

Emergence and Fundamentality

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Abstract: In this paper, I argue for a new way of characterizing ontological emergence. I appeal to recent discussions in metaontology of fundamentality and dependence, and show how emergence can be simply and straightforwardly characterized using these notions. I then argue that many of the standard problems for emergence don't apply to this account: given a clearly specified metaontological background, emergence becomes much easier to explicate. If my arguments are successful, they show both a helpful way of thinking emergence and the potential utility of discussions in metaontology when applied to first-order metaphysics..

In this paper, I argue for a new way of characterizing ontological emergence.¹ I appeal to recent discussions in metaontology of fundamentality and dependence and show how emergence can be simply and straightforwardly characterized using these notions.² I then argue that many of the standard problems for emergence don't apply to this account: given a clearly specified metaontological background, emergence becomes much easier to explicate. If my arguments are successful, they show both a helpful way of thinking about emergence and the potential utility of discussions in metaontology when applied to first-order metaphysics.

The specific commitments of emergence are opaque. Emergentists maintain that the parts of a system, through their collective activity, can sometimes give rise to an entity which is quite distinct – in terms of its structure, its causal powers, its

¹ There is a separate notion, often employed in philosophy of science, of *epistemological emergence* which does not concern me here. I'm interested in emergence as a metaphysical thesis: the prospect of emergent entities (with "entity" being understood as either an object or a property).

² I by no means wish to assert that appealing to fundamentality and/or dependence is novel to discussions of emergence. Rather, the *way* in which I make this appeal -- tying explication of emergence specifically to recent debates in metaontology -- is to my knowledge new, and presents an as-yet-unexplored way of thinking about emergence.

ontological makeup, etc – from the parts of that system, or from anything those parts compose. The resultant entity, in these special cases, is *emergent*. Things get tricky, though, when we try to understand exactly what’s meant by this notion of emergence. It’s often couched in metaphors – e.g., an emergent entity is ‘something new’³, something which is ‘over and above’ its parts⁴ – and it’s not clear how to cash those metaphors out.

One thing that does seem clear, however, is this: to claim that some entities are emergent is to make a claim about the world’s structure. The emergentist is saying that not everything about the world’s structure can be explained in terms of smaller parts building into larger, more complex wholes. Sometimes the collective activity of the smaller parts produces not just a complex thing made up of those smaller things, but also something fully distinct from (‘emergent’ from) those parts, their sum, and anything they compose. And that’s a claim about how the world is structured.

If such claims are going to be made clearly, they need to be made in the context of an explicit and coherent ontological (or perhaps more accurately, meta-ontological) framework. My claim is that much of the mystery about emergence arises from having no clear statement of what its meta-ontological background should be. In this paper, I will show how a specific meta-ontological framework can be used as a background for understanding emergence. Within this framework, I will argue, most of the standard puzzles and problems surrounding emergence disappear. Emergence,

³ As in, e.g., Marras (2006)

⁴ As in, e.g., Crane (2001)

whether or not you think there's any reason for endorsing it, is not on this interpretation *mysterious*.

I begin by sketching a structural distinction – which I will call a ‘fundamentalist ontology’ – between the *fundamental* and the *derivative* (section 1). I’ll then argue that this distinction can be pulled apart from a further distinction – that of the ontologically *dependent* and the ontologically *independent* (section 2). Separating these two distinctions allows for the characterization of emergent entities as those which are fundamental but not independent (section 3) and coheres nicely with standard (as well as some non-standard) examples of emergence (section 4). I’ll argue that this way of explicating emergence avoids many of the traditional problems associated with emergence, which often presuppose a connection between fundamentality and a hierarchy of ontological levels - a connection that the fundamentalist ontology explicitly rejects (section 5).

I won’t argue for the ontological framework – the ‘fundamentalist’ ontology – that I explain in subsequent sections. Nor will I argue that there is emergence. If you are committed to emergence, you can read what follows as giving (defeasible) motivation for a fundamentalist ontology (since a fundamentalist ontology helps explicate emergence). Likewise, if you are committed to a fundamentalist ontology, and think that it’s at least an open (epistemic) possibility that there is emergence, you could count as one more advantage for ontological fundamentalism that it can help explain emergence. But this paper won’t give you independent arguments either for a fundamentalist ontology or for emergence. Rather, my aim is to show that

establishing a specific ontological background like ontological fundamentalism can sometimes help to resolve longstanding problems – in this case, the vexed questions about the metaphysics of emergence.

1. The Fundamentalist Ontology

The basics of an approach which I call the *fundamentalist ontology* has recently been defended by, inter alia, Kit Fine (2001), John Heil (2003), JRG Williams (forthcoming), Jonathan Schaffer (forthcoming)^{a,b}⁵, and Ross Cameron (2008), (forthcoming).⁶ The fundamentalist ontology maintains a single crucial ontological distinction: the divide between what exists derivatively and what exists fundamentally. Fundamentality, as deployed in metaphysics, is often considered a matter of degree: e.g., molecules are less fundamental than electrons, but more fundamental than tables and chairs.⁷ But, in contrast to a picture wherein certain things can be more or less fundamental than other things (even if they are not *absolutely* fundamental), on the fundamentalist view things are either fundamental or they are not, in which case they are derivative. Fundamentality does not come in degrees. That is, everything that is not fundamental exists in the same manner; rather than having degrees of fundamentality (which will vary inversely with the degree of

⁵ Or, better, this approach is cited as one of the possible interpretations of monism which Schaffer proposes, though remains neutral on. Schaffer argues that only the world is absolutely fundamental, and he says that one way of interpreting this is that everything else is simply derivative, and thus on a par. He remains neutral, however, on whether this is the correct interpretation (as opposed to saying that there are degrees of fundamentality, with the world as the only *absolutely* fundamental thing, but with other entities being more and less fundamental than one another).

⁶ There are different ways of explaining the distinction – e.g., Fine (2001) characterizes it as the distinction between what exists and what exists *in reality*. I will proceed with the fundamental/derivative distinction here, but translation to other locutions shouldn't be problematic.

⁷ See especially Heil (2003) and Schaffer (2003) for critical discussion.

complexity), everything that is not fundamental simply has its existence derivatively from what exists fundamentally.

To get clearer on this, more needs to be said about the notion of fundamentality invoked here. I will take *fundamentality* to be a metaphysical primitive, and as such I will not attempt to give a definition of it. I can, however, gloss it in a number of ways that may be helpful.

Take, for example, the familiar theological metaphor: the fundamental entities are all and only those entities which God needs to create in order to make the world how it is. So if God wants to create a world w , the fundamental entities will be the entities necessary and sufficient for God to create in order for her creation to count as a creation of w . Likewise, if she changes her mind and decides to create w^* instead, she will alter her creation by changing what fundamental entities she creates; she need change her creation only in fundamentals in order to make it a creation of w^* rather than w .

So, for example, if God decides that she wants a world with a single complex object composed of two mereological simples, she would simply have to create the two mereological simples.⁸ She would not have to engage in a further act of creation: ‘let there be a complex object’. By setting the composition relation and what simples exist, she gets the (derivative) complex object for free.⁹

⁸ And arrange them appropriately, if restricted composition is true.

⁹ Something like this won’t work as an *analysis* of fundamentality, however, because we shouldn’t rule out by definition that there are necessary fundamental existents, or necessary connections between fundamental existents.

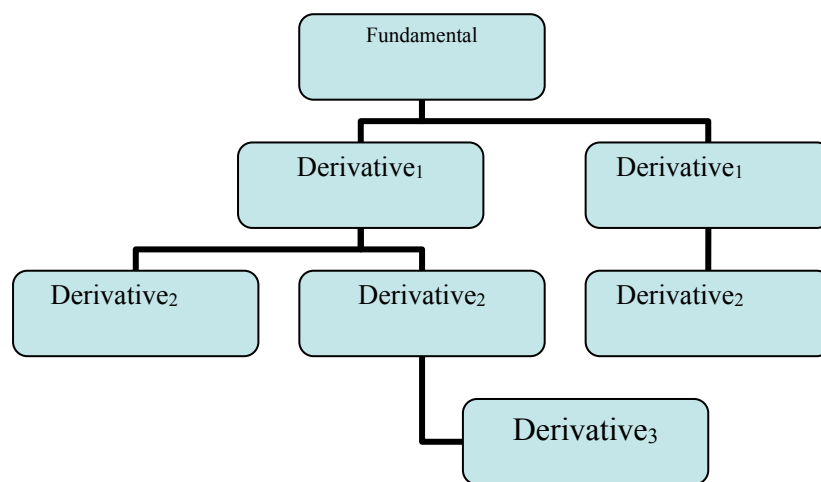
Alternatively, fundamentality can be cashed out in terms of truthmakers. Entities which are fundamental are those which truth-make their own existence, and which are capable of serving as truthmakers for the existence of other (derivative) entities.¹⁰ So, for example, suppose that a trope bundle theory is true, and that tropes are fundamental but tables are not. The tropes truth-make their own existence; for each individual trope, you need appeal to no ontology other than that trope itself for the truth of ‘that trope exists’. Contrast this to the existence of a table. The table exists, but the truthmaker for its existence is not the table itself, but the tropes it’s composed of (plus relations between them – be it mereology or compresence). Each of the tropes truthmake their own existence, and they also jointly truth-make the existence of the table.

Derivative entities will then be characterized in simple contrast to fundamental ones. An entity is derivative just in case it is not fundamental. Derivative entities are those which, as it were, derive their existence from the fundamental entities. Couched in the previous metaphor, derivative existents are those which God doesn’t need to include in her ‘ontological shopping basket’. She can create them simply by creating the fundamental existents which they are derived from. Likewise, the derivative entities are those which aren’t the truthmakers for their own existence. For any derivative entity x , ‘ x exists’ is true but made true, not by x , but by some collection of fundamental entities $y_1 . . . y_n$.

¹⁰ See Heil (2003) and Cameron (2008) for discussion of this approach.

Being derivative, in this characterization, is irreflexive, asymmetric, and transitive (but only trivially so, since you never get chains of derivativeness). Derivative entities are derivative only on fundamental entities, never on other derivative entities.¹¹

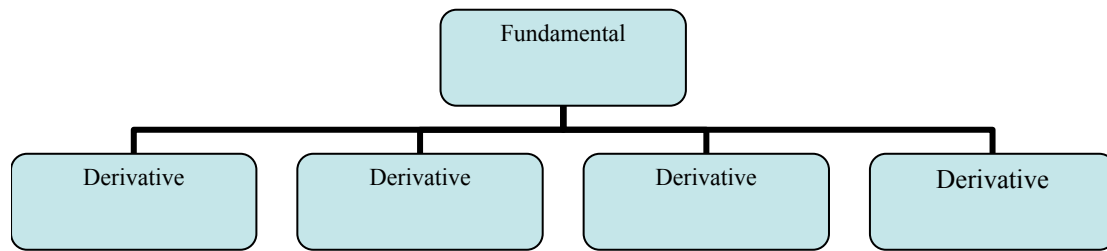
That is, on a picture in which fundamentality comes in degrees we have the following 'hierarchical' picture:



with things which are Fundamental being *absolutely* fundamental, things which are Derivative₁ being less fundamental than the Fundamental things, but more fundamental than the Derivative₂ things, and so on.

Whereas on the fundamentalist approach we have:

¹¹ Though there are various ways of cashing out the notion of 'derivative on'. See note 20.



There are different ways to characterize the existence of the derivative entities – the picture can be either *deflationary* or *inflationary*. The former interpretation would say something to the effect of ‘fundamental things exist and derivative things exist, but only fundamental things *really* exist’.¹² Or ‘of course we can say true things about the derivative existents, and in that loose sense they exist, but the only things that make up the world in some metaphysically privileged sense are the fundamental things.’ The latter interpretation, in contrast, would claim something along the lines of ‘of course both fundamental and derivative entities exist, and of course they really exist (whatever that means), there’s just a difference in *how* they exist or what the nature of their existence is’.¹³ For the purposes here I’ll remain neutral on this question, as nothing in the subsequent arguments will hang on whether an inflationary or deflationary approach to derivative existence is adopted.

2. Ontological Dependence

¹² See Cameron (2008), (forthcoming) for explanation of this more deflationary approach. Cameron argues that the truth in natural language of ‘x exists’ does not require that we include x in our ontology. Cameron adopts the Lewis-Sider account of meaning and quantification, claiming that meaning is determined by both use and naturalness. But use can sometimes trump naturalness, if common usage is very unnatural. So it might be that the quantifier expressed by ‘exists’ in English is very unnatural. If that’s the case, there can be true sentences of English (and other natural languages) of the form ‘x exists’ which do not ‘carve the world at its joints’ – that is, they do not correspond to the non-linguistic structure of reality. But this does not preclude there being some other language (though not a language anyone speaks – call it ‘Ontologese’) which *is* perfectly natural and whose quantifiers *do* carve the world at its joints. It’s the true sentences of the form ‘x exists’ in this language, Cameron argues, that the metaphysician should be interested in. And a complete inventory of such existence facts will be sufficient for the truth of the true sentences of English (even though English quantifies over things Ontologese does not, and possibly vice versa).

¹³ This is the interpretation favored by, e.g., Schaffer. See his (forthcoming)a,b.

I will appeal to one other basic distinction: that between entities which are ontologically *dependent* and those which are ontologically *independent*. I will argue that the two distinctions are distinct and come apart. This potential separation between fundamentality and independence will be what gives rise to the basic characterization of emergence that follows.

Here is the basic idea behind dependence: an entity x is dependent on entities y_1, \dots, y_n just in case x is both caused and *sustained* by the y 's. The difference between something simply being caused by something else and something being *sustained* by something else will do a lot of work in the understanding of dependence in play here, so it's best to spell it out in more detail. I suspect that, like fundamentality, dependence is primitive, so I don't intend what follows as an analysis. Think of it, rather, as a helpful explanation that generalizes from basic cases: what I'm concerned with is giving an intuitive gloss on the idea I'm labelling 'dependence'.

There is a sense in which a person is dependent on her parents for her existence: her parents cause her to exist, and had her parents not existed she wouldn't have existed. But this is a very weak sense of dependence: it doesn't demand that anything exists *now* whose existence you depend on – it only requires that at some time or other, something(s), y_1, \dots, y_n , existed, such that (roughly) had they not existed then you wouldn't exist now.

There is, though, a stronger sense of dependence – that had between, say, a complex object and its parts. The contrast is that, rather than merely being counterfactually

dependent on the existence of something in its past, the object is dependent *at each moment of its existence* on the existence of something *which exists at that very time*.

Take the case of a complex object dependent on its parts. It's not enough for the object to exist at t that at some previous time t_n there were some simples arranged object-wise. Rather there must be simples arranged object-wise *at t* in order for the object to exist at t . The stronger notion of dependence, which I will call *ontological dependence*¹⁴ can be understood as:

(OD) An entity x is dependent iff: for all possible worlds w and times t at which a duplicate of x exists, x is accompanied by other contingent objects in w at t .

That is, anytime you've got a thing exactly like x , you've got to have other things existing alongside it.¹⁵ You can't ever just have x by itself. And in that sense, x *depends* (at every moment of its existence) on other things.

So, for example, even if essentiality of origin is true you're not, in this stronger sense, dependent on your parents. Your existence requires the existence of your parents, but it's not the case that for every time at which you exist, your parents must exist at that time. And there could be an exact copy of you in a world that doesn't contain exact

¹⁴ From here on, unless specifically noted 'dependence' will be understood in this stronger sense.

¹⁵ So any cases where the requirement of (OD) is met *apart from those cases where a thing depends on its parts* will be cases where Humean recombination fails. (OD) will likely be unattractive to those with strongly *non-Humean* views of modality, though it's not implausible to think that if there are lots of necessary connections in the world there are a lot more dependencies then we might originally have suspected. In any case, I'm not optimistic about getting a definition for dependence -- especially a modal definition -- that makes all varieties of modalist happy, so I'm untroubled if (OD) needs to presuppose some kind of Humeanism.

copies of your parents. Contrast this to the relationship you bear to the parts which compose you: at every time you exist, some collection of parts must be there to make up your body. And anything which is an exact copy of you had better include copies of those parts. You're dependent on the parts of your body, but not on your parents. In contrast, a duplicate of something like a mereological atom could exist unaccompanied by anything. That is, you could have an exact copy of the atom without needing to have a copy of *anything else* to support its existence.

Notice also that what's being explained by (OD) isn't the dependence of x on the ys. Rather, it's the dependence of x simpliciter.¹⁶ A complex object is dependent because you can't have a duplicate of it without having some things which are its parts. But it would be at best misleading to say that it's dependent on its *particular* parts. Nothing about dependence encodes the essentiality of constitution – the complex object requires the existence of *some parts or other*, but not the particular parts which in fact compose it.

(OD) is restricted to contingent entities because it shouldn't come out that, if there are necessary existents (e.g., abstracta), everything trivially depends on those necessary existents.¹⁷ If (OD) was aiming for *analysis* of dependence, you might hope that this

¹⁶ I'll sometimes use the locution 'dependent on' for convenience, but nothing significant should be read into that. The key notion is simply dependence simpliciter. I take 'dependent on' to mean something roughly like the following: x is dependent on the ys iff: x is dependent because it is part of its intrinsic nature that it bears relation R to things intrinsically like the ys.

¹⁷ This allows that abstracta can depend on concreta, but assuming that abstracta exist necessarily it rules out that anything (including abstracta themselves) depend on abstracta. I don't find this problematic. But if you think that, for example, necessarily existing abstracta can depend on other necessarily existing abstracta, no sort of modal definition is going to work. If you thought that it's necessary that there be some abstracta, but contingent what abstracta there are, then (OD) would need to be further restricted to concrete entities to avoid having all concrete objects trivially depend on abstracta.

would fall out of the definition, rather than be packed into it. But since I'm here only trying to provide a useful gloss on the idea, I don't consider this too much a problem.

The basic distinction is just this: if God took away everything distinct to, e.g., a table, she would by that very act have to take away the table. She's taken away the simples that compose the table, and so the table comes with them. The table is ontologically dependent. In contrast, if she took away everything distinct from one of the simples, nothing in that very action commits her to taking the simple as well. One of the simples can get by without the others (and without the table) in a way the table can't get by without the simples. The simples are ontologically independent.

Something is ontologically independent, on this reading, just in case it is not ontologically dependent. If the existence of x does not, at each moment of its existence, rely on some other entity or entities, then x is ontologically independent. So the ontologically independent entities are those capable of 'lonely existence', in Lewis-Langton sense.¹⁸

3. Fundamental dependants

So we now have two basic ontological distinctions: the divide between the fundamental and the derivative, and the divide between the dependent and the independent. It's tempting to think that these two distinctions are more or less glosses on the same basic idea, but I want to dispute this. I'll argue that the doctrine of

¹⁸ Langton and Lewis (1998)

emergence¹⁹ can be captured in the simple thought that the two distinctions cut across each other. My central thesis is this: that there is ontological emergence is the claim that some things which are fundamental are not ontologically independent.

If fundamentality and independence are separate distinctions which cut across one another, then there is space for four possibilities: the fundamental independent, the fundamental dependent, the derivative independent and the derivative dependent.

That there could be fundamental independent entities is hardly controversial. If there were mereological atoms, for example, they would plausibly be both fundamental and independent in the sense given above. Derivative dependent entities aren't a hard sell either: plausibly macroscopic objects like tables fall into this category. It's the other two combinations that are problematic, but I think there's conceptual space for both. I'm going to argue, in subsequent sections, that fundamental dependent entities plausibly fit the characterization of emergent entities; but before I get to that I'll say something about why there might be derivative independent entities.

Consider, for example, numbers. On Platonic metaphysics of mathematical entities numbers are fundamental; but on others, they are derivative – and while on some metaphysics that take them to be derivative they might be held to be dependent (on, for example, the structure of infinitely many concrete entities), there are plausible views whereby numbers are derivative but independent. Consider mathematical trivialism, as defended recently by Agustin Rayo (forthcoming). Rayo suggests that mathematical truths are trivial in the sense that their truth imposes no demand on the

¹⁹ Or, at least, one version of it. A lot of things get labelled 'emergence'.

world. So ‘there is a prime number between 4 and 6’ is true, but nothing is required of the world in order for it to be true (as opposed to ‘there is an elephant’, whose truth requires there to be an elephant). While Rayo doesn’t speak in these terms, it’s natural to take this as a view according to which numbers are derivative: they are no part of fundamental reality.²⁰ Since the truth of sentences proclaiming the existence of numbers makes no demands on the world, numbers need be no part of God’s ontological shopping basket if she wants to make a world where the truths of math are true. In Fine’s terminology, numbers exist on this view, but they don’t exist ‘in reality’; in the language of the truthmaker theorist, numbers need not be included amongst one’s ontology to do any truthmaking work, because the truths of math are trivially made true.

So this is a metaphysic according to which numbers are derivative; but are they dependent? Plausibly not. If we assume that a duplicate of a number is just itself, it seems that numbers could exist unaccompanied by any contingent things (unless a world empty of concreta is impossible), so they meet the requirement of (OD). Of course, (OD) was not meant as an analysis of dependence, but merely a litmus test to test for dependence in paradigm cases, and one might think necessary existents are precisely *not* paradigm cases; that is, if the definition was going to break down, it would be when dealing with necessarily existing dependent entities. That may be so.

Nevertheless, it doesn’t seem correct to say that numbers are dependent on this view.

²⁰ The obvious question then: what are they derivative *on*? Nothing, I claim. Some things are derivative *on* others, some are merely derivative. We characterized fundamentality as follows: *x* is fundamental iff *x* makes true [*x* exists]. So for *y* to be derivative is just for [*y* exists] to be true, but *y* not to make it true. But there’re two ways that can be the case. It can be the case because something *other* than *y*, *z* say, makes it true, in which case *y* is derivative on *z*, or it can be the case because *nothing* makes it true that [*y* exists], in which case *y* is simply derivative, without being derivative *on* anything. The latter, it seems, is the position of the trivialist. See, for discussion, Cameron (forthcoming)b.

Why would they be? This is not a view on which talk about numbers is talk about some structure(s), either abstract or concrete, possible or actual; it is not a view on which numbers are properties or sets and can therefore plausibly be said to be dependent on their instances/members. This is a view according to which numbers are an ontological free lunch: their existence makes *no* demand on the world, *a fortiori* no demand that there be some entities on which they depend (in the way that the existence of a table makes the demand on the world that there be parts which compose it). Numbers, on this view, look independent. But they are nonetheless derivative, because the fact that they exist does not demand that they be included amongst fundamental ontology (since it does not demand *anything*).

And so if this view is correct, numbers are derivative independent entities. Now, I'm not arguing here that it *is* correct. But it seems to me to be *coherent*, and so we should at least admit the conceptual possibility of independent derivative entities. And once we're happy with the fundamental and the independent coming apart in that direction, we should drop any lingering suspicion against the coherence of it coming apart in the other direction – that is, with the coherence of the idea that there are fundamental dependent entities. And the class of fundamental dependent entities, I'll argue, is the class of emergent entities.

And so we can make divisions like the following:²¹

²¹ I'm not committed to the particular examples in these boxes. One might, for example, argue that there are fundamental complex objects, or derivative simples, etc. The examples are just meant to illustrate the framework – and what is important for present purposes is that each of the four categories is potentially occupied by some things, and that emergent entities are whatever goes in the top right box.

	Independent	Dependent
Fundamental	Mereological Simples	Emergent entities
Derivative	Numbers (and other necessarily existing abstracta?)	Complex objects, artefacts etc

As I'll explain below, I think that all entities plausibly described as emergent should be characterized as both fundamental and dependent, and I think that an entity can't be both fundamental and dependent without being considered emergent. Thus I think that the following holds:

(OE) An entity x is ontologically emergent iff: x is fundamental and dependent.

I'll first explain, by some general remarks and a few examples, why I think (OE) captures the basic idea of emergence. I'll then argue that the characterization of emergence given by (OE) avoids many of the standard problems faced when emergence is couched in the more familiar framework of a hierarchical *levels* ontology.

The central idea of ontological emergence has generally been glossed as getting ‘something new’ which is ‘over and above’ its parts. An emergent entity is thus taken to be a substantial ontological commitment – you don’t get emergent things for free. Yet emergent entities are likewise characterized as not being among the very basic building blocks of the world (whatever they may be). Here, then, is where the two distinctions can do some work. An emergent thing is a robust ontological commitment – ‘something new’, distinct from the sum of its parts. And so, ostensibly, it is one of the things God would have to create in order to make the world how it is. If the table is simply a complex object made up of simpler parts, God can create the parts, arrange them table-wise, and get the table for free. But if the table is emergent – something distinct from the sum or arrangement of its parts – then God can’t just create the parts and arrange them table wise. She has to create the table as well.

Likewise for the truthmaker gloss on fundamentality. Whatever reasons pushed you towards emergence would also likely push you towards the idea that you need emergent entities in your ontology as truthmakers. If the emergent entity is really something new, something over and above its components, then those components won’t be sufficient truthmakers for its existence. You’ll need the emergent thing itself (and it looks plausible to think that the emergent entity will serve as the truthmaker for its own existence).

Thus emergent entities look plausibly characterized as fundamental. They are part of the real stuff, the core stuff, in the world. They are not the stuff you get for free. If a

basic distinction between fundamental and derivative is in place, emergent entities are best understood as fundamental.

But emergent things are clearly not ontologically independent. They depend on the entities from which they emerge. That is, though the emergent entity is ‘something new’, the existence of the ‘new’ entity must be both caused *and* sustained by the collective activity of other entities. Otherwise, the entity in question would not be properly characterized as ‘emerging’ from anything.

What about the other direction of the biconditional? Why characterize all cases of fundamental dependent entities as emergent? I’m less committed to this claim, but I do find it plausible. Emergent entities have typically been characterized as straddling some sort of ontological middle ground – sharing some things in common with the basic or fundamental (robust causal powers, simple structure, etc) and some things in common with more complex entities (requiring a certain level of complexity in the structures which cause them, supervening on other complex structures, etc). On the standard picture, emergent entities aren’t the basic building blocks of matter, nor are they complex entities made up of those basic entities – they’re something distinct, something which shares features with both the basic and the complex, but can’t really be classed as either. This idea is captured by postulation of fundamental dependent entities. If the paradigm of fundamentality is the fundamental independent entity, then emergent entities have something in common with that paradigm – namely, fundamentality. But they also have something in common with the paradigm of the derivative (the derivative dependent entities) – namely, dependence. Fundamental

dependent entities carve out much the same ontological middle ground that emergence was originally meant to characterize on the levels picture. So I think it's reasonable to class all fundamental dependent entities as emergent.

The issue is at most a terminological one: whether it makes sense to call all and only the fundamental dependent entities 'emergent'. Since the fundamental dependent entities seem to play the kind of role that we often associate with emergence (and 'emergence'), I think it makes good sense to do so. Regardless, I think the idea of fundamental dependent entities usefully and non-mysteriously captures the basic ideas that talk of 'emergence' is often employed to cover, and that's what seems philosophically important.

4. Examples

Some examples of the sort of ontology that might best be characterized as emergent will help to make the above picture clearer. None of the examples are in any way meant to be arguments that there is emergence. They're conditional claims (if the world was like this, then there would be emergence) and I'm not endorsing the antecedents. But the conditionals themselves are useful for understanding the characterization given in (OE).

I hope to show that (OE) captures a basic idea of emergence, as demonstrated by standard cases. But I also want to argue that the characterization of emergence given by (OE) reaches beyond the usual examples of emergence discussed in the literature. You could worry that this means (OE) over-generalizes, but I actually think it's one of

its main benefits. Once we see that the same basic phenomenon invoked when talking about consciousness could come up in discussions of gunky ontologies or trope bundle theories the phenomenon begins to look less mysterious and more theoretically useful.

4.1 Minds

Take perhaps the most familiar case from literature on emergence: the relationship between mind and body. For various reasons philosophers are sometimes attracted to the idea that mind and body are distinct.²² Claiming that mental properties *emerge* from the complex interaction of physical properties has been one attempt at capturing this distinctness. We can interpret that according to (OE) as follows.

Mental properties are part of the fundamental make-up of reality. They do some sort of work (causation, truthmaking, etc) that cannot be done by anything else. If God wants to create a world like ours, with creatures like us, she can't just create microphysical particles in certain arrangements and get the mental properties 'for free'. She has to create the mental properties as well. But the existence of mental properties is both caused and sustained by the collective activity of certain physical properties. Without those physical properties persisting in very specific arrangements, the mental properties would cease to exist. That is, according to the emergentist, the world of pure Cartesian minds is impossible. Mental properties are

²² Often the reasons are causal, though causal reasons don't exhaust the potential motivation. Differences, in persistence conditions, metaphysical structure (you might think minds are 'simple' or 'unified' in a way bodies aren't), etc can all be put forward as reasons for a robust mind/body distinction.

dependent: they depend on the existence of physical properties and relations. Mental properties are thus fundamental dependent entities.

4.2 Living beings and persons

Another familiar case of emergence that can illustrate (OE) comes from the metaphysical theories of Trenton Merricks' *Objects and Persons* and Peter van Inwagen's *Material Beings*. Van Inwagen argues that only mereological simples and composites of those simples which are *subjects of a life* exist; Merricks makes the stronger claim that only simples and composites of those simples which are *persons* exist. In both cases, compositional nihilism, though thought to be *prima facie* methodologically attractive, is found wanting. Simples (arranged object-wise) can do all the work we need for ordinary macroscopic objects. But they can't do all the work, the thought goes, for living beings (van Inwagen) or more specifically for persons (Merricks). These entities have special properties, causal powers, etc that simply can't be accounted for solely with reference to simples. But they certainly aren't ontologically independent. They depend for their existence on the fact that some simples are arranged organism-wise; e.g., at each moment of a person's existence there must be some simples arranged *qua* human organism to sustain the existence of that person. Thus, it seems that on a van Inwagen/Merricks-style ontology, living beings and/or persons are fundamental, even though they are not independent.

4.3 Gunk

Examples of (OE) don't come only from familiar discussions of emergence. A *gunky* ontology might also give substantial motivation for endorsing (OE), simply because a gunky ontology would ostensibly be one in which *nothing* is ontologically independent. Assuming that complex objects depend on their parts, if everything has proper parts everything will be dependent. And a gunky ontology is one in which there is no smallest, indivisible component – everything has proper parts. Thus if the believer in gunk is going to say that anything in her ontology is fundamental, she will need to say that there are fundamental dependent entities.²³ In a gunky ontology, all fundamental entities are fundamental dependent entities.

There would be multiple ways to characterize such entities in a gunky framework. A defender of gunk could maintain, for example, that a certain class of objects and everything which composes those objects counts as fundamental. For example, she could claim that electrons *and all the infinitely many proper parts that compose electrons* are fundamental. She still needs to accept fundamental dependent entities to say this, because any electron or electron-part she picks out will count as fundamental, but will also be dependent on the parts which comprise it.

Alternatively, the gunk theorist could maintain that only a certain class of objects – electrons, living beings, ordinary objects, whatever – are fundamental. These fundamental entities combine to compose further derivative entities, but they are also themselves composed of derivative entities. There's nothing contradictory in this

²³ Or be a monist. Notice how the picture of emergence given in (OE) gives a nice way a resisting the argument from gunk to monism given in Schaffer (forthcoming)a. Schaffer motivates priority monism as the only way of capturing fundamentality within a gunky framework. But if we have reason to accept fundamental entities which are dependent, then there is an alternative way of allowing for fundamentality in a gunky ontology.

thought (a fundamental entity composed of derivative entities) since the fundamentalist ontology doesn't commit to fundamentality residing only in the very smallest things. This is particularly relevant to a gunky ontology, in which "very smallest things" is just a case of reference failure. On this picture, there are fundamental entities which are not only dependent (on their parts), but dependent on derivative entities (since their parts are derivative). This might strike many as problematic, but it's plausible that when dealing with gunk we often come across things which appear problematic not because of any internal tension, but because we're so accustomed to thinking about these issues within an atomistic framework.

To stretch this position yet further, it should be noted that dependence, as characterized, allows that, for example, *both* an object and its parts could be dependent: that is, nothing we've said so far commits us to dependence being asymmetric. So nothing (at least nothing said here) rules out that a fundamental gunky object *and* its parts could be dependent. It may be that if these kinds of dependence are allowed, then "dependence" is no longer an appropriate name – maybe something like "co-dependence" or "ontological symbiosis" is more apt – but that question is at most terminological. The point here is simply that this option isn't obviously ruled out.

4.4 Trope theory

Examples of fundamental dependents can also come from trope theory. Let's assume, as many commonly do, that certain properties cannot exist independently – for

example, that there cannot be ‘bare mass’.²⁴ Mass tropes are arguably dependent – certain other tropes (shape and size tropes, perhaps) must exist, and relate in specific ways to one other, in order for a mass trope to exist. But this shouldn’t undermine the idea that a mass trope is a fundamental existent. Mass is something quite distinct from shape and size, and ostensibly can’t be fixed just by shape and size. It’s just that it can’t exist independently of them.

The problem of ‘bare mass’ would thus, I contend, be a case of dependent fundamentality. If God’s creating the world, she can’t create mass just by creating shape and size (mass doesn’t come for free). But the existence of mass tropes is dependent – you can’t have mass tropes without shape and size tropes. And again, this might plausibly be case multiple dependence: bare size or bare shape is likely just as bad as bare mass. Alternatively, a trope theorist might maintain that, e.g., the shape-size-mass complex (the trope “bundle”) is also fundamental. It does work as a unit that the individual tropes cannot do. In that case, she could maintain that each of the mass, shape, and size tropes, though they are themselves fundamental, cannot exist without the shape-size-mass bundle, which is itself fundamental. Regardless of the specifics, the basic point is this: if you are a trope theorist, properties like mass can thus be understood, via (OE), as emergent.

4.5 Physics

Finally, there are the increasingly appealed to cases from quantum mechanics wherein the properties of a system cannot, apparently, be exhaustively explained by properties

²⁴ Though see Schaffer (2003)b for critical discussion.

of the parts of that system.²⁵ That is, the system as a whole seems to display properties which can only be accounted for by the whole, not by the behaviour of the parts. The interpretations of cases like these will, obviously, be controversial, and I don't want to be committal about them. But they're worth thinking about, even if only to decide what *would be* the correct thing to say if cases like these *were* part of a correct physics.

Examples include so-called 'quantum entanglement' and the generation of a field from constituent particles (or the generation of the particles from the field, depending on which interpretation of fields you adopt – likewise for the subsequent examples). In cases such as these the system as a whole seems to be dependent on the relevant components; you only get the holistic system because you have the parts interacting in a certain way, and the parts have to keep interacting in a very specific way in order for the system to continue to exist. For example, you only get the field because you have (and continue to have) particles. But once you get the system, you get something, as it were, 'over and above' the parts. Again, in the field case, the field is generated by the collective activity of the particles, but it has causal powers that are more than just the collective causal powers of the particles. The system does causal work, has explanatory power, etc. holistically. Thus you're going to need the system itself, rather than just its components, as a truthmaker; likewise, only the system, not the collective actions of its parts, makes it true that the system exists.²⁶ So the system,

²⁵ See, e.g., chp. 2 of Maudlin (2007) for discussion.

²⁶ It might be objected that parts + laws are the only things needed for truthmakers in this case, so the system isn't a candidate for fundamentality. I am, however, assuming that laws are not components of ontology that can be used as parts of truthmakers (i.e., laws are not themselves fundamental). Moreover, even if a more robust account of laws is assumed, it's far from clear that in such quantum cases (and for instances of emergence in general), you'd be able to get anything like the sort of deterministic law you'd need for truthmaking.

on the characterization offered here, is part of fundamental ontology, even though it's ontologically dependent on its components.

And this seems intuitively correct. If a system, *x*, is as a whole really something over and above its parts, then ostensibly it wouldn't be enough, if God wants to create system *x*, for her to say 'let there be the parts arranged *x*-wise'. She needs to create the parts *and* the system. But the system, even though it is part of the fundamental make-up of the world, is still dependent on there being parts that compose it. And so, on the characterization given here, such systems would be apt examples of emergence.²⁷

5. Advantages

Now that I've given some potential examples of (OE), let me explain why understanding emergence this way is helpful. In what follows, I'll argue that the major objections traditionally put toward emergence don't apply, or don't apply with nearly as much force, to emergence as characterized by (OE).²⁸ Many common objections to emergence seem to be objections to emergence couched in a very specific framework (an ontology of ontological 'levels'); when you place emergence in a fundamentalist framework, those objections no longer look forceful.

²⁷ This gives another way of resisting an argument for monism (the argument from physics) from Schaffer (forthcoming)a.

²⁸ Defenders of emergence, of course, have ways of responding to these objections without invoking anything like (OE) (see, inter alia, Wilson (2005) and Crane (2001) for discussion of potential responses). Nothing in the discussion that follows assumes these responses fail. The point is simply that the characterization of (OE) gives a very neat and unified way of dissolving a lot of the standard objections to emergence.

But first, some caveats. These are simply some of the most common objections put toward emergence - that I discuss my account's way of getting out of them doesn't mean I think they have force against all other accounts of emergence, nor does it mean that I think there mightn't be other equally effective ways of avoiding them. Additionally, these are objections that get tossed out at a views labelled "emergence". But it would be a mistake to think that all philosophers developing theories of "emergence" are trying to talk about exactly the same thing -- as discussed above, the usage of "emergence" in philosophical literature is both ambiguous and sometimes unclear. So insofar as these are objections, they are only objections to some views which get labelled "emergence". The point here is just that these perennial worries about (some forms of) emergence - worries which are bound to come up when you start talking about emergence - don't apply to emergence as characterized by (OE).

5.1 Levels Ontology

I've described emergence using a 'fundamentalist' framework. Emergence is not usually described with reference (explicit or otherwise) to a metaontological framework, but we can find in the background of some discussions of emergence, both positive and critical, an alternative conception of fundamentality. Emergence is sometimes discussed within the context of a picture that divides reality into a series of stratified 'levels'. This 'layered' conception of reality played a key role in the original development of emergence as a philosophical thesis²⁹ and has been characterized as '[providing] an essential framework needed to formulate the

²⁹ See especially McLaughlin (1992) for an excellent historical overview.

emergentist/reductionist debate³⁰. Unsurprisingly, discussions of emergence often utilize it heavily.³¹

What does the levels picture involve? Again, just like ‘emergence’ its usage is varied and ambiguous, but one way to understand it, a way that seems quite common in the literature and which makes it explicitly relevant to metaontology, is as directly connected to fundamentality. It’s this specific view -- stratified ontological levels, plus facts about how those levels determinate fundamentality - that I’m labelling the ‘levels ontology’.³²

Jaegwon Kim, one of its clearest proponents, explains the basic idea:

The natural world is stratified into levels, from lower to higher, from the basic to the constructed and evolved, from the simple to the more complex. All objects and phenomena each have a unique place in this ordered hierarchy (Kim 1999).

At the bottom or ‘fundamental’ level are the basic components of matter. It’s generally agreed that it’s up to the physicists to tell us what these are, on the

³⁰ Kim (1999)

³¹ See, *inter alia*, Chalmers (2006), O’Connor and Wong (2005), Kim (1999), McLaughlin (1992), and Wilson (2005).

³² I’m not claiming that all talk of ontological levels commits to a ‘levels ontology’, nor am I claiming that it’s always assumed in discussions of emergence, nor that it’s the sole source of problems for emergence. Rather, I’m claiming that it’s one common background (either explicit or, perhaps more often, implicit) in discussion of emergence, one which is usually contrasted to the fundamentalist background I’ve described above. This is the notion of ontological levels that is, e.g., criticized in Schaffer (2003) and defended in Callender (2001).

assumption that the physicists will (or a perfected physics would, even if actual physics can't) eventually come up with some particles that are indivisible – the ultimate constituents of the universe. This lowest level is where we find 'absolute fundamentality'.³³

The levels then develop in increasing complexity, with each higher-order level made up of those things from the level directly below. Kim (1993) again explains:

It is generally thought that there is a bottom level, consisting of whatever microphysics is going to tell us are the most basic physical particles out of which all matter is composed. . . [At] higher levels we find structures that are made up of entities belonging to the lower levels.

So, for example, if subatomic particles are at level n , then atoms will be at $n+1$, molecules at $n+2$, and so on. And this levels structure is then explicitly connected to fundamentality. Things get more complex, and as a result less fundamental, the further up the level hierarchy you go. Atoms exist and tables exist, but atoms are more fundamental than tables. And neither is absolutely fundamental.

This talk of levels is, of course, a metaphor, and it mustn't be taken too seriously. The important thing to remember, and what the stratified levels picture is meant to illustrate, is that there are degrees of fundamentality which vary inversely with

³³ The levels picture is sometimes explained in terms of fundamentality, sometimes in terms of basicness or simplicity, and sometimes with some combination of these terms. I'm assuming that something like a notion of fundamentality is in play in most discussions of the levels pictures (see Schaffer (2003)).

degrees of complexity. So it's not just that the world is stratified into ontological levels -- it's that *this levels structure (perhaps necessarily) determines the facts about fundamentality*. The absolutely fundamental is the simple. As things get more complex, they get less fundamental.³⁴

To recap: the basic tenets of what I'm calling the 'levels ontology' are that (i) there is a stratified hierarchy of ontological levels; (ii) this hierarchy determines the facts about fundamentality. As discussed in section {1}, this ontological framework contrasts markedly to what I've called the fundamentalist ontology. The fundamentalist ontology can certainly *allow* for a world in which all and only the smallest things are fundamental, with those things combining to compose other, derivative things (that is, the fundamentalist ontology can recapture a structure that looks exactly like the structure of the levels ontology). But it doesn't *require* this sort of picture. And it doesn't allow for degrees of fundamentality. In what follows, I'll argue that many of the problems traditionally associated with emergence are problems for emergence couched in a levels ontology, but dissipate when that framework is replaced with the one advocated here.

5.2 Causation

Emergent causation is problematic. Emergent entities are usually understood as having unique, non-redundant causal powers which can affect, not only other emergent entities, but also the entities (or kinds of entities) from which they emerge

³⁴ For detailed discussion of these issues, see Schaffer (2003).

(“downward causation”). This is often considered problematic, especially by those who endorse a broadly physicalist account of causation. Emergent entities are not, *ex hypothesi*, part of the very basic building blocks of matter (they emerge, further down the line), yet it’s often assumed that all causation can be explained solely in terms of those basic building blocks. So if emergent entities have causal powers – and not only that, but causal powers that affect what the basic physical things do – then we have a problem.³⁵

Notice, however, that this problem is couched in the very specific ontological framework of ontological levels. And that framework is explicitly rejected here. The claim -- meant to be in tension with emergence -- is that all causation must ultimately be accounted for by what’s absolutely fundamental. On the levels picture, those are the ultimate constituents of matter (the very smallest things). Since emergent entities explicitly aren’t those kinds of entities, we run into problems saying that emergent entities have real, non-redundant causal powers – particularly causal powers that can impact the activity of the fundamental bits of matter.

Contrast this to the background ontological characterization that informs (OE).

Fundamentality, on the levels picture, is something which can come in degrees, and which will always be found to the highest degree in the smallest, most basic things there are. But on the characterization of fundamentality given here, fundamentality does not come in degrees (things are either fundamental or they are not, in which case they are derivative) and we have no guarantee that the basic, smallest things will be

³⁵ See especially Kim (1999) – note that this is simply an emergence-specific formulation of his famous ‘exclusion argument’ (as in, *inter alia*, Kim (1993)).

what's fundamental (e.g., the monist could be right, in which case the very biggest thing is fundamental, or the gunk theorist could be right, in which case there's no class of things which are the very smallest).

Emergent causation is a problem if you situate it within a levels ontology. Once we have levels in place, the physicalist then claims warrant to explain all causation solely in terms of what's *absolutely* fundamental (the very basic things), which will never include emergent entities. But the analogous claim for the ontological structure assumed here, looks to be this: all causation can be explained solely in terms of what is *fundamental*.³⁶ In that case, of course, there is no causation problem for emergence, since emergent entities are fundamental (just not independent).³⁷

Some philosophers further maintain that all causation should be explained only with reference to *physical* entities. But this isn't a problem for (OE) either. There's no pressure, on the theory of emergence offered here, to think that emergent entities are non-physical. The account is neutral in this respect. There is some thought, again hostage to a 'levels' ontology, that emergence would *have* to involve non-physical ontology, because all the physical ontology is exhaustively explained by the very basic things (the absolutely fundamental), and the emergent entity represents 'something new' over and above these. But again, the analogous claim on the characterization given here simply looks to be that all physical ontology is

³⁶ Since there's no notion of 'absolute', as contrasted to partially, fundamental. Things are either fundamental or they're not, in which case they're derivative.

³⁷ You might think that that the analogous claim should instead be: all causation can be explained solely with reference to independent entities. But this seems to be too strong. Surely we think that there could still be causation in a gunky world, or that a mass trope can have causal powers, etc.

exhaustively explained by fundamental ontology, which is perfectly compatible with some of it being explained by dependent fundamental (i.e., emergent) ontology.³⁸

5.3 Ontological 'weight'

Another standard problem for emergence comes in saying why, exactly, we need to treat emergent entities with ontological seriousness. Emergent entities, on the levels picture, are not absolutely fundamental – they are not the basic, indivisible building blocks of matter³⁹ - or at the very least they are very different from the other sorts of things that are absolutely fundamental. But they are also not just another variety of complex entity, because they are somehow meant to carry more ontological weight.⁴⁰ So the question becomes: where do we situate them within the hierarchy of levels? Are they a higher-level entity that somehow has unique causal powers not usually possessed by higher-level entities? Are they higher-level entities picked out by their unique structure (e.g., they are simple, whereas most higher-level entities are complex)? Are they perhaps completely *sui generis* – not fitting into the stratified layers of the physical world because they are non-physical? It's difficult to say what exactly emergent entities would be, and where in the layers of reality we should place them.

³⁸ Indeed, taking recent science to heart should at least suggest that it's not outlandish to suppose that not all of the fundamental physical entities are ontologically independent. The atomistic picture of tiny little independent bits of matter bumping into one another is elegant, but we don't have any a priori warrant that it's accurate.

³⁹ Defenders of emergence might protest that emergent entities *are* 'basic'. But this seems a terminological shift. If we take 'basic' to mean something like 'the smallest, indivisible, out of which all other things are built', then emergent entities don't count as basic. If basic is taken as a primitive which can come apart from mereological simplicity - something more like fundamentality - then we've moved away from the levels ontology. Once basicness or fundamentality comes apart from mereological structure, then, as Schaffer (2003) comments, 'the entire "levels" metaphor is perhaps best abandoned'.

⁴⁰ Alternatively, sometimes emergentism is described as *each level* being emergent from the previous one (as in, e.g., Kim (2006)). It's not clear that this formulation would make the problem any better.

The problem dissipates once we divorce fundamentality from the atomic structure of the levels picture. There is no question, on the account characterized by (OE) of why we take emergent entities to have ontological ‘weight’ – they are *fundamental*. There is, of course, the question of why we should take them as fundamental. But that’s a question for independent theorizing: what kind of theoretical work they do, whether we need them as truthmakers, etc. So we’d need to think hard about the entities themselves – whether they are what God has to include in her ontological shopping basket or whether they must be included on a basic list of truthmakers, etc. But these are just the basic sorts of questions asked of *any* entity (dependent or otherwise) in deciding whether or not we should consider it fundamental. There’s no special problem about *emergent* entities per se.

In contrast to the levels picture, the notion of fundamentality defended here makes no assumption about what sorts of things are fundamental. That is a task for further investigation, and it would be up to the emergentist to argue that some ontologically dependent entities are fundamental. The point here is simply that taking such (dependent) entities with ontological seriousness is not automatically problematic, because the notion of fundamentality in play doesn’t constrain her into considering only certain kinds of entities as candidates for the fundamental.

5.4 Non-reductive physicalism

Discussions of emergence often struggle at length with the question of whether and to what extent emergence is distinct from non-reductive formulations of physicalism.⁴¹

This debate is murky for many reasons – mostly notably because there is wide variance in what is meant by ‘emergence’ and wide variance in what is meant by ‘non-reductive physicalism’.⁴² However, if we understand ‘emergence’ via (OE), it’s easy to see how emergence (so characterized) is distinct from at least some standard construals of non-reductive physicalism.⁴³

Non-reductive physicalism is often understood as a claim about explanation.

Consider the layered hierarchy of the levels ontology. Now consider facts of type F at level n and (corresponding but more basic) facts of type G at level $n-1$. Are there so-called ‘bridge laws’ of the form ‘F iff: G’? If there are such bridge laws, then we can *reduce* facts about things at level n (F facts) to facts about things at level $n-1$ (G facts). That is, we can explain everything there is to explain about the Fs by talking about the Gs. So if, for example, facts about chemistry are reducible to facts about physics, we could explain (with a completed physics) everything about chemistry using only facts about physics; we wouldn’t need recourse to an additional, *sui generis* set of chemistry facts. If we can’t provide such bridge laws, then we can’t provide the relevant explanations and our theory is *non-reductive* (i.e., you can’t reduce facts at level n to facts at level $n-1$, for at least some levels n and $n-1$).

⁴¹ Some – e.g., Crane (2001) – take them to be the same. Others – e.g., Chalmers (2006) – take there to be stronger and weaker forms of emergence, with the weaker forms of emergence identical to non-reductive supervenience. Yet others – e.g., Kim (2006) – argue that they are distinct, but suffer from similar problems. While some – e.g., Wilson (2005), O’Connor and Wong (2005) – construe them as very different.

⁴² See Wilson (ms) for an excellent and exhaustive taxonomy of the issues in play in this debate.

⁴³ And perhaps others as well, though I don’t have the space here to go into a detailed discussion of interpretations of non-reductive physicalism.

Physicalism – understood according to the levels ontology – is (roughly) the doctrine that all facts about the world are fixed by the facts at the most fundamental level.

Thus one simple way of understanding non-reductive physicalism is this: it combines the ontological thesis of physicalism with the explanatory thesis of non-reduction. All facts are *fixed* by the facts at the most fundamental level, but not all facts are *explained* by the facts at the most fundamental level.

The relevantly similar claim, in a fundamentalist ontology, would be two-fold.

Firstly, that all fundamental facts are *physical* facts. Secondly, that all facts *simpliciter* are fixed by the fundamental facts, even though not all facts are explained by the fundamental facts. The fundamentalist can easily accept this – it is no part of her theory that anything like bridge laws can be provided to informatively explain facts about derivative entities in terms of facts about fundamental entities. Just because, for example, the truthmaker for ‘Tables exist’ is the existence of simples rather than the existence of tables does not entail that you can explain everything about tables just by talking about simples. Ontological fundamentalism is, by itself, completely neutral with regards to whether reductionism is true.

The important point here, though, is that the claim that not all facts are explained by the fundamental, even though all facts are fixed by the fundamental, is a completely separate from the claim that there is emergence. Commitment to emergence, as understood via (OE), is simply commitment to fundamental dependent entities.

Whether there are any such entities seems orthogonal to the question of whether

fundamental facts exhaustively explain derivative facts. So if emergence is construed according to (OE), the question of whether and how it is distinct from at least one standard interpretation of non-reductive physicalism becomes a non-starter.

Another interpretation of non-reductive physicalism is simply as the denial of type physicalism - that is, the denial that, for any property F, that property is *identical* to some physical property G. We can still have token physicalism - that any instantiation of a property is identical to the instantiation of some physical property (where that claim is de dicto, not de re) - but the possibility of multiple realizability precludes reduction.⁴⁴

Emergence, on the account presented here, is *consistent* with this type of non-reductive physicalism, but it does not entail it and is not entailed by it. And that's simply because this account of emergence is completely neutral as to whether emergent entities are non-physical. You could have a world in which there are fundamental dependent entities, but in which type physicalism is true (i.e., in which all properties are physical properties). Again, on this account the question of whether non-reductive physicalism is true looks to be completely orthogonal to the question of whether there is emergence.

6. Conclusion

⁴⁴ E.g., An instantiation of property F might be identical to the instantiation of physical property G at t, but an instantiation of F at t* be identical to physical property H. So we can't say that F=G nor that F=H.

I have argued that within a fundamentalist ontology (which makes a core distinction between fundamental and derivative entities) there is room for a further distinction: that of dependent and independent entities. I maintain that this set of distinctions can usefully explain the mysterious idea of ontological emergence. The characterization of emergent entities as simply those entities which are fundamental but not independent is simple (much simpler than many of the usual explanations) and avoids many of the standard problems associated with emergence. There may well be other meta-ontological frameworks that can provide similarly useful explications of emergence – whether that’s the case is beyond the scope of this paper. The point here is simply that carefully considering the ontological background in which emergence is situated can help clarify it, and that a fundamentalist ontology yields a natural and attractive account of emergence.

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