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In Defence of Indeterministic Building

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In this paper, I set out a new argument for the coherence of indeterministic building and defend its premises. The argument hinges on the underexplored notion of indeterministic supervenience. First, I argue that the logical possibility of an indeterministic supervenience relation entails the coherence of indeterministic building. Second, I argue that indeterministic supervenience is indeed logically possible. I conclude that there is a straightforward argument for the coherence of indeterministic building that has so far gone unnoticed.

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1 An Argument in Defence of Indeterministic Building

Some relations are, as Bennett (2017) puts it, building relations. We can understand building in terms of various generative idioms: a and b stand in a building relation when b obtains in virtue of a , a constitutes b , a produces b , or a builds b . ‘Building’ is a general term used by Bennett to capture a family of determination relations. Such relations might include grounding, causation, functional realization, composition, and the determinate-determinable relation. For Bennett, these relations are generative, necessitating, irreflexive, and antisymmetric, but differ in various other ways. For Bennett, the family of building relations is a noteworthy resemblance class.¹

A building relation is indeterministic when a is the full builder for b but it is left to chance whether a builds b – where the chance in question is understood to be *ontic*.² Here’s an example. Suppose that the physical profile, P , of an organism is not sufficient to fix that organism’s phenomenal profile. Perhaps there are two distinct phenomenal profiles, $Q1$ and $Q2$, that can be

¹ Although my primary focus is on building, I will sometimes use specific building relations, such as grounding, as examples.

² For recent positive discussions of indeterministic building and similar notions see Montero 2013; Craver 2017; Wasserman 2017; Emery 2019; Bader 2020; Pearce 2021; Werner 2021; Zhong 2020; Moorfoot forthcoming.

built by P , such as we get in putative cases of qualia inversion. This situation can be understood as a case of indeterministic building, such that $Q1$ and $Q2$ are members of a sample space, $\Omega = \{Q1, Q2\}$, and Ω is associated with P . It is then left to chance which phenomenal profile the organism instantiates.³ However, for each Qn , whenever Qn obtains, P is the full builder of Qn .⁴

Indeterministic building is importantly different from two related notions. First, indeterministic building is to be distinguished from *metaphysical vagueness*. A property is vague when it is unclear whether some object has it. A property is metaphysically vague when this lack of clarity is part of the world, and not just in our heads. A cloud, for instance, might have a vague boundary because it is genuinely indeterminate where the boundary of the cloud gets drawn. Indeterministic building does not concern this type of vagueness. In cases of indeterministic building, it is left to chance whether b obtains, but b need not be vague. An important difference between metaphysical vagueness and indeterministic building is that the latter, but not the former, entails intra- and inter-world variation of b independent of a . Second, indeterministic building is to be distinguished from *contingent building*. Contingent building (often discussed in terms of *contingent grounding* in the literature) is what we get when the background conditions, the *CCs*, for b are excluded from the full grounds of b , even though the *CCs* are required to bring about b (see, for example, Leuenberger 2014; Skiles 2015). The existence of Socrates, for instance, might be the full ground for the existence of {Socrates} despite the fact that independent background conditions are required for the obtaining of {Socrates} – for example, if mathematical constructivism is true, then certain mathematical truths must be constructed at any world at which {Socrates} obtains. Crucially, contingent building does not involve ontic chance, but rather the decision to draw a line between full grounds and background conditions.⁵ I will set both metaphysical vagueness and contingent building aside in this paper. I will assume that objects and properties are entirely determinate, and that building contingentism is false. These assumptions simplify my discussion.

Indeterministic building, under one guise or another, has recently been put to work in many areas. Montero (2013), Zhong (2020), and Moorfoot (forthcoming) have formulated versions of indeterministic physicalism, which are supposedly resistant to the zombie argument. Bader (2020;

³ In this paper, I will draw a distinction between partial and full indeterministic building. When a is a full indeterministic builder for b , a has some chance, n , of building b – where $0 < n < 1$. When a is a mere partial indeterministic builder for b , a in isolation has no chance of building b . Note that the status of some x as a mere partial indeterministic ground of some y should be relativised to a particular grounding chain.

⁴ This kind of example is also found in Montero 2013; Bennett 2017; Craver 2017; Zhong 2020; Moorfoot forthcoming.

⁵ Bennett (2017: 49–50) draws a similar distinction between indeterministic and contingent building.

2021) has used his stochastic grounding framework to offer us new solutions to the fission and coincidence paradoxes in metaphysics. Werner (2021) has used his arbitrary grounding framework to formulate the doctrine of arbitrary reference, a ground-theoretic version of the B-theory in the ontology of time, and a defence of haecceitism. Craver (2017: 169–70) has suggested that his stochastic supervenience might provide a new solution to the exclusion argument against non-reductive physicalism. Indeterministic building also raises more general methodological questions about the kinds of determination relations with which it is possible to construct philosophical theories. Finally, since many philosophers accept the coherence of indeterministic causation, showing that indeterministic building is, more generally, coherent strengthens the resemblance class between grounding and causation (*pace* Bernstein 2016).^{6 7}

Despite this growing interest, many philosophers take indeterministic building to be incoherent.⁸ That is, they not only claim that we do not live in a world with indeterministic building, but that the very idea of indeterministic building makes no sense. There is something about the nature of building that just doesn't sit well with ontic chance. Here's Schaffer:

“[I]ndeterministic grounding” seems impossible. Grounding seems to imply supervenience: fix the grounds and one fixes the grounded. The status of the grounded thus cannot be open to chance. By way of illustration, it seems impossible that, given a fixed physical ground, the biological status of the system remains open to chance. (Schaffer 2016: 61)

We can capture this general sentiment with:

⁶ If one agrees with Fine (2012: 40) that '[g]round [...] stands to philosophy as cause stands to science', then a strengthening of the resemblance class between grounding and causation takes us some way towards methodological continuity between philosophy and science. Such a strengthening also moves us towards monism about determination relations, a view that is attractive on account of its ideological parsimony. However, note that strengthening the resemblance class in this way does not *entail* methodological continuity or monism, since the relations may differ along other dimensions.

⁷ Schaffer (2016) and Wilson (2018) both argue that grounding and causation are deeply connected, however, they stop short of endorsing indeterministic grounding. Bennett (2020), on the other hand, argues that either both causation and grounding can be indeterministic, or neither can.

⁸ See especially Rosen 2010; Bernstein 2016; Schaffer 2016; Bennett 2017. Scepticism towards the coherence of indeterministic building is also widespread in casual conversation.

Tension Ontic chance and building are incompatible.

I take it that something like Tension is being assumed by many of those opposed to indeterministic building. The claim is not just that there *is* no indeterministic building, but that indeterministic building is *incoherent*.

But what is it that drives Tension? When philosophers talk about building, they often use idioms like *constitutivity*, *essence*, *generation*, and *nothing-over-and-aboveness* – especially when setting building relations apart from merely modal relations. These idioms create trouble for the coherence of indeterministic building. For instance, if *b* is nothing over and above *a*, then how can *b* vary independently of *a* in the way that indeterministic building requires? More generally, these idioms suggest a very tight relationship between the builder and what is built, and this tight relationship appears to rule out ontic chance.⁹ In this paper, I don't want to take a stance on precisely what it is that drives Tension. I will talk loosely of our *constitution intuitions* and the *constitutive character of building*, but these are to be understood as placeholders for whatever it is that is ultimately driving Tension. As will become clear, it is a benefit of my argument against Tension that we do not need to settle the driving forces behind Tension.

Before presenting my argument against Tension, it will be worth mentioning two other potential strategies, which I will not pursue here. First, the indeterminist might argue that the constitution intuitions of philosophers are somehow mistaken: in fact, there is nothing intuitively problematic about *a* indeterministically building *b*, and *b* being such that it is, for example, nothing over and above *a*. This kind of strategy might proceed by offering intuitive counterexamples to Tension. Second, the indeterminist might provide a *theory* to take the place of our constitution intuitions. For instance, instead of relying on a primitive understanding of, say, constitutivity, the indeterminist might provide a theory of constitutivity according to which constitutivity does not rule out ontic chance. The indeterminist would then have to show that we have independent reason to accept the theory. For instance, perhaps some promising variant of Craver's (2007: §8.3) mutual manipulation theory of constitution allows for indeterministic building. Both strategies are interesting and have not been explored in the literature. We might call them *direct* arguments for indeterministic building, insofar as they challenge Tension head-on.

⁹ The case of causation is a little trickier, since our intuitions behave slightly differently here insofar as more philosophers seem happy with the idea of causal indeterminacy. Thus, if causation is a building relation, then the intuitive case for Tension is already weakened. There is an open question as to whether causation counts as a building relation. Bennett (2017) argues that causation is a building relation while Schaffer (2020) argues that it is not. I will remain neutral on this question so as to avoid stacking the deck against the advocate of Tension. It's worth noting that Bennett is in the minority in endorsing the claim that causation is a building relation.

One problem for the direct arguments is that they must have a clear idea of the driving forces behind Tension. It is not enough to speak loosely of constitution intuitions or constitutive character. This creates difficulties because there is little consensus on what precisely is wrong with indeterministic building – partly because there is little consensus on the nature of building. Furthermore, the direct arguments either lean heavily on our intuitions, or provide theories for idioms that many philosophers would like to keep as primitives. For these reasons, the direct arguments are likely to be fairly controversial.

In this paper, I will explore an *indirect* argument against Tension. The indirect argument does not require us to engage with either constitution intuitions or theories of constitutive character. Moreover, the indirect argument appeals to well-understood technical terms. The hope is that philosophers who might be resistant to the direct arguments can still accept the indirect argument. The indirect argument runs as follows:

- (P1) If an indeterministic supervenience thesis holds somewhere in logical modal space, then indeterministic building is coherent.
- (P2) An indeterministic supervenience thesis holds somewhere in logical modal space.
- (C1) Indeterministic building is coherent.

Rather than tackling the relationship between the constitutive character of building and ontic chance, the argument aims to show that Tension *must* be wrong given the independent plausibility of (P1) and (P2).

There are a couple of things to note about the argument. First, the argument relies on a discussion of the underappreciated notion of *indeterministic supervenience*, which will be discussed at length in §2. Like other formulations of supervenience, indeterministic supervenience brings clarity and precision to debates about ontological determination. Second, I am trying to show that indeterministic building is *coherent*. For this reason, I only need *logical*, and not metaphysical, possibility.¹⁰ We can take a world to be logically possible when it contains no contradictions, and a world to be metaphysically possible when it is constrained by how things really are. A world might be logically possible on account of containing no contradictions, but metaphysically impossible because it is ruled out by, say, the essences of things. Consider what Schaffer (2017: 7–8) says about the debate between the mereological universalist and the nihilist. Neither thinks that the other's position is incoherent (typically, at least), although each thinks that their theory is metaphysically necessary. For the universalist, for instance, the real nature of mereological atoms rules out the

¹⁰ Moreover, for any logically possible picture of metaphysical modal space, I only need indeterministic building to obtain at some merely possible world.

metaphysical possibility of nihilism, despite the fact that nihilism is logically coherent. Establishing the logical possibility of indeterministic grounding is enough to reject Tension.

In §2, I will defend (P1). I will build my case for (P1) by reconsidering an argument that Bennett (2017) levels against indeterministic building. I will argue that the failure of Bennett's argument provides us with good reasons to accept (P1). In §3, I will defend (P2). I will argue that indeterministic supervenience is only possible if the properties in the supervenience base are modally inseparable from the relevant chancemakers. I then put forward a way to achieve modal inseparability. I conclude, in §4, that my argument is sound, and that indeterministic building is coherent. Given the strong opposition to the coherence of indeterministic building found in the literature, the existence of such a simple argument is surprising.

2 A Defence of (P1)

2.1 Bennett's Modal Recombination Argument

Bennett (2017: 50–51) presents an argument against the possibility of indeterministic building. The argument asks us to consider the following simple model:

w1: *a* and *b* both obtain.

w2: *a* obtains but *b* does not.

Where *w2* is an exact duplicate of *w1*, apart from the fact that *b* does not obtain at *w2*.

The advocate of indeterministic building wants to claim that, at *w1*, *a* builds *b*, despite the fact that, at *w2*, *a* obtains in the absence of *b*. But Bennett argues that this cannot be the case:

The joint possibility of *w1* and *w2* indicates that *b* is recombinable with *a*, and indeed with the rest of reality. But such modal recombinability is frequently taken as a mark of fundamentality: [...] But if something is fundamental, it is not in any way built! [...] In short: if something fails to supervene on the rest of reality, it is recombinable with the rest of reality; if it is recombinable in that way, it is fundamental; if it is fundamental, it is unbuilt. So *b* is not built by *a*, or by anything else for that matter. (Bennett 2017: 50)

The argument has a number of steps. Crucially:

Step 1 The joint possibility of w_1 and w_2 entails the failure of b to supervene on a .¹¹

Step 2 The failure of b to supervene on a entails that b is modally recombinable.¹²

Step 3 The modal recombinability of b entails the fundamentality of b .

Step 4 The fundamentality of b entails that b is unbuilt.

In this section, I will argue that Bennett's argument can be resisted by challenging Step 1.

2.2 Indeterministic Supervenience

It is clearly wrong to say that the joint possibility of w_1 and w_2 guarantees that all forms of supervenience fail. For instance, while strong supervenience fails for Bennett's model, weak supervenience does not:

Weak Supervenience $\Box \forall x \forall F \in B [Fx \rightarrow \exists G \in A (Gx \wedge \forall y (Gy \rightarrow Fy))]$

Strong Supervenience $\Box \forall x \forall F \in B [Fx \rightarrow \exists G \in A (Gx \wedge \Box \forall y (Gy \rightarrow Fy))]$

Unlike strong supervenience, weak supervenience only requires that the relationship between the A -facts and the B -facts be stable at each individual world, and this is consistent with there being different A - B correlations at different worlds.¹³ If, following Kim (1984: 157–58), we take the set of A -properties to be closed under negation, weak supervenience is consistent with the B -facts obtaining in the absence of *positive* A -facts. Thus, the A - B correlation at w_2 might be such that every fact of the form [b obtains] is accompanied by a fact of the form [a does not obtain]. This is less a criticism of Bennett, and more a reminder that we need to be careful when talking about supervenience failure. There are different versions of supervenience, and we need to be careful to specify which one we are talking about.

However, the fact that weak supervenience is consistent with w_1 and w_2 does not immediately show that Bennett's argument fails. To establish this, we would need to show that the failure of

¹¹ Of course, not just any notion of supervenience will do here. Only a supervenience thesis that can be used to underscore novel notions of recombination and fundamentality will be acceptable.

¹² Wang (2020) has challenged Step 2, by arguing that supervenience does not entail recombination. It is beyond the scope of this paper to engage with Wang's argument, although it is possible to see my discussion of indeterministic supervenience as an alternative way of dealing with Wang's concerns about modal recombination, which requires only the rejection of Step 1.

¹³ For Kim (1984), the A -facts are the supervenient facts and the B -facts belong to the supervenience base. I have swapped the letters around here so that the Kim-style supervenience theses gel better with Bennett's model.

weak supervenience was required to ensure Bennett's Step 2: the move from supervenience failure to recombination. That is, we would have to show that completely free recombination is not entailed by the failure of strong supervenience alone: the failure of weak supervenience is also required.¹⁴ My argument does not turn on whether the failure of weak supervenience is required for recombination, so I will not pursue this point. The question now is that of whether there are any salient variants of supervenience that are compatible with $w1$ and $w2$.

While Bennett's model is consistent with weak supervenience, I take it that building indeterminism, of the kind Bennett is attacking, is consistent with neither Strong Supervenience nor Weak Supervenience. Building indeterminism allows for intra-world variation, and thus worlds at which, for some $F \in B$ and some $G \in A$, the conditional $\forall y(Gy \rightarrow Fy)$ is false. So, not even the promise of weak supervenience will save us from total free recombination. I take it that Bennett's argument relies on the following assumption:

Determinism No supervenience relation holds in cases of indeterministic building.

If Determinism is true, then building indeterminism entails supervenience failure *tout court*. If steps 2 – 4 are then granted, we will move from supervenience failure to recombination to fundamentality, and, finally, to the unbuilt. We will then have a *reductio* of the claim that indeterministic building was possible in the first place. However, if Determinism is false, then the argument might fail to even get off the ground. That is, if we can find a form of supervenience with which indeterministic building is consistent, then we can argue that supervenience does not fail *tout court*, and that completely free recombination does not follow.

Consider the following supervenience theses:¹⁵

¹⁴ Weak supervenience fell out of favour because it is rather mysterious why the A - B relationship holds. As Bennett and McLaughlin (2023) put the point 'if there can be things in different worlds that are A -discernible but not B -discernible, why can't there be two such things within a single world?'

¹⁵ I'm not the first to suggest that supervenience comes in both deterministic and indeterministic flavours. Craver (2017) offers an interesting discussion of what he calls 'stochastic supervenience'. However, my theses don't follow Craver's.

Weak Indeterministic Supervenience $\Box \forall x \forall F \in B [Fx \rightarrow \exists G \in A \exists n (Gx \wedge \forall y (Pr(Fy|Gy) = n))]$

Strong Indeterministic Supervenience $\Box \forall x \forall F \in B [Fx \rightarrow \exists G \in A \exists n (Gx \wedge \Box \forall y (Pr(Fy|Gy) = n))]$

These are indeterministic analogues of the strong and weak supervenience theses considered above.¹⁶ In each case, we swap the conditional, $Gy \rightarrow Fy$, for the probabilistic relation $Pr(Fy|Gy) = n$, where $0 < n < 1$. In the case of weak indeterministic supervenience, there must be some probabilistic A - B correlation at every world.¹⁷ In the case of strong indeterministic supervenience, the same probabilistic A - B correlation must be stable across metaphysical modal space. In fact, strong indeterministic supervenience gives us the kind of stability that Kim valued:

The key aspect of [weak supervenience] is its last clause, the requirement that any object having G also has F . The force of this clause is that within each world this G - F generalization must hold; it does not require that the G - F connection be *stable across worlds*. (Kim 1984: 164, my emphasis)

For Kim, *stability across worlds* is an important measure of strength for a supervenience relation. In this way, strong indeterministic supervenience does better (along one dimension of strength) than the deterministic variant of weak supervenience. Unlike weak deterministic supervenience, strong indeterministic supervenience ensures stability across metaphysical modal space, it's just that what's stable is a probabilistic relation, not a conditional. $\forall y (Pr(Fy|Gy) = n)$ is stable across modal space just in case $\forall y (Pr(Fy|Gy) = n)$ is true at every metaphysically possible world and non-vacuously true at some worlds. In what follows, I'll talk mostly of strong indeterministic supervenience.¹⁸

Given both strong and weak indeterministic supervenience, Determinism is false: there are varieties of supervenience that are consistent with indeterministic building. So, Step 1, in its current form,

¹⁶ As far as I know, no one else has taken the standard Kim-style formulations of strong and weak supervenience and given them probabilistic analogues.

¹⁷ If such a correlation is understood merely in terms of the instantiation patterns at the world in question, then weak indeterministic supervenience isn't informative, since every world where deterministic variants of supervenience fail will trivially give us some probabilistic A - B correlation. But if the truth of $\forall y (Pr(Fy|Gy) = n)$ is understood to require the truth of certain counterfactuals, then weak indeterministic supervenience will be informative.

¹⁸ Keep in mind that this section is only concerned with the conditional, (P1). I am not yet arguing that indeterministic supervenience is logically possible. That task is reserved for §3.

stands in need of refinement. We must either allow indeterministic varieties of supervenience to be included in Step 1 (in which case Step 1 is false), or explain why we are ignoring them.

2.3 Recombination, Fundamentality, and Building

I've argued that Step 1 needs refinement. However, this doesn't yet guarantee the failure of Bennett's argument. We also need reason to think that *b* failing to strongly indeterministically supervene on *a* entails that there is some interesting sense in which *b* is recombinable. We need reason to think that there is a plausible form of recombination that is underscored by strong indeterministic supervenience. If there isn't, then Bennett would have good justification for restricting Step 1 to deterministic supervenience theses.

But I think it's clear that we *do* have an informative notion of recombination here. The distinction between strong deterministic and strong indeterministic supervenience gives us the following distinction at the level of recombination:

Recombinability₁ *F* and *G* are recombinable₁ iff there is a possible world at which *F* obtains in the absence of *G*, and a possible world where *G* obtains in the absence of *F*.

Recombinability₂ *F* and *G* are recombinable₂ iff there is no probabilistic relationship between *F* and *G* that is stable across metaphysical modal space.

While the failure of deterministic supervenience ensures recombinability₁, it does not ensure recombinability₂. If indeterministic supervenience holds, then *a* and *b* are recombinable₁ but not recombinable₂.

Someone might question whether recombinability₂ is a genuine notion of recombination. Let's respond to this objection one step further down the line and talk about fundamentality instead.¹⁹ With recombinability₁ and recombinability₂, we can distinguish between:

Fundamentality₁ *F* is fundamental₁ iff, for every *G*, *F* is recombinable₁ with *G*.

Fundamentality₂ *F* is fundamental₂ iff, for every *G*, *F* is recombinable₂ with *G*.

There are grounds for thinking that fundamentality₂ captures important facts about fundamentality that fundamentality₁ misses out on. Bennett understands fundamentality in terms of independence: to be fundamental is to be, in some sense, independent from the rest of reality.

¹⁹ Note that, for Bennett (2017), recombination and fundamentality are very closely connected. For this reason, in moving from recombination to fundamentality, I am not making any substantive move. I am assessing fundamentality₂ instead of recombination₂ for purely expositional reasons. The reader should feel welcome to apply the argument below to recombination₂ instead.

But, when, for some $F \in B$ and some $G \in A$, $\forall y(Pr(Fy|Gy) = 1/2)$ holds with metaphysical necessity, F and G are not entirely independent. Fundamentality₁ misses out on the fact that F and G might be probabilistically dependent on one another. When there's a stable probabilistic relationship between F and G , it seems right to say that F and G are not totally independent. So, moving from fundamentality₁ to fundamentality₂ seems to *enrich* our understanding of independence-based fundamentality.²⁰ Suppose that b failed to strongly deterministically supervene on a but that b strongly indeterministically supervenes on a . b is not entirely independent because it is bound up in a probabilistic modal correlation with a . Moreover, even that both necessity operators in the definition of strong indeterministic supervenience are read with metaphysical necessity, there is a world in metaphysical modal space where a and b do not stand in this probabilistic relationship. Crucially, this information cannot be obtained simply by checking to see if there are worlds at which a obtains in the absence of b (and *vice versa*).²¹ The failure of deterministic supervenience is thus unable to tell us anything about fundamentality₂.²²

We can conclude that Bennett's recombination argument fails. While indeterministic building entails the failure of strong deterministic supervenience, it does not entail the failure of strong indeterministic supervenience. Moreover, the failure of strong indeterministic supervenience

²⁰ Indeterministic supervenience may also open the door to treating recombination as a matter of degree. The stronger the probabilistic relationship between F and G , the *less* modally recombinable₂ F and G are. This suggests that Bennett's w_1 and w_2 are not rich enough to capture all the salient combinatorial facts. However, note that accepting a degree-based notion of recombination does not require us to give up on the binary notion of recombination: just because there is more fine-grained combinatorial information available does not mean that there isn't room for a coarse-grained concept. Compare with descriptions of events: it is sometimes pertinent to offer a very fine-grained microphysical description of an event (e.g., when we are doing particle physics), but other times it is better to give a much more coarse-grained description of an event (e.g., when we are doing geology or social science). There is room for both a binary and degree-based notion of recombination (we might even understand the binary notion as providing limiting cases of the degree-based notion).

²¹ Even a very weak probabilistic connection is still enough to show that there is more combinatorial information than the binary notion of recombination gives us. Consider a conditional probability such as $Pr(F|G) = 1/10000$. First, the conditional probability is stable across all metaphysically possible worlds. Second, the conditional probability is not merely a claim about the F - G distribution at each world, it is also (plausibly) a claim about counterfactual scenarios for that world.

²² Another way of putting this is that fundamentality₂ is concerned with an *inter*-world notion of independence, whereas fundamentality₁ is only concerned with *intra*-world independence.

entails important kinds of recombination and fundamentality that the failure of strong deterministic supervenience alone cannot ensure.²³

2.4 From Supervenience to Building

The recombination argument no longer establishes the incoherence of indeterministic building. We have shown that Step 1 is false, and that strong indeterministic supervenience can be used to underscore novel variants of recombination and fundamentality. While we have not yet reached a justification for (P1), the coherence of indeterministic building is now much more of an open question. I now want to argue that we can move from the presence of indeterministic supervenience to the presence of indeterministic building.

To begin with, note that we defined our novel variants of recombination and fundamentality in modal terms. Thus, the fundamentality of *A* boils down to a claim about the modal independence of *A* from the rest of reality. However, we cannot define indeterministic building in this way. Indeterministic building is hyperintensional, and therefore is not logically entailed by indeterministic supervenience.²⁴

But while we can't move from modal notions to indeterministic building *via* entailment, other options are available. Consider the following analogy with deterministic building. Deterministic supervenience does not entail deterministic building. But the following principle is nevertheless plausible:

Backing When one has strong deterministic supervenience between two non-identical contingent properties, *A* and *B*, there is a form of co-variation that calls out for an explanation, and positing a building relation between *A* and *B* (or with respect to a third factor) can provide such an explanation.²⁵

Why think that Backing is plausible? First, we are considering two non-identical contingent properties. That is, we cannot explain away the supervenience relation by pointing either to one of the properties being necessary, or to *A* and *B* being identical. Second, Backing is limited to strong

²³ In §3, I will explore whether strong indeterministic supervenience is logically possible. For now, if we grant that the modified Kim-style formula has described something genuine, it is clear that someone who only pays attention to fundamentality₁ has missed out on an important set of facts concerning fundamentality-based independence.

²⁴ Perhaps recombination and fundamentality should also be understood hyperintensionally, but I assume here that they can be given intensional definitions to simplify matters.

²⁵ Given the possibility that *A* and *B* are modally co-extensive, the strong supervenience of *B* on *A* is not enough to establish the direction of building, and thus Backing remains neutral on whether *A* builds *B*, or *vice versa*.

deterministic supervenience. The idea is that the stability of the *A-B* conditional across metaphysical modal space cries out for an explanation. There must be some reason why two non-identical contingent properties stand in such a modally robust relationship. Consider Kim's optimism about supervenience:

[W]hen a supervenience claim is made, it makes perfectly good sense to ask for an explanation of why the supervenience holds. It may well be that the only answer we can muster [...] is that, as far as we can tell, it is a brute fact. But that need not be the only kind of answer; we should, and can, hope to do better. (Kim 1990: 24)

The idea is that appealing to metaphysical bruteness should be the last resort. If we can explain the relation in some other way, then we should.²⁶

Can Backing be extended to strong indeterministic supervenience? Consider:

Backing* When one has strong indeterministic supervenience between two non-identical contingent properties, *A* and *B*, there is a form of co-variation that calls out for an explanation, and positing a building relation between *A* and *B* (or with respect to a third factor) can provide such an explanation.²⁷

If Backing is plausible, Backing* should also be plausible. Indeterministic strong supervenience requires that a conditional probability be stable across metaphysical modal space, but it's hard to see why moving from a conditional to a conditional probability would remove the demand for explanation. There is still a robust *A-B* connection that should not be left brute. We could even rework this point into a challenge for the advocates of the recombination argument:

Challenge Explain why Backing is justified but Backing* is not.

My suspicion is that very little (if anything) can be said in favour of Backing that does not also apply to Backing*. In both cases, leaving the stability unexplained will be unsatisfactory. We want to know why these two contingent properties are bound up in a relationship that is stable across metaphysical modal space, such that there are no metaphysically possible worlds at which they fail to stand in that relationship.

Thus, although we don't want to say that building is nothing more than supervenience, we also need room to say that certain patterns in modal space cannot be brute. If we encounter a stable pattern in modal space, there must be some explanation for that pattern. In the case of indeterministic supervenience, there must be some reason that a probabilistic relationship is stable

²⁶ Backing has also been discussed in the meta-ethics literature. See, e.g., Blackburn 1984: 182–87; 1985.

²⁷ Note that $[A \neq B]$ is already entailed by the strong indeterministic supervenience of *B* on *A*.

across all metaphysically possible worlds. And that reason is the presence of an indeterministic building relation that *backs* indeterministic supervenience.²⁸ Thus, even by allowing for indeterministic supervenience, we have opened the door to indeterministic building.²⁹

3 A Defence of (P2)

The question now is that of whether (P2), the thesis that an indeterministic supervenience thesis holds somewhere in logical modal space, is correct. This isn't necessarily an *easier* question, but it is very different. To defend (P1), we had to look to the relationship between supervenience and building. To defend (P2), we need only look to supervenience. We now want to know whether Strong Indeterministic Supervenience describes a genuine logical possibility.

3.1 A Physicalist Analogy

It will help to begin with an analogy. Physicalists think that everything is physical. They also think that the higher-level facts supervene (deterministically and with metaphysical necessity) on the

²⁸ Perhaps someone could try to argue that all I have shown is that mere *partial* indeterministic building is logically possible (thanks to an anonymous reviewer for this suggestion). But given how we set up full and partial indeterministic building earlier, mere partial indeterministic builders never build anything, and are thus unable to explain the stable probabilistic patterns of covariation that we are considering. Moreover, a mere partial indeterministic builder for *G* would be modally separable from the relevant chancemakers for *G*. Thus, so long as we are reading the necessity operators in Strong Indeterministic Supervenience with metaphysical necessity, mere partial indeterministic building cannot be sufficient. Furthermore, if mere partial indeterministic building were understood differently, such that mere partial indeterministic builders were generative (which would be highly controversial), showing that mere partial indeterministic building was logically coherent would be enough to reject Tension. This is because we would still have shown that there is a type of building that involves indeterminism. Moreover, on such a reading of mere partial indeterministic builders, there would be no fine line between full and partial indeterministic building, and thus it would be unclear why establishing the coherence of mere partial indeterministic building would not be enough to establish the coherence of full indeterministic building.

²⁹ Note that the failure of one of Bennett's Steps 2 – 4 would diminish the case for indeterministic building. Suppose we challenged the link between supervenience failure and recombination. First, such a move appears *ad hoc*. Nothing about indeterministic building seems to motivate the rejection of Bennett's Step 2. Second, indeterministic supervenience could no longer be used to define novel variants of recombination and fundamentality. But it was access to these novel variants that allowed us to adequately challenge Step 1. That is, recombination₂ and fundamentality₂ showed us that, in strong indeterministic supervenience, we had an interesting form of modal co-variation, and not some mysterious gerrymandered relation like weak supervenience.

fundamental physical facts. However, physicalists also think that it is only a contingent fact that everything is physical. That is, ‘everything’ is limited in scope to the actual world. *Our* higher-level properties (the properties of the actual world) are all physical, but metaphysical modal space is vast, and there is room within it for *alien* properties that behave differently to the actual properties. For instance, perhaps there are worlds with non-physical Cartesian minds or *sui generis* phenomenal properties. In such worlds, the higher-level facts fail to supervene on the physical facts. But this is all perfectly consistent with the physicalist’s claim that the *actual* higher-level facts *metaphysically* supervene on the actual physical facts.³⁰ Moreover, many physicalists take this to be an important and beneficial consequence of their view: even though metaphysical supervenience holds, physicalism is still a contingent thesis: our world didn’t *have* to consist only of well-behaved, physically acceptable properties.

All that is required for justifying (P2) is that we grant a similar kind of leniency towards indeterministic supervenience. That is, (P2) does not even require that there be any *actual* indeterministic supervenience: there need only be some distant pocket of modal space where indeterministic supervenience holds non-vacuously. And this is consistent with all of our actual properties standing only in deterministic supervenience relations. Moreover, to show the *coherence* of indeterministic building, we need only find a pocket of *logical* modal space in which there is indeterministic supervenience. Thus, I will not be arguing that indeterministic supervenience is metaphysically possible, only that it is a live logical possibility. In this way, (P2) requires an even weaker form of leniency than what the physicalist shows towards spooky dualist worlds.

However, we need to do more than merely appeal to alien properties. We must say something about what such properties would be like. The physicalist has a fairly good idea of why a property might fail to supervene on the physical properties: such a property is *sui generis*, and nothing binds it to the physical properties. But what would properties need to be like if they were to stand *only* in an indeterministic (and not a deterministic) supervenience relation? They clearly shouldn’t be entirely *sui generis* entities, but they must also not be like the properties that stand in deterministic supervenience relations.

Consider the entities that, for some instance of Strong Indeterministic Supervenience, make it the case that $\forall y(Pr(Fy|Gy) = n)$. In particular, the entities that determine the value of n . Call these entities the *chancemakers*. One thing seems clear: the properties entering into a metaphysical indeterministic supervenience relation should not be modally recombinable with their *chancemakers*. We want the indeterministic supervenience thesis to hold across all of metaphysical modal space, which means that every world at which the base properties obtain must be a world at which $\forall y(Pr(Fy|Gy) = n)$ is true. However, if the *chancemakers* are merely ‘bolted’ onto the

³⁰ For a summary, see Chalmers 1996: 38–41.

properties, then nothing seems to rule out the properties and chancemakers being modally recombinable.

So, the task of defending (P2) becomes clear: we must describe a situation where the chancemakers are bound up with the properties entering into the supervenience relation. If we can coherently describe such a situation, then we will have good reasons for thinking that indeterministic supervenience is logically possible. Moreover, we will have some grasp on the kinds of properties that can enter into such a relation.

3.2 Non-Fundamental Objective Chance

Some philosophers take objective chance to be a derivative feature of the world:

Chancemaker Building The chancemaker facts are (deterministically) built by the fundamental physical facts.^{31 32}

Suppose that the chancemakers are *symmetries*.³³ Chancemaker Building then has it that the symmetry facts are (deterministically) built by the fundamental physical facts.³⁴ Consider an example from Bader 2020: §3. Suppose that a person undergoes a fission event, such that the person stage, *S1*, at *t1* branches into two new person stages, *S2* and *S3*, at *t2*. We can then ask which person stage *S1* can expect to become. Bader deploys something similar to the indeterministic building framework as a new response to the fission problem, such that *S1* can expect to become either *S2* or *S3* (but not both) and which person stage *S1* becomes is left to

³¹ Chancemaker Building is often understood as a thesis about causation and chance. For instance, the symmetries on a roulette wheel are built out of the fundamental physical properties. Here I understand the thesis more broadly, such that synchronic building relations like grounding can also have chancemakers. It is beyond the scope of this paper to provide a detailed theory of, say, grounding propensities and chancemakers. Moreover, Bader (2020) has already discussed this at length.

³² As a reviewer helpfully points out, another option here would be to say that the chancemakers are *identical* to the subvening properties.

³³ Thus, we are assuming that symmetries deterministically ground objective probabilities. For more on the connection between symmetries and probabilities, see Strevens 1998. Note that we didn't need to make this assumption, we could have focused on different theories of objective chance, such as frequentist or propensity theories.

³⁴ Sets-ups like this are common in discussions of theories like statistical mechanics, evolutionary theory, and the many-worlds interpretation of quantum mechanics. Theories like this have a role for chance, but the relevant kind of chance is neither *fundamental ontic chance* nor *subjective chance*.

chance. In this example, the chancemakers are the symmetries in the branching structure, and the fundamental physical facts fully deterministically ground those chancemakers.³⁵

While non-fundamental objective chance has received much discussion in the literature, it has not been noted that such a thesis vindicates indeterministic supervenience.³⁶ Let $[P1, \dots, Pn]$ be all the fundamental physical facts, and $[C1, \dots, Cm]$ be all the chancemaker facts. Suppose that $[P1, \dots, Pn]$ and $[C1, \dots, Cm]$ collectively (deterministically) build the fact $[There\ is\ a\ propensity\ to\ Q]$. Now, the advocate of Chancemaker Building has it that $[P1, \dots, Pn]$ deterministically builds $[C1, \dots, Cm]$. So, $[C1, \dots, Cm]$ deterministically supervenes on $[P1, \dots, Pn]$. Moreover, $[There\ is\ a\ propensity\ to\ Q]$ will then also deterministically supervene on $[P1, \dots, Pn]$. Thus, the obtaining of $[P1, \dots, Pn]$ ensures the obtaining of $[There\ is\ a\ propensity\ to\ Q]$. But this is now enough to guarantee the indeterministic supervenience of $[Q]$ on $[P1, \dots, Pn]$. We have constructed a model where the chancemakers and the fundamental physical facts are not modally recombinable on account of them standing in a deterministic building relation. Thus, the indeterministic supervenience thesis holds with metaphysical necessity. Importantly, while we made use of deterministic building, we did not assume indeterministic building.

We now have a model for making sense of (P2). If the fundamental physical facts deterministically build the chancemaker facts, then those two sets of facts are not modally recombinable, and indeterministic supervenience holds. Really, this is no more than the idea behind Chancemaker Building: if chancemakers are deterministically built, then the modal consequences of indeterministic building are guaranteed.³⁷

³⁵ Note that we don't have to think that this is how the fission problem should actually be resolved for the example to be instructive.

³⁶ For discussion of emergent chance, see Schaffer 2007; Hofer 2007; Glynn 2010; Strevens 2011; Emery 2015.

³⁷ There's an interesting comparison here between the deterministic/indeterministic building work distribution and the anchoring/grounding work distribution. Just as anchoring provides the conditions for grounding (see Epstein 2015: 74–87), deterministic building provides the conditions for indeterministic building. Moreover, just as the presence of anchoring doesn't do away with the need for grounding, neither does the presence of deterministic building do away with the need for indeterministic building. Indeterministic building is the relation that holds between, for instance, the phenomenal facts and the physical facts such that the nature of the former is exhausted by the latter. Deterministic building cannot play this role, but merely sets up conditions under which such an indeterministic relation is required.

4 Conclusion

I conclude that the argument in §1 is sound. The logical possibility of indeterministic supervenience entails the coherence of indeterministic building, and indeterministic supervenience is indeed logically possible. Thus, we have a simple argument for the coherence of indeterministic building from two fairly uncontroversial premises. Furthermore, the argument did not require us to appeal either to constitution intuitions nor to a detailed analysis of constitutive character. I take this to be a significant advantage of the argument.

Why are philosophers so opposed to the coherence of indeterministic building, especially given that there exists such a straightforward argument for it? One diagnosis is that philosophers tend to rely heavily on constitution intuitions. Consider Bennett's other argument against indeterministic building, the *argument from luck*:

If both w_1 and w_2 are possible, it's a matter of chance whether or not b exists (or obtains, etc.). It just does or it doesn't. Certainly, nothing a is doing (as it were) makes the difference between worlds where it exists and worlds where it doesn't. Neither a nor anything else is really accounting for b , or making b exist. So b just isn't accounted for or made to exist—it isn't built at all. (Bennett 2017: 50)

Bennett's argument seems to amount to something like: if something is a matter of chance, then it cannot be a matter of building. But this is a *statement of Tension*, not an argument for it! There is no reason to accept the argument from luck unless Tension has already been assumed. Bennett's argument is intuitively compelling, but it does not tell us why Tension is true. I think that it would be more productive for both advocates and opponents of Tension to turn their attention to my indirect argument for indeterministic building. Engagement with (P1) and (P2), which appeal to well-understood notions like supervenience, chancemakers, and properties, promises a better payoff than an exchange of constitution intuitions.

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