two systems are facts about the absolute velocities of their constituents. If there really is such a thing as absolute velocity, the two systems are genuinely distinct. But note that they are *indistinguishable*: they look (and smell and taste) exactly the same. Just recall your experiences on trains: when the train is moving smoothly, happenings within the train look exactly as they would if the train were stationary. So if you were confined to one of the systems, you would never be able to work out what anything’s absolute velocity is. You could never tell whether the center of mass of the system is at rest or in smooth motion, since it would look the same either way. In this sense, absolute velocity is undetectable.

It is also physically redundant. For consider two isolated physical systems that start out alike in all respects except that one is in smooth motion relative to the first. It turns out that, according to all our best physical theories, as they evolve they will *always* be alike in all respects except that one is in smooth motion relative to the first. So the particular absolute velocities of things (that differ between the two systems) make no difference to how a system evolves.⁹ The physics is in this sense “blind” to absolute velocity and “cares” only about the other facts that the two systems share.

So if absolute velocity and primitive individuals were real, they would both be undetectable and redundant in the same sense. Just as systems differing only in facts about absolute velocity are indistinguishable, so too are qualitatively identical systems that differ only in which primitive individuals lie behind the qualities. And just as the particular absolute velocities of things make no difference to how a system evolves, so too the particular primitive individuals that populate the system make no difference either.

It is commonplace to think that this is a serious mark against the view that absolute velocity is real. On pain of inconsistency, we should think that this is a serious mark against the view that primitive individuals are real, i.e. a serious mark against

⁹ As I argue in Dasgupta (forthcoming), this is not quite true. But it is close enough to the truth for our purposes here.

individualism. It does not yet follow that we should certainly reject individualism. That depends on whether there is a good enough qualitativist theory to endorse instead. But we will come to that: for now, the point is that positing primitive individuals is as serious a vice as positing absolute velocity.

There is much more to say about this idea that we should reject undetectable and redundant structure—the above is just an outline. I discuss the reasoning in detail in Dasgupta (forthcoming), where I argue that the charge of undetectability is doing most of the work. In contrast, Baker (2010) argues that the charge of redundancy is more important. And both charges are intimately related, so another view is that they are ultimately the same thing. But I leave these difficult questions for another time—the above gloss is good enough to be getting on with.

3. Qualitative Structures

Suppose these considerations lead us to suspect that the fundamental facts are all qualitative. We then face two questions: (i) What kinds of qualitative facts are fundamental, and (ii) How do they ground individualistic facts? Without answers we have no particular qualitativist view in hand, just some vague idea that some such view is likely true.

Start with the first question. Perhaps the most well-known qualitativist view is the traditional *bundle theory*, according to which the fundamental facts about the world concern which qualitative properties are “compresent”. Thus if a particular individual is red and round, the bundle theory says that the fundamental fact about the situation is that redness and roundness are compresent. Indeed the bundle theorist *identifies* individuals with maximal sets of compresent properties.

The standard objection is that this view cannot make sense of symmetric situations. Consider the “Max Black” world, a world containing just two qualitatively identical iron spheres—each of exactly the same shape, color, mass, etc.—2 miles apart. According to the bundle theory, each sphere is identified with the very same set of compresent properties—which is to say that the spheres are not distinct and there is only *one* of them after all.¹⁰

The objection does not depend on which kinds of qualitative properties are compresent. If the bundle theorist says that only *monadic* and *intrinsic* properties are compresent, she will identify each sphere with the set {spherical, brown, ...}. If she allows that *relations* can also be compresent, she will identify each with the set {spherical, brown, 2 miles from, ...}. Either way, the spheres share exactly the same qualitative properties, so the bundle theory identifies them.

The standard responses concede that the bundle theorist cannot make sense of *two* such spheres, but argue that she can make sense of *one* sphere that is 2 miles from itself. The

¹⁰ Adams (1979) discusses this kind of objection at length.

hope is to make *some* sense, if not perfect sense, of symmetric situations.¹¹ I find none of these responses satisfying, but this is not the time to argue the point. Let me instead develop a less familiar idea, namely that there is no need for the qualitativist to be a bundle theorist in the first place: there are other qualitativist views that can easily make perfect sense of symmetric situations.

This might sound surprising, for the bundle theory is often presumed to be the qualitativist's only option—Adams (1979) presumes as much, insofar as it is the only qualitativist view he considers. Thus the objection from symmetric situations is often considered qualitativism's death-knell. But this is all a mistake. Qualitativism, remember, is the view that individualistic facts are explained in terms of qualitative ones. The bundle theory tried to implement this by constructing each individual out of qualitative properties. But another approach is to bypass the construction of each individual and simply find a qualitative characterization of the entire situation. Call this approach *generalism*.¹²

There are many ways to implement this approach, but let me outline just two: *quantifier generalism* (which I am inclined to reject) and *algebraic generalism* (which I prefer). To see the idea behind quantifier generalism, note that the Max Black world can be characterized qualitatively like so:

(*) $(\exists x)(\exists y)(x \neq y \ \& \ x \text{ is } F \ \& \ y \text{ is } F \ \& \ x \text{ is 2 miles from } y)$

where 'F' expresses the intrinsic qualitative nature of each sphere. This is a purely qualitative fact: whether it holds does not depend on how things stand with any particular individual. So the quantifier generalist says that this is the most fundamental qualitative fact of a Max Black world. More generally, she says that the fundamental facts are quantified facts that we express in first-order logic without constants.

Against quantifier generalism, one might argue that it is *analytic*, or perhaps *essential*, of the existential quantifier that existential facts hold in virtue of their instances. For example, suppose something is red. Then the idea is that it is analytic or essential of the existential quantifier that, given any red object x , something is red because x is red. Both claims—that this is analytic, and that it is essential—have some plausibility, and neither is *obviously* false.¹³ So this is a potential consideration against quantifier generalism. The consideration might also be developed without appeal to analyticity or essence. Perhaps it is enough if the main idea—that existential facts hold in virtue of their instances—is central to our “web of belief”.

¹¹ See Hacking (1975) and O'Leary-Hawthorne (1995).

¹² Paul (2014) also explores various qualitativist views that purport to make perfect sense of symmetric situations. Unfortunately there is no room to discuss how our views relate here.

¹³ The claim that this is analytic does not imply the implausible claim that anyone possessing the concept “something” be familiar with the recent literature on grounding explanations. For that literature aims to describe a concept we already had and used, not introduce a new one.

However it is developed, note that this consideration does not tell against qualitativism writ large. The thought is not that the instances must be fundamental. The thought just concerns quantified facts—that they cannot be fundamental. Even if the qualitativist agrees that quantified facts hold in virtue of their instances, she might insist that the instances are in turn grounded in some other qualitative matter. Indeed this is my preferred view, as will become clear.

Some say (in conversation) that this consideration against quantifier generalism is unconvincing. If they are right, qualitativists like myself should welcome the result! But Russell (manuscript) has developed the consideration into a rigorous argument against quantifier generalism, and I have yet to see a quantifier generalist respond.

Personally, I am uncertain about the matter.¹⁴ But uncertainty is motivation enough to explore other approaches. Ideally, an alternative approach will make sense of the full range of situations that a quantifier generalist can, without taking quantified facts to be fundamental.

In Dasgupta (2009) I outlined an approach of this kind using the resources of algebraic logic. This is *algebraic generalism*. Like the bundle theory, this view starts with a domain of qualitative properties. But unlike in the bundle theory, the fundamental facts do not just concern which properties are compresent. Instead, algebraic generalism allows for more complex ways in which the properties can be “stitched together”.

How does this work? I refer the reader to Dasgupta (2009) for details, but here is the rough idea. Suppose that one’s initial domain of properties includes the property R of being red, the property G of being green, and the relation L of loving. One then introduces various operations by which complex properties can be constructed. Two operations are $\&$ and \sim , which take properties and yield their conjunctions and negations, respectively. So $(R \& G)$ is the property of being red and green, and $\sim R$ is the property of being not red. Another operation, σ , is permutative: if L is the relation that we ordinarily think of being instantiated by the pair $\langle x, y \rangle$ iff x loves y , then σL is the relation that we ordinarily think of being instantiated by $\langle x, y \rangle$ iff y loves x . Thus $(L \& \sim \sigma L)$ is the relation of loving unrequitedly. Two other permutative operations are also used.

The final operation, c , is known as “cropping”. Intuitively, when applied to a property, it says that one of its argument places is filled. Thus cL is the 1-place property of being loved, i.e. the property that we ordinarily think of being instantiated by x iff someone loves x . Applying c once more then gives ccL , the 0-place property—perhaps better called a state of affairs—of love occurring, a state that we would ordinarily describe as the state of someone loving someone.¹⁵

¹⁴ I mentioned this consideration against quantifier generalism in Dasgupta (2009) and (2011). Later I became less confident in it, though Russell’s work has convinced me that there might be something to it after all. Clearly, there is more work to do on this issue.

¹⁵ Here I am introducing the properties of the algebraic generalist by saying how we ordinarily talk about them. One might complain that the properties of the algebraic generalist cannot be *the same* as the ones we *ordinarily* talk about, since the latter are essentially had by individuals. But

In this way, the properties are stitched together to construct states of affairs. The fundamental facts of the world then concern which of these states obtain.

The operations just described are designed to mimic the workings of first-order logic without constants. Because of this, the algebraic generalist can construct *any* state of affairs that can be expressed in first-order logic without constants: she can use the operations to stitch together a state that characterizes the situation exactly.¹⁶ So, just as the quantifier generalist can make perfect sense of a Max Black world, so too can the algebraic generalist: according to her, it is a world in which the fundamental fact is that a certain state of affairs obtains (a state that consists of various qualitative properties stitched together in a certain way). Thus, like the quantifier generalist, the algebraic generalist has no problem making sense of symmetric situations.

The advantage of algebraic generalism is that, unlike in quantifier generalism, there is little temptation to think that the facts she claims to be fundamental *must* hold in virtue of individualistic facts. For her ontology is clear: there are just properties, stitched together by the operators. No individuals in view.

Both quantifier and algebraic generalism are *holistic*.¹⁷ To see this, consider a situation the fundamental nature of which is exhaustively characterized, according to the individualist, by the following facts:

a is F
b is G
a bears R to b
a ≠ b

How would the quantifier generalist characterize the fundamental facts of this situation?
Not as

$(\exists x) x$ is F
 $(\exists x) x$ is G
 $(\exists x)(\exists y) x$ bears R to y
 $(\exists x)(\exists y) x \neq y$

for this leaves open whether the thing that is F is the same as the thing that is G, and whether it is the same as the thing that bears R to something, and so on. The trouble is that the variables in this list are not “coordinated”. To coordinate them, the quantifier generalist must express the fundamental nature of the situation all at once, as

if so, the proper thing to say is that the algebraic generalist is introducing surrogate properties to stand in for the ones of ordinary discourse. I have nothing against this alternative way of talking. Thanks to Michaela McSweeney for a discussion of this point.

¹⁶ See Dasgupta (2009) for a more detailed discussion of what this means and why it is so.

¹⁷ In Dasgupta (2009) I discuss this aspect of the views in more detail.

(§) $(\exists x)(\exists y)(x \text{ is } F \ \& \ y \text{ is } G \ \& \ x \neq y \ \& \ x \text{ bears } R \text{ to } y)$

This is not to deny that the four “smaller” existentially quantified facts listed above obtain in the situation. They do. It is just to say that they are not fundamental: they hold in virtue of (§).

Precisely the same goes for algebraic generalism too—which should not be surprising, given that the operations of algebraic generalism are designed to mimic first-order logic. Thus, to characterize the situation just discussed, the algebraic generalist will construct a complex state of affairs that characterizes the situation as a whole, and the fundamental fact (according to her) will be that that state of affairs obtains.

Thus while the individualist thinks that the world at its most fundamental level decomposes into a number of distinct atomic facts, both generalists disagree: for them, the world is at rock bottom a unified whole. That is the respect in which both generalist views are holistic.

4. Plural Grounding

So much for the first question, concerning what kinds of qualitative facts are fundamental. The second question remains: Are they sufficient to ground the individualistic facts?

If not, the qualitativist must embrace an error theory and say that there are no individualistic facts and (therefore) no individuals like apples, alligators, or atoms. On this view, what we discovered to be the fundamental facts of the world are not sufficient to ground this aspect of the manifest image.¹⁸

But one might argue that an error theory about the existence of individuals is intolerable (I have some sympathy with this line of thought). If so, the qualitativist must show that individualistic facts *are* explicable in terms of the qualitative basis after all. And this is surprisingly hard to do.

The problem arises when one attends to two constraints governing ground, namely that a grounding explanation must both *necessitate* and be *explanatorily relevant* to what it grounds. Consider the fact that a particular apple A exists. By Necessitation—the principle introduced in section 1—whatever grounds its existence must necessitate its existence. But what qualitative facts could necessitate this? Not the fact that some apple or other exists, since this does not necessitate A’s existence: another apple could exist without A existing. Nor the fact that some apple has various qualities and exists in certain qualitatively specified local conditions—e.g. is red, is near a silver laptop, etc.—since that does not necessitate A’s existence either (there is a possible world in which there are qualitatively identical local conditions in Moscow even though A does not exist). The

¹⁸ This is analogous to Mackie’s (1977) view of morals, and Boghossian and Velleman’s (1989) view of color. In each case the idea is that what we have (supposedly) discovered to be the fundamental facts—e.g. physical facts concerning the distribution of physical magnitudes—are not sufficient to account for morals or color, respectively.

only qualitative fact that might necessitate A's existence is the qualitative state of a very large region of spacetime—perhaps the state of the entire cosmos. But the problem is that such a state will include qualitative information that is *irrelevant* to an explanation of A's existence, e.g. information about the state of Alpha Centauri. If I asked you to explain why (in the grounding sense) A exists, and you started talking about events in Alpha Centauri, I would accuse you of wandering off topic: intuitively, such events are *explanatorily irrelevant* to why A exists. This idea that events in Alpha Centauri are irrelevant is not something we can give up just because we are generalists. Rather (the argument is) this idea is central to our understanding of what the apple A is: if qualitativism cannot accommodate it, then qualitativism cannot accommodate the apple.

This is not to say that *no* qualitative facts are relevant to an explanation of A's existence. The qualitative state of a small region around the cup might be relevant. But (as we saw) that does not necessitate its existence. So the argument is this. When it comes to finding a qualitative ground for a given individualistic fact, the two constraints that a ground must both *necessitate* and be *explanatorily relevant* cannot be jointly met: either the putative ground necessitates but is irrelevant, or it is relevant but does not necessitate.¹⁹

The solution, I think, is to relax the logical form that grounding explanations can take. The above argument assumes that the qualitativist must find a qualitative ground for each individualistic fact in turn. But what if grounding explanations can be non-distributively plural, where this means that a plurality of facts taken together, the Xs, are grounded in some others, even though no one of the Xs has a ground on its own? If so, the qualitativist can say that the individualistic facts are *plurally* grounded in the qualitative facts in this non-distributive sense: *they*, the individualistic facts taken together, *are* grounded in qualitative facts, even though no individualistic fact taken on its own has a qualitative ground. This solution concedes the argument (above) that there is no qualitative explanation of why the apple A exists, and yet agrees with the qualitativist that the world is fundamentally qualitative.

This solution arguably satisfies the two constraints that grounds both necessitate and are relevant. For the question is whether all the qualitative facts (taken together) necessitate and are relevant to all the individualistic facts (taken together). And the answer in both cases is plausibly “Yes”.

If this solution is right, it might explain why individualism is often considered the more natural view. For the solution implies that if one looks at an individualistic fact on its own, one will not find a qualitative ground for it; and it is easy to infer from this to the conclusion that qualitativism is false. The inference is invalid if ground is non-distributively plural, but the mistake is understandable.

There is much more to say about how plural explanations work and whether this specific explanatory proposal is plausible. But I cannot discuss it all here; for now I can only suggest that this idea of plural grounding is a promising option for the qualitativist.²⁰

¹⁹ I develop this argument in more detail in Dasgupta (2014).

²⁰ See Dasgupta (2014) for a more thorough development and defense of this idea.

5. Applications

So far I have motivated qualitativism and outlined some qualitativist views about what the fundamental facts are like, including the one I prefer, algebraic generalism. I also outlined how individualistic facts might be grounded in a qualitative basis.

Suppose you are convinced. What of it? Are there any applications, any issues on which generalism might shed light?

There are. Here I will outline two from the philosophy of physics. The first concerns the metaphysics of spacetime. Many contemporary philosophers of physics are attracted by substantivalism, the view that spacetime exists independently of matter. But substantivalism faces the notorious “problem of shifts”: it appears to imply that uniformly shifting the matter around, while preserving the relations between bits of matter, yields a genuinely distinct possible world (after all, each bit of matter would be situated in a *different* region of spacetime).

Precisely what these shifts are, and why they are problematic, varies across physical theories. With classical theories, the shifts are uniform translations in space—e.g. shifting all matter over 3 feet to the right—and the putative problem is that the differences between worlds related by such a shift are undetectable and physically redundant (see section 2).²¹ In General Relativity, the shifts are diffeomorphisms, and the putative problem is that they imply that General Relativity is indeterministic. This is the famous “Hole Argument”.²²

In both cases, the difference between worlds related by the shift is merely haecceitistic: the two worlds are qualitatively alike. For example, worlds related by a uniform translation in space differ only with respect to which particular region of space each bit of matter is located at. So, if anti-haecceitism is true, the shift arguments fail. But in section 1 we saw that qualitativism implies anti-haecceitism. Thus if a substantivalist were also a qualitativist, neither shift argument would get off the ground!

To be clear, the idea of responding to these shift arguments by endorsing *anti-haecceitism* is not new: Butterfield (1988), Maudlin (1992), Brighouse (1994), Hofer (1996), Pooley (2006 and manuscript), and Caulton and Butterfield (2012) all respond this way. Some endorse a counterpart theoretic view of *de re* modality that is thought to imply anti-haecceitism; others take the anti-haecceitism to follow from some other modal axiom. But they all appear to be working with an individualistic conception of spacetime. So their anti-haecceitism is an *addition* to their view of spacetime, in the sense that their individualistic view of spacetime does not *by itself* imply anti-haecceitism. As it were, their anti-haecceitism is an extra thesis that must be put in “by hand”.

²¹ For further discussion, see Sklar (1974, chapter 3) and Maudlin (1993).

²² See Earman and Norton (1987).

This should strike us as odd. For when substantialists are faced with other possibilities that look problematic—e.g. the boosts discussed in section 2—the orthodox response is *not* just to tack on an additional modal thesis that implies that boosts are impossible. Rather, it is to endorse a view of the fundamental nature of spacetime that *by itself* yields the result that boosts are impossible.²³ Endorsing qualitativism about spacetime is the analogous move in the case of shifts, for this is a view about the fundamental nature of spacetime that yields *by itself* the result that shifts are impossible, without the need for an additional modal thesis.

So that is one application of qualitativism: it is the natural substantialist response to the problem of shifts, more natural than other responses that build in the anti-haecceitism “by hand”.²⁴

Admittedly, if the *only* qualitativist view on offer were the traditional bundle theory, this would all be moot. For it is difficult to see how the traditional bundle theory could be true of points of spacetime. At least in classical (flat) spacetimes, the kinds of properties that could be used to bundle a spacetime point—e.g. *being point-sized*, *being a spacetime region*—hold of *all* spacetime points, so the bundle theorist will identify all spacetime points with the very same set and say that there is only one spacetime point! This is clearly intolerable.²⁵

But as we have seen, the traditional bundle theory is not the only qualitativist view on offer: there is also generalism of one kind or another. And there are no obvious obstacles in the way of the substantialist endorsing generalism. So my advice to the substantialist is: Endorse generalism instead.

A second issue illuminated by generalism is this. Many contemporary philosophers of physics are attracted by what they call “structural realism”. They are moved to this view

²³ I am thinking of the orthodox move of endorsing a Galilean (sometimes called Neo-Newtonian) view of the structure of spacetime.

²⁴ This is the moral of Dasgupta (2011), where I expand on these points.

²⁵ The issue is less clear in curved spacetimes, since the curvature at each point might be used to distinguish them. But I leave this for others to pursue. Strikingly, when working in a classical setting, O’Leary-Hawthorne and Cover (1998) endorse this position that the bundle theory is true of points of substantial spacetime, and they embrace the result that there is only one point! According to them, the One Point stands in many distance relations to itself: it is 1 ft from itself, 2 ft from itself, and so on. They recognize that the view faces difficulties and say that ‘further development of this metaphysic must be postponed to another occasion’ (p. 212). But they appear not to have appreciated the severity of its difficulties. The whole point of substantialism is to ground facts about distances between material bodies in terms of their locations in spacetime: considerations such as the bucket argument are taken by substantialists to show that distances between material bodies cannot be fundamental. But on O’Leary-Hawthorne and Cover’s view, all material bodies are located at the same point. If that point is both 1 ft from itself and 2 ft from itself, how far apart are the material bodies? Their locations in substantial space do not answer the question. So their distances must be taken as an extra, fundamental, fact. Which is to say that, on their view, distances between material bodies are fundamental after all. Which is to say that calling their view “substantialist” is a sham.

by a number of considerations, including the Hole Argument (mentioned above), entangled quantum particles, and constancy across theory change, among other things.²⁶

But what exactly is structural realism? Its adherents are notoriously unclear. Ladyman and Ross (2007) offer the following:

There are objects in our metaphysics, but they have been purged of their intrinsic natures, identity, and individuality, and they are not metaphysically fundamental. (p. 131)

But this talk of ‘identity’ and ‘individuality’ is obscure in the extreme—indeed it is emblematic of the kind of metaphysics they purport to disdain! Moreover the description is only negative, telling us what objects are *not*, but not what they *are*. And when something positive is said, it is hardly enlightening. Thus they say

There are no things. Structure is all there is. (p. 130)

But what exactly is structure? We are not told. As a result, it is easy to doubt whether there is a coherent view lying behind the quotes.²⁷

Generalism is a view very much in the ballpark of what these quotes gesture at. If so, it serves as a “proof by construction” that there are coherent views corresponding to the quotes. Thus generalism is a natural resource for structural realists keen on developing their views.

6. Conclusion

The world is a purely qualitative mosaic. That is the slogan, and I believe it corresponds to something true.

It is less clear which precise qualitativist theory it corresponds to, but my best guess is this. At rock bottom, there is the World Fact of the algebraic generalist: it details how various qualities are stitched together, and constitutes an entire specification of the state of the world all at once. Individualistic facts—that this electron is charged, that this quark has a certain spin—*plurally* hold in virtue of that World Fact: *they*, the individualistic facts taken together, hold in virtue of the World Fact, even though no individualistic fact taken on its own holds in virtue of anything. Quantified facts then hold in virtue of their instances (*contra* the quantified generalist) just as we always thought.

The resulting view is “structuralist” or “holistic” in two respects. First, one can state something fundamental only by characterizing the fundamental nature of the world as a whole. And second, the derivative individualistic facts then flow from that fundamental

²⁶ See Ladyman and Ross (2007), and references therein.

²⁷ I have heard this doubt regularly in conversation. Admittedly, I am choosing quotes congenial to my point, but I believe the quotes are representative enough for the point being made.

fact only as a group, not one-by-one. So there is no making sense of *either* the fundamental *or* the derivative without making sense of everything at once.

So, this is what might be called a “many-from-one” metaphysics, on which many elements (the individualistic facts) flow together from one source (the World Fact). I am not aware of other many-from-one views in recent metaphysics, but Spinoza arguably endorsed one when he argued that the finite modes flow together, but not individually, from the essence of God.²⁸ If I am right, we have good reason to revisit many-from-one views today.²⁹

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²⁸ See Garrett (1991) for a defense of this reading of Spinoza.

²⁹ Many thanks to Robbie Hirsch, Michaela McSweeney, and John Morrison. Their insightful (and timely) feedback was invaluable.

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