

Comments on *Making Things Up*

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1. Bennett's framework

Making Things Up is a first-rate work of philosophy, that should be read by anyone interested in fundamentality and metaphysical dependence. Here I'll focus on the following components of Bennett's 'building'-based framework for understanding these notions:

- I. There are diverse building relations, including but not limited to mereological composition, constitution, set formation, and realization, via which some goings-on are built out of others.
- II. Though diverse, the building relations are unified in being members of a class of relations that are directed (irreflexive and antisymmetric), necessitating, and generative, in that building goings-on produce or generate built goings-on (32).¹
- III. Though unified, there is no generic building relation (what I call 'big-'G' Grounding', for terminological clarity) of the sort advocated in Fine 2001, Schaffer 2009, and Rosen 2010, serving as a more natural or more fundamental core of the specific building relations.
- IV. Building relations "connect entities that are in some sense more fundamental to entities that are in some sense less fundamental" (2) in a way providing a reductive basis for relative fundamentality: "one of the central claims of the book [is] that there is nothing more to relative fundamentality than the obtaining of certain building relations" (3).
- V. The not-holding of building relations provides a reductive basis for absolute fundamentality, via a conception according to which "to be fundamental is to be unbuilt" (103), either relative to a building relation, or *simpliciter*.
- VI. Causation is a building relation.

¹ Bennett later refines the operative understanding of generativity to be such that the holding of the relation "licenses generative talk".

2. Building and relative fundamentality

If building relations are to provide a reductive basis for relative fundamentality, they must determine directions of priority between their relata without, as Bennett puts it, “additional metaphysical resources”. There is a question of whether they do so, however.

Consider the relation between classical mereological fusions and their parts (‘parthood’, for short). Monists and Pluralists agree that the Cosmos and its proper parts stand in this relation, but they disagree about whether the Cosmos, *qua* fusion, is more fundamental than its proper parts, or *vice versa*. This dispute is not plausibly construed as a dispute over which direction of priority should be associated with parthood (i.e., over whether parthood is bottom-up composition or top-down decomposition), not just because the dispute is not over the nature of parthood, but because either disputant can and often will maintain that parthood can point in different directions. Hence, as Schaffer observes, a Monist can maintain that while the Cosmos *qua* fusion is prior to its parts, molecules *qua* fusions are posterior to their parts. Similar considerations apply for functional realization, constitution, and other purported building relations.

What more is needed for (instances of) these relations to be associated with a direction of priority? A similar question has been pressed (by Fine, Schaffer, and others) against what I call ‘small-‘g’ grounding relations’, which Bennett suggests are akin to her building relations (12, 34). In both cases the question is important, and calls for an answer.

It won’t suffice to appeal to the supposed directedness (and/or other features) of building relations, since at issue here is the prior question of how such directedness gets fixed in a specific direction—as it must, if building relations are to serve as a reductive basis for relative fundamentality. Both composition and decomposition are directed; the question remains: what fixes which direction is operative in a given case of parthood? Nor will it suffice to maintain that (unlike my small-‘g’ relations) building relations *do* have built-in directions of priority, such that, e.g., while parthood is not itself a building relation, it is associated with building relations (composition and decomposition); for the question remains: what more is required for (instances of) relations such as parthood (functional realization, etc.) to come to have, in a given case, one direction of priority rather than another (and presumably not both!)? The previous answers are bump-pushing. Correspondingly, rather than complicate matters by considering how what we might call ‘pre-building relations’ such as parthood give rise to building relations (composition, decomposition) with built-in directions of priority, I will cut to the chase and focus on the question of how (instances of) building relations such as parthood come to be associated with a given direction of priority. (If you want to give types of such instances their own names—composition, decomposition—feel free.)

I can discern four candidate answers.

First: relations such as parthood (functional realization, etc.) are each associated with a different primitive, which fixes the direction of priority of each instance of the relation, perhaps in different directions. This undermines (IV), since additional metaphysical resources are required for relative fundamentality. (Note—here and for the next two answers—that taking building relations to be constituted by some or other primitive priority fixer(s) such that these last aren’t really ‘additional’ to the relations would be a shell game—one Bennett explicitly rejects (64).)

Second: the priority associated with (instances of) building relations is fixed by Grounding (Fine, Schaffer, Rosen): the direction of priority associated with (an instance of) a building relation is a primitive, albeit free-ranging matter. This again undermines (IV), and now also (III).

Third: the priority associated with (instances of) building (small-‘g’) relations is fixed by what goings-on are (or serve as²) fundamental, where what goings-on are fundamental at a world is a primitive matter (see Wilson 2014, 2016b, and 2016a).³ For example, if the Cosmos is fundamental, its proper parts are non-fundamental; if the atoms are fundamental, their fusions are non-fundamental; and priority between non-fundamenta, where such exists, is determined by relevant metaphysical facts (registering, e.g., how the non-fundamenta are small-‘g’ related to the fundamenta, whether the non-fundamenta fall under salient types, whether instances of the one type can exist in the absence of instances of the other, etc.).⁴ This answer undermines (IV), and now also (V).

Fourth: the priority associated with building relations is fixed by convention. This answer is indirectly suggested by Bennett herself, in explicating her third, ‘generative’, requirement on building relations “in terms of what we can correctly *say*” (58). There she notes that this requirement leaves open what underpins the correctness of generative talk, observes that one unsatisfactory account appeals to Grounding, then registers rather being inclined to take this underpinning to be “a matter of convention” (59). Given that generativity is part of the proposed reduction basis for relative fundamentality, it wouldn’t be far from what Bennett here loosely endorses to take the priority of building relations to ultimately rely on convention, as per the approach she later describes as follows: “The world (presumably) decides which relations are asymmetric, irreflexive necessitation relations; but *we* conventionally choose which subset are generative, and these are the building relations” (185). Moreover, since conventions are not (relevantly) additional metaphysical posits, a conventionalist account of priority is compatible with (IV).

Nonetheless, a conventionalist answer is unsatisfactory, from a metaphysical point of view. To start, as the Monist–Pluralist dispute illustrates, there is no agreement, conventional or otherwise, about which direction of priority is associated with relations such as parthood (nor, relatedly, about what ‘generates’ what). Conventionalism is even less plausible as a means of making sense of how different instances of building relations may point in different directions. Even if there were conventional agreement on these scores, what is wanted in a metaphysical realist rather than anti-realist account of relative fundamentality, of the sort that Bennett implies is her target (“I am an unabashed metaphysical realist”, 4), is some relevant metaphysical basis for this phenomenon. Conventions are irrelevant to this project.

To sum up: either Bennett’s reductionism (IV) or her implied (and in any case, an independently attractive) metaphysical realism about relative fundamentality must go.

² My view does not require that there be an absolutely fundamental level; see Wilson 2016b.

³ In discussing my view, Bennett says “Wilson thinks fundamentality is undefinable” (110). For the record, what I take to be primitive is not the concept of fundamentality but rather the metaphysical determination of what is fundamental at a world. Even if ‘fundamental’ could be defined (as, e.g., ‘being among the goings-on providing a minimal basis for everything that exists at the world’), it would remain that what metaphysically determines what is fundamental at a world is a primitive matter.

⁴ No algorithm is to be expected here. Figuring out relative fundamentality relations between non-fundamenta requires doing substantive metaphysics.

3. The characterization of building relations as directed

Bennett maintains, as per (II), that building relations must be directed: irreflexive and anti-symmetric. Against this, on many accounts of metaphysical structure the phenomena at issue constitute or otherwise metaphysically depend on themselves or each other, as with, e.g., a self-constituting God (Wilson 2014), bipolar magnets (Bliss 2014), and mental states as identical to physical states (Jenkins 2011, Wilson 2014).

Bennett's negative strategy here is to either reinterpret the cases (God is unbuilt rather than self-built; the magnet poles depend on the magnetic field, not each other) or problematize them (the neural states to which mental states are identical do not build them; rather, the mental/physical state is built by more fundamental physical states). These moves are controversial or indecisive,⁵ and further seeming counterexamples await, including cases involving mutually constituting quarks (Wilson forthcoming, Tahko 2018b), unified but distinct fundamental interactions (Wilson 2002), certain views of properties (Shoemaker 1980), and global interdependence à la Huayan Buddhism (Kang 2017). As Bennett admits, continued rejection of counterexample after counterexample would be increasingly *ad hoc* (38). That point has arguably arrived: given the plethora of seeming counterexamples, spanning live scientific, philosophical, and religious views, rejectionism is not a working strategy.

More positively, Bennett argues that taking building relations to be directed best satisfies two methodological constraints: conceptual conformity and theoretical utility.

Re conceptual conformity, she says "that our pretheoretic [understanding] of building pulls in the direction of antisymmetry and irreflexivity is clear, and I doubt that proponents of symmetric or reflexive grounding would deny it" (39). But the many countervailing views undercut the claim that our pretheoretic conception pulls toward directedness, and I for one am happy to deny it.

Re theoretical utility, Bennett maintains that directedness is a consequence of the reductive proposal in (IV), understood as involving

$B \rightarrow MFT$: for all x and y , and all building relations B , if x at least partially B s y then x is more fundamental than y . (40)

$B \rightarrow MFT$, if true, would entail that building relations must be directed, since the *more fundamental than* relation is directed (41). But as previously, the proposed reduction fails; hence so does this motivation for taking building relations to be directed.

Indeed, against the backdrop of (III), endorsement of $B \rightarrow MFT$, hence directedness, cuts against Bennett's methodological criteria. As Bennett notes, the antisymmetry of *more fundamental than* and $B \rightarrow MFT$ together entail, contra a presupposition of her argument against Grounding, that different building relations cannot hold in different directions between the same relata ($B \rightarrow MFT$ would thereby entail that each was more fundamental than the other, contra the antisymmetry of *more fundamental than*). Bennett goes on to say "the only way to avoid this is to say that strictly speaking [...] relative fundamentality is itself relative to specific building relations". As she acknowledges, "this is a big and perhaps surprising claim" (42).

⁵ For example, even if neural states are built by more fundamental physical states, the reductionist will maintain that neural states are more fundamental than the mental states to which they are purportedly identical.

But that it is big and surprising (as it is) that relative fundamentality is relative to building relations counts against taking $B \rightarrow MFT$, hence directedness, to be conceptually core to building. Relativization also undercuts the theoretical utility of these theses. Re physicalism, for example: how are relativized attributions of relative fundamentality to be compared, in such a way to make sense of this comprehensive thesis? Certainly the vast literature on physicalism has not proceeded in such piecemeal fashion. Bennett gestures at a couple of strategies⁶ which do not strike me as promising. The supposition, in $B \rightarrow MFT$, that even partial building is sufficient for relative fundamentality is also theoretically unuseful, since ruling out accounts of strongly emergent goings-on—physicalism’s best naturalistically acceptable rival—as equally fundamental as, though partially metaphysically dependent on, physical goings-on.⁷

Bennett’s final gambit proceeds by problematizing attempts to reject the directedness of building by rejecting either $B \rightarrow MFT$ or the directedness of *more fundamental than*.

First, she considers Barnes’s (2018) rejection of $B \rightarrow MFT$ due to yet further purported cases of symmetric building. Here Bennett aims to turn the tables: “I have available to me a straightforward account of relative fundamentality [...] on which it reduces to complex patterns of building. On Barnes’s approach, a different story is required. But what story? Must she take relative fundamentality to be a further primitive? Without having something to compare to the account I offer [...] it is hard to do the math, but on the face of it this is a significant theoretical cost” (43). Now, *pace* Bennett, I too reject $B \rightarrow MFT$, and I have offered a different account of relative fundamentality, which adverts to primitive fundamentality (see above). Is my story more theoretically costly than Bennett’s? I don’t think so; for the failure of relations such as parthood and functional realization to come with built-in directions of priority means that Bennett’s story either tacitly relies on one or more additional metaphysical resources or else deflates relative fundamentality into a metaphysically unsatisfactory conventionalism.

Second, Bennett considers whether (as per my 2014) one might deny that relative fundamentality is directed on grounds that ‘more fundamental than’ creates an opaque context, so that ‘*a* is more fundamental than *b*’ and ‘*a* = *b*’ might each be true without ‘*a* is more fundamental than *a*’ being true. Bennett argues that certain accounts of how identity claims may be associated with opaque contexts, due to Gibbard (1975) and Lewis (1971), do not carry over to the case of ‘more fundamental than’—in particular, she argues that the opacity in the present case cannot reflect an ambiguity in this expression; she then challenges me to come up with “a different explanation of, or metaphysical underpinning for, the putative opacity”. I appreciate and accept this invitation. To start, my explanation relies not on an ambiguity in ‘more fundamental than’ but rather on the supposition that in cases of identity-based dependence, attributions of relative fundamentality attach to the relata *qua* members of different levels. Hence, for example, given that $a = b$, the claim that *a* is more fundamental than *b* is, properly elucidated, the claim that *a qua* physical is more fundamental than *b qua* mental. Even if one could substitute referring expressions *salva veritate* into such ‘*qua*’ contexts, the clearly false claim that *a qua* physical is more fundamental than *a qua* physical would not follow. Moreover, if such contexts are opaque, the reductive

⁶ E.g., the suggestion (due to David Kovacs) that generalized relative fundamentality involves “a (complicated, imprecise) weighted sum of the various specific indexed notions” (165).

⁷ See McLaughlin 1992 and Wilson 2015 for arguments that strong emergence is both metaphysically coherent and naturalistically acceptable.

physicalist can avoid commitment to somewhat odd (though not clearly false) claims such as that *b qua* physical is more fundamental than *a qua* mental.

The upshot is that the characterization of building relations as directed, as per (II), remains unmotivated, both in general and by Bennett's own methodological lights.

4. The absolutely fundamental as the independent

Bennett maintains, as per (V), that building relations provide a reductive basis for an account on which "absolute fundamentality is independence" (107), where "x is independent iff x is not built by anything" (105), such that "to be fundamental is to be unbuilt" (103), either relative to a building relation, or *simpliciter*.

Now, many seeming counterexamples to taking building to be directed are also seeming counterexamples to taking fundamentality to be independence—simply add in that the goings-on at issue (God, quarks, Huayan existents, properties) are fundamental. Bennett registers her commitment to rejecting any and all such cases, but suggests that her account of fundamentality could accommodate them via the "easy replacement" of independence with 'independence*', according to which "for all y such that y builds x, x builds y" (136). But first, such a strategy won't accommodate the fundamentality of strongly emergent goings-on, which may be partly (and asymmetrically) constituted by fundamental physical goings-on. And second, such a strategy would undermine (V): since many mutually dependent goings-on are not fundamental, something besides building or its absence must be wheeled in to select mutually dependent goings-on that are fundamental. So the counterexamples remain, undercutting the motivation for an independence-based account.

Why, then, take the fundamental to be the unbuilt? Bennett claims that such a conception is conceptually core to our understanding of fundamentality:

I do not think there is any question that independence is a—the—central aspect of our notion of fundamentality. Things that are [fundamental] do not depend on anything else. (138)

But this claim is straightforwardly undermined, as above, by many live accounts of fundamental structure.

What instead seems core to our notion of fundamentality is, first, that the fundamental goings-on are basic, and second, that they serve as a basis for whatever else there might be. (This last is along lines of what Bennett calls the 'completeness' conception.) The 'all God had to do' metaphor serves as a common heuristic tracking both components, as when Kripke (1972/80) says, "Suppose we imagine God creating the world; what does He need to do to make the identity of heat and molecular motion obtain? Here it would seem that all He needs to do is to create the heat, that is, the molecular motion itself", and Schaffer (2009) says, "The primary is (as it were) all God would need to create" (351).⁸ Characterizations of the fundamental goings-on as serving as an axiomatic basis for all else are silent on whether the fundamental goings-on stand in constitution or other metaphysical dependence relations to themselves or each other. So again: why assume that to be among the fundamenta is to be independent/unbuilt?

⁸ See Tahko 2018a for further discussion and citations.

I speculate that this assumption reflects an ambiguity in common claims to the effect that the fundamental goings-on are ‘basic’ or ‘independent’. To be sure, the fundamental goings-on at a world do not *collectively* metaphysically depend on anything else. This broader sense of independence is suggested by Bernstein’s (in progress) description of ‘middleism’:

A most fundamental middle level grounds all facts above it and all facts below it. A middle level is the most ontologically independent of all levels: all God has to do is create the fundamental middle level of reality, and the existence of the bottom-most levels and the uppermost levels comes for free.

But it doesn’t follow from such collective independence that individual fundamenta fail to depend on anything; for a collection might be metaphysically independent of anything else, but members of the collection nonetheless stand in metaphysical dependence relations to themselves or each other.

Bennett’s purported motivation for (V) thus appears to conflate the true claim that the fundamental goings-on are collectively metaphysically independent with the questionable claim that each fundamentum is so independent.⁹

5. Causation as a building relation

That causation is a building relation (VI) follows from Bennett’s characterization of building relations as directed, necessitating, and generative. To be clear: it is commonly supposed that building/metaphysical dependence might indirectly involve causal relations, as when the causal roles of special science features are played by physical realizers. At issue here is the further claim that causation itself is a form of building, conforming to $B \rightarrow MFT$.

This claim is problematic by Bennett’s own methodological lights. To start, it’s no part of our concept of causation that effects are in any sense less fundamental than their causes. Causes and effects are often taken to be at the same ‘level’ of the fundamentality hierarchy, as per causal special science laws, and non-fundamental causes can, many think, have fundamental effects, as when my pushing the button causes the electron to accelerate. Relativizing relative fundamentality to causation doesn’t help, nor does emphasizing that the relative fundamentality at issue is intended to be deflationary (168). It simply isn’t any part of our understanding of causation that as the world causally unfurls, all the goings-on are becoming causally less and less fundamental, whatever that is supposed to mean.

Nor is it theoretically useful to suppose that effects are less fundamental than their causes. The dearth of views on which causation has such a structure reflects, first, that a plausible precondition of relative fundamentality is that the less fundamental goings-on be completely metaphysically dependent on the more fundamental goings-on, and second, that causation is paradigmatic of a relation that is not a form of complete metaphysical dependence and which correspondingly is not seen as tracking relative fundamentality (similarly for strong emergence, a close nomological cousin of causation). Hence the bulk

⁹ Prefiguring Bennett’s response, I’ll here register that given the lack of an operative means of comparing relativized attributions of relative fundamentality, it is unclear how the proposed reduction in (V) might target the collective rather than the individual.

of effort in specifying the schematic physicalist thesis that all broadly scientific goings-on are ‘nothing over and above’ (completely metaphysically dependent on, etc.) fundamental physical goings-on has focused on identifying relations (i.e., small-‘g’ relations, or what Bennett calls ‘vertical’ building relations) that rule out¹⁰ that seemingly higher-level goings-on are effects of or strongly emergent from lower-level physical goings-on, since the holding of these latter relations between physical and other goings-on does not ensure that the latter are (in every respect!) less fundamental than the former. Taking causation to be a building relation conforming to $B \rightarrow MFT$ thus erases the primary fault line between physicalists and their rivals.

Here we should note that among the main motivations for looking to conceptions of metaphysical dependence going beyond supervenience was precisely that even the strongest correlations were compatible with supervenient goings-on being caused by or strongly emergent from their physical supervenience bases, hence were useless for purposes of illuminating or legislating disputes between (in particular) physicalists and their rivals (see, e.g., Wilson 2005 and McLaughlin and Bennett 2018). Bennett’s overly abstract characterization of building relations is subject to the same concern, and is correspondingly unlikely to serve as a useful theoretical resource in debates over relative fundamentality, even bracketing the metaphysically unsatisfactory conventionalism that lies at its core.

These considerations also undercut two reasons that Bennett gives for thinking that a class containing both vertical building relations and causation tracks a useful theoretical joint. First is that there are important analogies between questions or concerns associated with vertical building relations and with causation—e.g., the question whether there must be a foundational ground and the question whether there must be a first cause, and concerns about causal overdetermination and concerns about whether some goings-on can have multiple grounds. Second is that it is a methodological constraint that one must give analogous answers to analogous questions/concerns, modulo some good reason not to do so.

But that vertical metaphysical dependence relations do, but causation doesn’t, ensure relative fundamentality (more weakly: block ‘over and above-ness’), itself provides a basis for denying that the questions or concerns are importantly analogous and/or that they must be treated analogously. For example, one might reasonably maintain that chains of relative fundamentality must end in a fundamental basis, so that (since vertical metaphysical dependence tracks relative fundamentality) there must be a foundational ground, but (since causation does not track relative fundamentality) no first cause is needed—a first ground will suffice. And Kim is concerned with causal overdetermination but not concerned with ‘grounding’ overdetermination, precisely because there is not even a *prima facie* question of how some completely vertically dependent goings-on could have multiple bases (as when an instance of red is determined by multiple increasingly specific determinates), whereas there is a *prima facie* question of how an effect could be brought about by multiple causes from each of which it is wholly distinct. Indeed, the usual solutions to Kim’s causal overdetermination problem (as per, e.g., Wilson 1999 and Bennett 2003) consist in exploiting the intuition that if the competing causes stand in a relation of vertical metaphysical dependence, there is no problem—

¹⁰ Here and elsewhere, according to me: given what is fundamental—e.g., if physicalism is correct, the physical.

hence even if grounding overdetermination were a concern (which it isn't), it couldn't be treated analogously to the causal overdetermination concern.

So I am not yet convinced that Bennett's building-based framework can do the broadly reductive theoretical work she advertises it as doing. But it's par for the metaphysical course to disagree. One thing is certain: Bennett has here articulated a new and important package deal concerning the most foundational notions in metaphysics. *Making Things Up* is a major accomplishment, and one that many of us will be discussing for decades to come.

References

- Barnes, Elizabeth, 2018. "Symmetric Dependence". In Ricki Bliss and Graham Priest, editors, *Reality and Its Structure*. Oxford University Press.
- Bennett, Karen, 2003. "Why the Exclusion Problem Seems Intractable and How, Just Maybe, to Tract It". *Nous*, 37:471–97.
- Bernstein, Sara, in progress. "Could a Middle Level Be Most Fundamental?"
- Bliss, Ricki 2014. "Viciousness and Circles of Ground". *Metaphilosophy*, 45:245–256.
- Fine, Kit 2001. "The Question of Realism". *Philosophers' Imprint*, 1:1–30.
- Gibbard, Allan 1975. "Contingent Identity". *Journal of Philosophical Logic*, 4:187–222.
- Jenkins, C. S., 2011. "Is Metaphysical Dependence Irreflexive?" *The Monist*, 94:267–276.
- Kang, Li 2017. *Spreading Structures*. Ph.D. thesis, Syracuse University.
- Kripke, Saul 1972/80. *Naming and Necessity*. Cambridge, MA: Harvard University Press.
- Lewis, David 1971. "Counterparts of Persons and their Bodies". *The Journal of Philosophy*, 68:203–11.
- McLaughlin, Brian 1992. "The Rise and Fall of British Emergentism". In A. Beckermann, H. Flohr, J. Kim, editors, *Emergence or Reduction? Essays on the Prospects of Non-reductive Physicalism*, 49–93. Berlin: De Gruyter.
- and Karen Bennett, 2018. "Supervenience". In Edward N. Zalta, editor, *Stanford Encyclopedia of Philosophy*. Metaphysics Research Lab, Stanford University.
- Rosen, Gideon 2010. "Metaphysical Dependence: Grounding and Reduction". In B. Hale and A. Hoffmann, editors, *Modality: Metaphysics, Logic, and Epistemology*, 109–36. OUP.
- Schaffer, Jonathan 2009. "On What Grounds What". In D. Manley, D. Chalmers, and R. Wasserman, editors, *Metametaphysics: New Essays on the Foundations of Ontology*, 347–383. OUP.
- Shoemaker, Sydney 1980. "Causality and Properties". In Peter van Inwagen, editor, *Time and Cause*, 109–35. Dordrecht: D. Reidel.
- Tahko, Tuomas E., 2018a. "Fundamentality". In Edward N. Zalta, editor, *Stanford Encyclopedia of Philosophy*.
- , 2018b. "Fundamentality and Ontological Minimality". In Ricki Bliss and Graham Priest, editors, *Reality and its Structure*, 237–253. Oxford University Press.
- Wilson, Jessica M., 1999. "How Superduper Does a Physicalist Supervenience need to Be?" *The Philosophical Quarterly*, 49:33–52.
- Wilson, Jessica M., 2002. "Causal Powers, Forces, and Superdupervenience". *Grazer Philosophische-Studien*, 63:53–78.
- , 2005. "Supervenience-based Formulations of Physicalism". *Nous*, 39:426–59.

- , 2014. “No Work for a Theory of Grounding”. *Inquiry*, 57:1–45.
- , 2015. “Metaphysical Emergence: Weak and Strong”. In Tomasz Bigaj and Christian Wüthrich, editors, *Metaphysical Emergence in Contemporary Physics; Poznan Studies in the Philosophy of the Sciences and the Humanities*, 251–306.
- , 2016a. “Grounding-based Formulations of Physicalism”. *Topoi*.
- , 2016b. “The Unity and Priority Arguments for Grounding”. In Ken Aizawa and Carl Gillett, editors, *Scientific Composition and Metaphysical Ground*. London: Palgrave-Macmillan.
- , forthcoming. “Essence and Dependence”. In Mircea Dumitru, editor, *Metaphysics, Meaning and Modality: Themes from Kit Fine*. Blackwell.