Research Overview

Jessica Wilson (May 28, 2024)

Contents

I have research interests in (broadly speaking) metaphysics, metametaphysics, epistemology, and the philosophy of mathematics. I discuss my work and primary contributions in these areas in §§1–4, in broadly temporal order. All co-authored work is fully co-equal, with authors listed in alphabetical order.[1]

Citation numbers are as per Google Scholar. General stats: H-number of 26; 3550 citations.

1 Metaphysics

1.1 Interlevel Metaphysics

Much of my work in metaphysics is directed at understanding what it would be for natural reality to be, as the seeming structure of the sciences suggests, organized roughly into 'levels', where higher-level entities and features are, while synchronically dependent on lower-level (and ultimately micro-physical) entities and features, nonetheless to some extent ontologically and causally autonomous from lower-level goings-on, even taking into account that the latter stand in certain (typically highly complex) relational, boolean, mereological, or law-consequential relations. My main project in interlevel metaphysics has been to propose, develop, and defend the viability of schematic powers-based accounts of Weak emergence (a.k.a. 'non-reductive realization') and Strong emergence, as providing systematic, historically motivated, and properly metaphysical bases for understanding higher-level dependence of the sort that is and is not, respectively, compatible with physicalism. Relatedly, I have argued against epistemic, purely modal (e.g., supervenience-based), and primitivist (e.g.,

[1] One exception: Benj Hellie is the lead author on 'Relativized Metaphysical Modality: Index and Context'.

Grounding-based; see §2.2) approaches to interlevel relations or associated (e.g., physicalist) theses. I have also provided an account of what it is for some goings-on to be physical, and proposed and defended new implementations of the powers-based schemas for Weak emergence (as involving the determinable-determinate relation or an elimination in degrees of freedom) and Strong emergence (as ultimately relying on the coming-into-play of a new fundamental interaction). These and other topics pertaining to interlevel metaphysics are the focus of *Metaphysical Emergence* (2021, OUP); see below.

1. 'How Superduper does a Physicalist Supervenience Need to Be?' (1999; *Philosophical Quarterly* 49:33–52; 226 citations).

   Main contribution: This paper is the first presentation and defense of the 'proper subset' account of non-reductive realization (a.k.a. 'weak emergence'), according to which it suffices for the physical acceptability, distinctness, and distinctive efficacy of a seemingly higher-level feature that it has, on any given occasion, a proper subset of the token powers of its base feature on that occasion.[2] It is also one of the first papers to highlight and respond to the need for a properly metaphysical approach to the interlevel relations operative in physicalism and strong (anti-physicalist) emergentism, distinct from epistemic or modal approaches.

   More specifically, I first argue, by attention to the historically different responses to the problem of mental causation given by physicalists and strong (e.g., British) emergentists, that a physicalist dependence relation (reductive or non-reductive) must ensure (in contrast to the strong emergentist approach) that every power of a supervenient higher-level feature is identical with a power of its lower-level physical base feature, and that satisfaction of this condition on powers suffices for the higher-level feature's being physically acceptable. I then argue that taking the set of powers associated with the higher-level feature to be a proper subset of those of its base feature provides a basis for the distinctness and distinctive efficacy of the higher-level feature, and I show that several non-reductive physicalist accounts (including functional realization and determinable/determinate-based accounts) arguably aim to ensure that the proper subset condition is met, and so are more similar than they appear.

2. 'Causal Powers, Forces, and Superdupervenience' (2002; *Grazer Philosophische-Studien* 63:53–78; 67 citations).

   Main contribution: I appeal to the fact that powers are metaphysically dependent on fundamental interactions, either individually or together, to respond to the concern that a powers-based account of strong emergence renders physicalism trivially true.

   More specifically, I present the triviality or "collapse" concern that physical features will inherit the powers of any feature they synchronically necessitate, then respond by relativizing 'over and aboveness' to sets of fundamental forces/interactions: physicalists will maintain that the powers of seemingly higher-level features are identical with powers of their base feature that are grounded (schematically speaking) only in physical fundamental forces/interactions, whereas strong emergentists will maintain that at least one power of some higher-level feature is not so identical. Strong emergentists are thus committed to there being at least one fundamental force or interaction that comes into play only at relatively high levels of organization; whether there is such a force/interaction is a matter for further scientific investigation. I then draw on the

[2] See note 29 of the first chapter draft of my forthcoming book, *Metaphysical Emergence*, for discussion of the pedigree of the proper subset strategy.

case of the weak nuclear interaction to provide support for the scientific acceptability of configurational fundamental interactions, and to identify a criterion for their posit as involving an apparent violation of a conservation law.

3. 'Supervenience-based Formulations of Physicalism' (2005; *Nous* 39:426–459; 225 citations).

   Main contribution: This is a comprehensive critical discussion of the prospects for characterizing physicalism, or associated interlevel relations, by means of some or other supervenience relation. Here also I offer new reasons for thinking that supervenience, even with metaphysical necessity, is insufficient to preserve physical acceptability.

   More specifically, I start by noting that on various scenarios, including 'consistent Malebranchean occasionalism' and necessitarianism about laws (according to which features—properties, states, etc.—are essentially individuated by all the laws into which they enter), strongly emergent features would metaphysically supervene on lower-level physical features. I then argue that the usually cited philosophical motivations for contingentism about laws—e.g., from Hume's Dictum (the denial of metaphysically necessary connections between wholly distinct existences), or from properties' having primitive non-causal identities or "quiddities"—are uncompelling, since scientific features are not individuated in accord with these theses. Finally, I argue that both scientific practice and the anticipated unification of fundamental interactions provide support for necessitarianism.

4. 'On Characterizing the Physical' (2006; *Philosophical Studies* 131:61–99; 234 citations).

   Main contribution: I offer a physics-based account of what it is for an entity (object, feature, etc.) to be physical that, unlike competing accounts, sidesteps both horns of Hempel's Dilemma (according to which neither present nor future physics can enter into a conception of the physical suitable for formulating physicalism) while accommodating the historical contrast between physicalists and their rivals.

   More specifically, I offer an account of the physical incorporating a 'No Fundamental Mentality' constraint, which makes sense of reference to physics as guiding the characterization of the physical goings-on while (reflecting the possibility that future physics might posit entities compatible with panpsychism in a way that would intuitively falsify physicalism) not handing over all authority of what counts as physical to the physicists:

   > *The NFM (no fundamental mentality) physics-based account*: An entity is physical just in case it is (approximately accurately) treated by present or future (in the limit of inquiry, ideal) physics, and is not fundamentally mental.

5. 'Determination, Realization, and Mental Causation' (2009; *Philosophical Studies* 145:149–169; 101 citations).

   Main contribution: Here I develop and defend, against several pressing objections, the suggestion (originally broached in Macdonald and Macdonald 1995 and Yablo 1992) that mental features might be determinables of their physical realizers, and more generally, that realization might be determination.

   More specifically, I consider the argument from 'mental multiple realizability', according to which determinates differ in respect of determinables, but realizers don't differ in respect of their realizers, and the argument from 'mental superdeterminates', according to which taking physical realizers to be determinates of mental features doesn't make

room for the intuitive possibility of a maximally specific mental feature (e.g., a precise feeling of pain). Among other things I draw on an analogy to metameric color science as illustrative of how determination dimensions can be science-relative, making room for qualitative mental events to be completely determinate *qua* mental, while being further determined by physical realizers, and I show how either Funkhauser's (2006) account of determination or my (1999) suggestion that determinable instances have a proper subset of the powers of their associated determinate instances can provide a metaphysical basis for such determination.

6. 'Non-reductive Physicalism and Degrees of Freedom' (2010; *British Journal for the Philosophy of Science* 61:279–311; 114 citations).

   Main contribution: This paper raises to philosophical salience the scientific notion of a degree of freedom, or DOF (an independent parameter needed to specify states upon which the law-governed properties and behavior of a given entity functionally depend) as relevant to the individuation of scientific entities, and applies the notion in service of a new account of non-reductive realization (conforming to the subset of powers-based approach to such realization) as involving an elimination in DOF.

   More specifically, I note that the DOF associated with higher-level entities may be reduced, restricted, or eliminated relative to those associated with base entities, and argue that cases of eliminations in DOF provide a basis for making sense of special science entities as both physically acceptable and ontologically irreducible to physical entities. Importantly, a DOF-based account of realization provides the means of blocking the inference from the deducibility of seemingly higher-level goings-on from lower-level physical goings-on to their reducibility. This doesn't follow, I argue, since when the deduced goings-on have eliminated DOF, they are not appropriately identified with any lower-level goings-on, since the lower-level laws require the information in the eliminated DOF (e.g., pertaining to quantum spin) in order to operate.

7. 'Non-reductive Realization and the Powers-based Subset Strategy' (2011; *The Monist* 94:121–154; 150 citations).

   Main contribution: I refine the subset of powers-based approach to non-reductive realization first presented in Wilson 1999, defend it against certain objections, and compare it to competing accounts of such realization.

   More specifically, after motivating the approach and showing that it is operative in several accounts of non-reductive realization, I argue that implementing the approach does not require that powers be either essentially or exhaustively individuated by their powers, and I argue that alternative approaches (appealing to supervenience, token identity, or constitution) each fail to guarantee either physical acceptability or non-reducibility of seemingly higher-level goings-on.

8. 'Nonlinearity and Metaphysical Emergence' (2013; *Metaphysics and Science*, Stephen Mumford and Matthew Tugby, eds.: 201–235; 41 citations).

   Main contribution: I provide an historically informed assessment of the bearing of the non-linearity of a composite system, whereby certain of its features cannot be seen as linear or other broadly additive combinations of features of the system's composing entities, on whether the system is properly seen as metaphysically emergent.

   More specifically, I argue that while the British Emergentist assumption that non-linearity suffices for fundamental novelty has turned out to be incorrect, it remains

a live if outside possibility that some complex phenomena involve new fundamental interactions, and I identify a scientifically supported criterion of the presence of a new fundamental interaction, in which a descendant of nonlinearity as indicative of strong emergence takes the form of seeming violations of conservation laws. I then consider several accounts of 'weak' metaphysical emergence taking nonlinear system as paradigmatic, and argue that the features appealed to in these accounts (e.g., incompressibility or universality) are compatible with the ontological reducibility of nonlinear systems/features. I then argue that my preferred degrees-of-freedom-based account of weak emergence has resources to establish some non-linear phenomena as genuinely weakly emergent.

9. 'Metaphysical Emergence: Weak and Strong' (2015; *Metaphysics in Contemporary Physics; Poznan Studies in the Philosophy of the Sciences and the Humanities*, Tomasz Bigaj and Christian Wuthrich, eds.: 251–306; 197 citations).

   Main contribution: I offer a systematic and unifying treatment of metaphysical emergence (coupling broadly synchronic dependence with ontological and causal autonomy), taxonomically locating a wide spectrum of available interpretations of the dependence and autonomy in one or other of my two powers-based schemas for metaphysical emergence.

   More specifically, I first argue, by attention to the problem of higher-level causation, that there are two and only two schematic routes to metaphysical emergence of the broadly synchronic variety, as follows:[3]

   > *Strong emergence*: Token higher-level feature S is strongly metaphysically emergent from token lower-level feature P, on a given occasion, just in case (i) S synchronically depends on P on that occasion; and (ii) S has at least one token power not identical with any token power of P on that occasion.
   >
   > *Weak emergence*: Token higher-level feature S is weakly metaphysically emergent from token lower-level feature P on a given occasion just in case (i) S synchronically depends on P on that occasion; and (ii) S has a non-empty proper subset of the token powers had by P, on that occasion.

   (Note: in *Metaphysical Emergence*, reference to 'synchronic dependence' in the schemas for Weak and Strong emergence is replaced by reference to 'cotemporal material dependence'.) While others have observed that accounts of emergence may be sorted into 'weak' and 'strong' varieties, my treatment goes beyond these (typically gestural) treatments in cashing the distinction in metaphysical rather than epistemological terms, in more specifically identifying the differing schematic metaphysical bases for these two types of emergence, and in explicitly locating the schemas in a wide spectrum of existing accounts of emergent dependence and emergent autonomy.

10. 'Must Strong Emergence Collapse?' (with Umut Baysan; 2017; *Philosophica* volume on strong emergence, Alex Carruth, Mark Pexton, James Miller, eds., 91:49–104; 31 citations).

[3] The schemas are relativized to occasions; certain quantificational refinements treat the strong or weak emergence of an instantiated higher-level feature S, simpliciter, or of its feature type.

Main contribution: We assess the concern that the notion of strong emergence makes no sense, since any purportedly strongly emergent features or associated powers "collapse", one way or another, into the lower-level base features upon which they depend.

More specifically, we argue that there are several independently motivated and defensible means of preventing the collapse of strongly emergent features or powers into their lower-level bases, as directed against a conception of strongly emergent features as having fundamentally novel powers. We first motivate and present the powers-based account (§1); we then canvass the two main versions of the collapse objection, show how these apply to the powers-based account, and problematize certain strategies of response (§2); we then present and defend four better strategies of response (§3).

11. *Metaphysical Emergence* (2021; Oxford: Oxford University Press. 94 citations).

    Main contribution: Metaphysical emergence, as motivated by the special sciences and ordinary experience, couples cotemporal material dependence with ontological and causal autonomy (that is, with distinctness and distinctive efficacy). Here I aim to answer the two key questions of what metaphysical emergence is, and whether there actually is any. More specifically (from the cover description):

    > Both the special sciences and ordinary experience suggest that there are metaphysically emergent entities and features: macroscopic goings-on (including mountains, trees, humans, and sculptures, and their characteristic properties) which depend on, yet are distinct from and distinctively efficacious with respect to, lower-level physical configurations and features. These appearances give rise to two key questions. First, what is metaphysical emergence, more precisely? Second, is there any metaphysical emergence, in principle and moreover in fact? *Metaphysical Emergence* provides clear and systematic answers to these questions. Wilson argues that there are two, and only two, forms of metaphysical emergence of the sort seemingly at issue in the target cases: 'Weak' emergence, whereby a dependent feature has a proper subset of the powers of the feature upon it depends, and 'Strong' emergence, whereby a dependent feature has a power not had by the feature upon which it depends. Weak emergence unifies and illuminates seemingly diverse accounts of non-reductive physicalism; Strong emergence does the same as regards seemingly diverse anti-physicalist views positing fundamental novelty at higher levels of compositional complexity. After defending the in-principle viability of each form of emergence, Wilson considers whether complex systems, ordinary objects, consciousness, and free will are actually metaphysically emergent. She argues that Weak emergence is quite common, and that there is Strong emergence in the important case of free will.

12. 'On the Notion of Diachronic Emergence' (forthcoming; *Rethinking Emergence*, David Yates, ed.).

    Main contribution: I argue that there is no need for a distinctively diachronic conception of metaphysical emergence.

    More specifically, my strategy consists in considering a representative sample of accounts of purportedly diachronic metaphysical emergence, and arguing that in each case, the purportedly diachronic emergence at issue either can (and should) be subsumed under a broadly synchronic account of metaphysical emergence, or else is better seen as simply a case of causation.

1.2 Determinables and Determinates

My interest in the determinable-determinate relation as a basis for non-reductive realization led to an independent interest in the metaphysics of determinables and determinates.

1. 'Fundamental Determinables' (2012; *Philosophers' Imprint* 12:1–17; 152 citations).

   Main contribution: I argue against the usual assumption that any fundamental entities there may be are maximally determinate, or that in any case determinables are completely metaphysically dependent on, hence less fundamental than, more determinate entities.

   More specifically, I argue that cited reasons for taking determinables to be less fundamental than determinates, based in determinates' being more natural than determinables (since the former make for more objective resemblance between objects than the latter), and in facts about determinables' being fixed by facts about determinates, are uncompelling. First, determinables make for more objective resemblance between properties than determinates, and so are more natural than determinates in this respect; second, certain constitutive modal facts about determinable instances—namely, that these are of a type that could be otherwise determined—are either not fixed by associated determinate instances or else can only be accounted for by appeal to disjunctive or otherwise gerry-mandered (i.e., non-fundamental) combinations of determinates.

2. 'Determinables and Determinates' (2017; *Stanford Encyclopedia of Philosophy*; 122 citations)

   Main contribution: This is a comprehensive discussion of determinables, determinates, and their relation ('determination', for short), covering the historical development of these notions, the theoretical options for understanding them, and certain of their contemporary applications.

   More specifically, the article is organized as follows. In §1, I trace key points of the historical trajectory whereby determination came to be seen as a distinctive form of specification. In §2, I present the commonly advanced features of determinables, determinates, and their relation; here also I discuss extensions of the (realistically construed) relation to ontological categories beyond properties. In §3, I sketch the main anti-realist, reductionist, and non-reductionist accounts of determinables and determinates, saying how these aim to accommodate the seeming features of determinables and determinates, and flagging key concerns and responses; here also I discuss certain accounts of the structure or logic of determination. In §4, I consider reasons for and against thinking that determinates are metaphysically prior to determinables. In §5, I present three applications of these notions, on which the distinctive features of determinables and/or determinates are seen as key to understanding physical laws, mental/higher-level causation, and metaphysical indeterminacy, respectively.

1.3 Metaphysical Indeterminacy

My interest in determinables as irreducibly unspecific and potentially fundamental features of reality led to my seeing these as providing a new basis for metaphysical indeterminacy.

1. 'A Determinable-based Account of Metaphysical Indeterminacy' (2013; *Inquiry* 56:359–385; 144 citations).

   Main contribution: I offer a novel account of metaphysical indeterminacy (MI):

> *Determinable-based MI*: What it is for a state of affairs S to be metaphysically indeterminate at a time t is for S to constitutively involve an object (more generally, entity) O such that (i) O has a determinable property P at t, and (ii) O does not have a unique determinate of P at t.[4]

More specifically, I first canvas certain phenomena whose natural interpretation as involving MI faces difficulties due to concerns about the intelligibility (as per Dummett and Lewis) and coherence (as per Evans) of MI. I start by showing that previous accounts of MI (heuristically: 'meta-level' accounts) have taken this to involve its being *indeterminate* which of various *determinate* (precise) states of affairs obtain, by way of contrast to my alternative 'object-level' account, on which MI involves its being *determinate* (or just plain true) that an *indeterminate* (imprecise) state of affairs obtains. I more specifically cash the notion of an imprecise state of affairs in terms of an object's (i) having a determinable property, but (ii) not having any unique determinate of that determinable. I motivate the needed extension of the traditional understanding of determinables, then argue that a determinable-based account of MI accommodates, in illuminating fashion, both 'glutty' and 'gappy' cases of MI, corresponding to different ways in which the failure of unique determination can occur, while satisfactorily treating concerns about MI stemming from Evans' argument.

2. 'Are There Indeterminate States of Affairs? Yes' (2017; *Current Controversies in Metaphysics*, Elizabeth Barnes, ed., 105–125; 41 citations).

   Main contribution: I compare my determinable-based account of MI to the metaphysical supervaluationist account described by Elizabeth Barnes and Ross Cameron in the companion to this paper, on which every state of affairs is itself precise/determinate, and MI involves its being indeterminate which determinate state of affairs obtains.

   More specifically, I first note an important difference between our accounts, concerning whether MI is taken to induce propositional indeterminacy: their account does; my account does not. I then highlight and defend certain advantages of my account, including that it is reductive (reducing MI to a certain pattern of instantiation of properties), appeals to familiar resources, and fully preserves classical logic. Finally, I address objections to my account raised by Barnes and Cameron.

3. 'Quantum Metaphysical Indeterminacy', with Claudio Calosi (2018; *Philosophical Studies* 176: 2599–2627; 75 citations).

   Main contribution: We offer new and better reasons to think that metaphysical supervaluationist accounts of metaphysical indeterminacy cannot properly handle quantum MI, understood as involving value indefiniteness, and offer new reasons to think that a determinable-based account of metaphysical indeterminacy can do so.

   More specifically, we first identify different sources of quantum value indefiniteness; we then show that arguments in Darby (2010) and Skow (2010) according to which a metaphysical supervaluationist account cannot properly accommodate quantum MI do not succeed, and go on to provide better arguments for the same conclusion. We then motivate a determinable-based approach to MI and extend it to the quantum case. Here we draw on, develop and respond to discussions in Bokulich (2014) and Wolff (2015) to argue that either gappy or glutty implementations of a determinable based account can accommodate quantum MI.

[4] This definition is simplified for purposes of brevity, in ways that do not matter here.

4. 'Quantum Indeterminacy and the Double-Slit Experiment', with Claudio Calosi (2021; *Philosophical Studies* https://doi.org/10.1007/s11098-021-01602-7; 22 citations).

   Main contribution: We argue a determinable-based approach to Quantum Metaphysical Indeterminacy (QMI) is superior to other treatments of QMI on offer, both realistic and deflationary, in providing the basis for an intelligible explanation of the interference patterns in the double-slit experiment.

   More specifically: In Calosi and Wilson 2018, we argue that on many interpretations of quantum mechanics (QM), there is quantum mechanical indeterminacy (QMI), and that a determinable-based account of metaphysical indeterminacy (MI), as per Wilson 2013 and 2016, properly accommodates the full range of cases of QMI. Here we argue that this approach is superior to other treatments of QMI on offer, both realistic and deflationary, in providing the basis for an intelligible explanation of the interference patterns in the double-slit experiment. We start with a brief overview of the motivations for QMI and for a determinable-based account of MI (§1). We then apply a developed 'glutty' implementation of determinable-based QMI to the superpositionbased QMI present in the double-slit experiment, and positively compare the associated explanation of double-slit interference with that available on a metaphysical supervaluationist account of QMI (§2). We then present and respond to objections, due to Glick (2017) and Torza (2017), either to QMI (§3) or to our specific account of QMI (§4); in these sections we also positively compare our treatment of double-slit interference to that available on Glick's deflationary treatment of QMI. We conclude with some dialectical observations (§5).

5. 'Metaphysical Indeterminacy in the Multiverse', with Claudio Calosi (2022; *Quantum Mechanics and Fundamentality*, Valia Allori, ed., 375–395; 5 citations).

   Main contribution: We provide further support for A. Wilson's claim that there is metaphysical indeterminacy (MI) in world nature on Everettian quantum mechanics (EQM), and provide five arguments in favour of treating MI in world nature in EQM via a determinable-based approach to MI.

   More specifically: One might suppose that Everettian quantum mechanics (EQM) is inhospitable to indeterminacy (MI), given that, as A. Wilson (2020) puts it, "the central idea of EQM is to replace indeterminacy with multiplicity" (77). But as A. Wilson goes on to suggest, the popular decoherence-based understanding of EQM (henceforth: DEQM) appears to admit of indeterminacy in both world number and world nature, where the latter indeterminacy—our focus here—is plausibly metaphysical. After a brief presentation of DEQM (§1), we bolster the case for there being MI in world nature in DEQM (§2). The remainder of the paper is devoted to a comparative assessment of the two main approaches to MI for purposes of accommodating this MI—namely, a metaphysical supervaluationist approach (as per Barnes and Williams 2011) and a determinable-based approach (as per Wilson 2013 and Calosi and Wilson 2018 and forthcoming). We briefly describe each approach (§3), then offer five arguments in favour of a determinable-based approach to world nature MI in DEQM (§4).

1.4 Forces

My work on interlevel metaphysics led to an interest in the metaphysics of Newtonian forces as special science entities, which give rise to a distinctive problem of causal exclusion.

1. 'Newtonian Forces' (2007; *British Journal for the Philosophy of Science* 58:173-205; 68 citations).

   Main contribution: I defend Newtonian forces—pushes and pulls, possessing magnitude and direction, that are exerted (in the first instance) by objects, and which cause motions—against the four best reasons for denying or doubting their existence.

   More specifically, I defend Newtonian forces against the following objections: (1) that Newtonian mechanics is unfit to deliver ontological conclusions on grounds of having been superceded by energy-based theories (i.e., Lagrangian and Hamiltonian mechanics); (2) that Newtonian forces are unobservable, and hence are, at best, instrumentalist fictions; (3) that since we can construct a theory empirically equivalent to Newtonian mechanics that eliminate all reference to forces, Ockham's razor counsels accepting the more parsimonious theory, and rejecting forces; and (4) that since Newtonian forces cause effects that non-force entities already cause, the posit of forces leads to an unacceptable problem of causal overdetermination. A running theme in my defense of forces is that Newtonian mechanics is a special science, and as such invokes certain *prima facie* ontological commitments, that may be maintained against various challenges.

2. 'The Causal Argument Against Component Forces' (2010; *Dialectica* 63:525–554; 34 citations).

   Main contribution: I problematize Cartwright's (1980) argument against component forces, then offer a better, distinctly causal, argument for the same conclusion.

   More specifically, after canvassing certain problems with Cartwright's argumentation, I formulate an exclusion argument against component forces, first showing that component and resultant forces are genuine causal competitors, then arguing that it is component rather than resultant forces that should be excluded. I go on to argue that rejecting component forces does not require, *pace* Cartwright, rejecting the 'facticity' account of laws of nature, according to which laws express facts about what happens.

1.5 Miscellaneous Metaphysics

1. 'Free Will and Mental Quausation', with Sara Bernstein (2016; *Journal of the American Philosophical Association*, 2:310–331; 15 citations).

   Main contribution: We argue that the problems of free will and of mental causation can be seen as special cases of a more general problem; we then build on this result to identify fruitful parallels between certain positions in the two debates.

   More specifically, we argue that the two problems can be seen as special cases of the problem of whether and how mental events of a given type may be efficacious, qua the types of event they are—qualitative, intentional, freely deliberative—given their apparent causal irrelevancy for effects of the type in question; here we generalize what Horgan (1989) identifies as "the problem of mental quausation". We then use this result to identify a parallel between hard determinism and eliminative physicalism (which suggests a better argument against hard determinism than that usually offered), and between soft determinism/compatibilism and non-reductive physicalism (which provides the basis for a new line of defense of compatibilism).

2. 'Essence and Dependence' (2020; in *Metaphysics, Meaning and Modality: Themes from Kit Fine*, Mircea Dumitru, ed.; 22 citations).

Main contribution: I celebrate and critically apply Kit Fine's ecumenical methodology to his essence-based account of ontological dependence, arguing that it is subject to counterexamples involving views that should be kept on the table.

More specifically, I first discuss Fine's distinctive 'schema-based' approach to metaphysical theorizing, which aims to identify general principles accommodating any intelligible application of the notion(s), and show how this approach is operative in his accounts of essence and dependence. I then present several counterexamples to Fine's essence-based account of ontological dependence. The problem, roughly speaking, is that Fine supposes that an object's essence makes reference to just what it ontologically depends on, but various cases suggest that an object's essence can also make reference to what ontologically depends on it. As such, Fine's account of ontological dependence is subject to the same objection he raises against modal accounts of essence and dependence—that is, of being insufficiently ecumenical.

2 Metametaphysics

My metaphysical investigations have led me via a number of paths to an interest in certain metametaphysical topics. Much of my work in this area is directed at critically assessing the philosophical motivations for certain influential or pervasive metaphysical or metametaphysical posits, presuppositions, or accounts against my preferred positive alternatives.

2.1 Hume's Dictum

Hume famously said "There is no object, which implies the existence of any other if we consider these objects in themselves" (*A Treatise of Human Nature*, Book I, Part III, §VI). One of my metametaphysical projects involves formulating and assessing the contemporary version of Hume's Dictum—roughly and typically, the principle that there are no metaphysically necessary connections between distinct, intrinsically typed, entities. Hume's Dictum plays a significant role in metaphysical debate, both constructively (in motivating, e.g., combinatorial accounts of modality and supervenience-based formulations of physicalism) and destructively (in rejecting, e.g., states of affairs and necessitarian accounts of properties and laws; relatedly, whether a given position (e.g., perdurantism, the non-transferability of tropes) is motivated by or compatible with Hume's Dictum is now a topic in its own right. One should ask of such an influential thesis: why believe it? Interestingly, post-Humean arguments for Hume's Dictum are in short supply. In a series of papers which will eventually form the basis of a book, I consider what motivations might exist for this thesis.

1. 'What is Hume's Dictum, and Why Believe It?' (2010; *Philosophy and Phenomenological Research* 80:595–637; 195 citations).

   Main contribution: I argue that Hume's Dictum is not motivated as either analytic or synthetic a priori (that is: motivated by intuitions we have no good reason to question).

   More specifically, I first identify certain ambiguities in the general contemporary version of Hume's Dictum (see above), and motivate and present more formal characterizations of the Dictum. I then argue that Hume's Dictum is not analytic on any of the available conceptions of its constitutive notions ('wholly distinct', 'intrinsic'), taking Hume's Dictum as applied to the case of causal connections as a crucial test case. The short story as regards 'wholly distinct', for example, is that on some strong modal readings of whole distinctness, Hume's Dictum looks analytic; but that A and B can each exist

without the other's existing is compatible with the failure of Hume's Dictum as applied to causal connections, which moreover requires, e.g., that it is possible that A could exist *in the conditions or circumstances actually requisite for the occurrence of effect* B and yet B not occur. Afterwards, I turn to whether Hume's Dictum is synthetic a priori; here again I argue that there is a prima facie case for thinking so, which upon closer examination does not go through.

2. 'Hume's Dictum and the Asymmetry of Counterfactual Dependence' (2014; *Chance and Temporal Asymmetry*, Alastair Wilson, ed.: 258–279; 17 citations).

   Main contribution: I argue that Hume's Dictum is not motivated as required by (what many take to be) the best account of counterfactuals—namely, a similarity-based possible worlds account, where the operative notion of similarity requires 'miracles'—i.e., worlds where entities of the same type that actually exist enter into different laws.

   More specifically, I start by observing that the main cited motivations for such an account of similarity are first, that some salient contexts presuppose counterfactual (CF) asymmetry, and second, that accounts of CFs failing to presuppose CF asymmetry are epistemologically problematic, such that under conditions of determinism, the variations in initial micro-conditions needed to implement a given counterfactual antecedent would result in so many changes to macro-states that evaluation of CFs would be rendered practically impossible. Against the first reason, I argue that no non-artificial contexts presuppose CF asymmetry; against the second, I observe that such micro-variation is compatible with significant similarity as regards macroscopic states of affairs—enough, in particular, to allow CFs to be appropriately evaluated.

3. 'Hume's Dictum and Metaphysical Modality: Lewis's Combinatorialism' (2015; *The Blackwell Companion to David Lewis*, Barry Loewer and Jonathan Schaffer, eds.: 138–158; 53 citations).

   Main contribution: I assess a potential motivation for Hume's Dictum, tacit in David Lewis's work, according to which one should accept this thesis as presupposed by the best account of the range of metaphysical possibilities—namely, a combinatorial account, applied to spatiotemporal fundamenta.

   More specifically, I elucidate this motivation for Hume's Dictum, then problematize the motivation by identifying a number of concerns with Lewis's combinatorialism. Most criticisms of Lewis's combinatorialism have targeted seeming ways in which the theory overgenerates the desired space, letting in as possible what, by some or other lights, is impossible; I rather argue that Lewis's combinatorialism seriously undergenerates the desired space, for possibilities involving broadly scientific entities in particular.

2.2 Relativized Metaphysical Modality

Metaphysical modality is frequently taken to reflect 'what could not have been otherwise no matter what' (Burgess 2009, 46); in terms of possible worlds, the suggestion is that metaphysical modality involves absolutely unrestricted quantification over the space of possible worlds. Along with my co-authors Adam Murray and Benj Hellie, I argue that this 'classical' approach is incorrect, and that what is metaphysically possible or necessary is rather relativized to which world is actual, as per what we call 'Relativized Metaphysical Modality' (RMM).

1. 'Relativized Metaphysical Modality' (with Adam Murray; 2012; in *Oxford Studies in Metaphysics*, Karen Bennett and Dean Zimmerman, eds.: 189–226; 19 citations).

   Main contribution: We argue that the common supposition that metaphysical modal claims are to be evaluated with respect to a single domain of possible worlds is incorrect; rather, metaphysical modality has a complex structure, reflecting what is counterfactually possible, relative to each indicatively actual world.

   More specifically, we motivate our view by attention to discussions in Salmon 1989 (directed at a version of Chisholm's Paradox) and Fine 2005, in which various data are taken to support rejecting the transitivity of accessibility (hence standard modal logic) and modal monism; we argue that RMM can accommodate these data compatible with standard modal logic and modal monism. Noting an analogy with two-dimensional semantics, we argue that metaphysical modality has a complex structure, reflecting what is counterfactually possible, relative to each indicatively actual world. In arguing for relativization, we are on the same side as Crossley and Humberstone, and Davies and Humberstone; our contribution is to offer distinctively metaphysical reasons for relativization, and to show that relativization can be incorporated in ways minimally departing from standard modal logic.

2. 'Relativized Metaphysical Modality: Index and Context' (with Benj Hellie and Adam Murray; 2020; in *Routledge Handbook of Modality*, Otavio Bueno and Scott Shalkowski, eds.; 7 citations).

   Main contribution: We draw on and extend Murray and Wilson 2012 and Murray 2017 (*Perspectives in Modal Metaphysics*, PhD, University of Toronto), appealing to Lewis's (1980) Context-Index distinction and associated framework to provide a 'double-indexing' semantics for modal languages, on which truth is twice over relativized to a possible world, and show how RMM operates to resolve three long-standing puzzles in modal metaphysics in metaphysically and logically non-revisionary fashion.

   More specifically, after an overview in §1, we describe the 'classical' approach to semantic theorizing in §2, as involving a nested series of modal fragments (a basic propositional modal fragment, to which predicate-term syntax is added, to which quantification is added); in §3 we describe the metaphysical puzzles (involving seemingly fixed laws of nature, seemingly flexible individual essence, and seemingly contingent ontology) attaching to each of these fragments, which puzzles offer a choice between preserving intuitive metaphysics and preserving intuitive logic; we argue that the puzzles in §3 each involve a common presupposition—the 'In-Light Principle' (ILP)—which identifies possibility in light of which and possibility that such-and-such; §4 develops RMM as a way to reject the ILP and solve the puzzles in metaphysically and logically non-revisionary fashion.

2.3 Grounding, Metaphysical Dependence, and Fundamentality

1. 'No Work for a Theory of Grounding' (2014; *Inquiry* 57:535–579; 688 citations).

   Main contributions: I argue that the recently posited (by Fine, Rosen, and Schaffer, among others) primitive relation or notion of metaphysical dependence—"Grounding"—is neither able nor needed to do the work it is or might be supposed to do. I also argue for my preferred alternative approach to metaphysical dependence, as involving specific 'small-g' metaphysical relations coupled with a primitivist conception of fundamentality.

More specifically, I argue that primitive Grounding alone cannot do the work of illuminating metaphysical dependence, for bare claims of Grounding leave open such basic questions as whether Grounded goings-on exist, whether they are reducible to or rather distinct from Grounding goings-on, whether they are efficacious, and so on; but in the absence of answers to such basic questions, we are not in position to assess the associated claim or theses concerning metaphysical dependence. There is no avoiding appeal to the specific ('small-g') metaphysical relations typically at issue in investigations into dependence—e.g., type or token identity, functional realization, classical mereological parthood, the set membership relation, the proper subset relation, the determinable/determinate relation, and so on—which are capable of answering these questions. But, I then argue, once the specific relations are on the scene, there is no need for Grounding, either as tracking a coarse-grained but still useful level of investigation, as needed for the specific relations to fix the direction of priority (here I offer my own account of how priority gets fixed, which adverts to what is primitively fundamental at a world), or as unifying the specific relations.

2. 'The Unity and Priority Arguments for Grounding' (2016; in *Scientific Composition and Metaphysical Ground*, Ken Aizawa and Carl Gillett, eds.; 61 citations).

   Main contribution: I argue that Schaffer's attempts to provide better unity- or priority-based motivations for positing primitive Grounding do not succeed.

   More specifically, Schaffer's new unity argument appeals to the claim that the specific 'small-g' dependence relations are unified by appeal to the formalism of Structural Equations modeling. I argue that this formalism is not suited for these purposes, insofar as it supposes that dependence relations are tracked by counterfactual dependence; but the whole point of many dependence relations (e.g., those at issue in the special sciences) is to allow for insensitivity of dependent goings-on to counterfactual variation in base-level goings-on; and nor do highly broad contrast classes overcome this basic inaptness. Schaffer's new priority argument targets my positive suggestion that priority is fixed by appeal to the holding of specific small-g relations against (in the first instance) a backdrop assumption about what is fundamental, on grounds that this approach is overly committing, since there might not be a fundamental level; I respond that my approach can be applied in the absence of a fundamental level, if levels converge or if the archeology of dependence doesn't matter to higher-level goings-on.

3. 'Grounding-based Formulations of Physicalism' (2016; *Topoi*, Andreas Elpidorous, ed.; 62 citations).

   Main contribution: I problematize Grounding-based formulations of physicalism.

   More specifically, I consider whether metaphysical dependence of the sort preserving physical acceptability should be understood in terms of primitive 'Grounding'. I argue, first, that stated motivations for such a view are unsound; second, that a Grounding-based formulation lacks illuminating content, and that attempts to imbue Grounding with content by taking it to be a (non-monotonic, hyperintensional) strict partial order are unuseful, since (among other problems) 'over and above' relations such as strong emergence may also be (non-monotonic, hyperintensional) strict partial orders; third, that conceptions of Grounding as a relation of metaphysical explanation conflate metaphysics and epistemology, and problematically assume that physical dependence is incompatible with explanatory gaps; fourth, that in order to appropriately contrast with strong emergentism, a Grounding-based formulation must introduce one and likely two

new primitives; and fifth, that understanding physical dependence in terms of Grounding gives rise to 'spandrel' questions, including, e.g., "What Grounds Grounding?", which arise only due to the overly abstract nature of Grounding.

4. 'The Fundamentality First Approach to Metaphysical Structure' (forthcoming; lead article in a forthcoming issue of *Australasian Philosophical Review*, Dana Goswic, ed.).

   Main contribution: I motivate and defend a 'Fundamentality First' approach to metaphysical structure (see below), coupling a primitivist account of fundamentality with a pluralist account of metaphysical dependence.

   More specifically: a wide range of scientific, religious/cosmological, and philosophical views presuppose that there is what I call 'metaphysical structure', whereby (i) some goings-on in a given domain D are (absolutely or comparatively) fundamental; and (ii) (comparatively) non-fundamental goings-on in D metaphysically depend on (absolutely or comparatively) fundamental goings-on in D. Such presuppositions motivate the broadly metametaphysical questions of (i) what makes it the case that some goings-on in a domain D are (absolutely or comparatively) fundamental? and (ii) what makes it the case that (comparatively) non-fundamental goings-on in a domain D metaphysically depend on (absolutely or comparatively) fundamental goings-on in D? Here I advance my preferred 'Fundamentality First' package deal approach to metaphysical structure, which couples a primitivist approach to fundamentality with a pluralist approach to metaphysical dependence.

2.4 Metaphysical Methodology

My investigations into Hume's Dictum, Grounding, and other influential theses or posits have led me, more generally, to an interest in contemporary metaphysical methodology.

1. 'Much Ado About 'Something': Critical Notice of *Metametaphysics: New Essays on the Foundations of Ontology*, edited by David Chalmers, David Manley, and Ryan Wasserman (2011; *Analysis* 71:172–188; 31 citations).

   Main contribution: I argue that due to certain problematic metametaphysical presuppositions, most contributions to *Metametaphysics* miss the deeper mark. The moral is that real progress in metametaphysics is likely to occur less by attention to semantic issues pertaining to representation, translation and quantification and more to non-semantic issues pertaining to epistemology and, e.g., metaphysical indeterminacy.

   More specifically, I observe that most contributions, whether pessimist or optimist about metaphysics, presuppose that metametaphysical questions are best treated by attention to semantics, and especially quantifier semantics. I then problematize these contributions by considering how best to answer three metametaphysical questions. First, why be pessimistic about metaphysics—why be Carnapian in a post-positivist age? There is, I suggest, an epistemological strategy for reviving Carnapian pessimism, but it is neglected here; and the alternative motivations on offer are not compelling. Second, why think that metametaphysical questions should be approached via attention to features of language, and in particular to quantifiers, in ordinary or ontological language(s)? Here again we are offered little motivation for this supposition, which, notwithstanding its near-uniform acceptance here, faces clear difficulties. Third, granting that quantification is bound up with first-order questions about what exists, what is the nature of this connection, and what are the implications for metametaphysics?

Here I find the accounts of the connection on offer implausible, especially as compared to an alternative making better sense of metaphysical practice and disagreement.

2. 'Three Dogmas of Metaphysical Methodology' (2013; *Philosophical Methodology: The Armchair or the Laboratory?*, Matthew Haug, ed.: 145–165; 27 citations).

   Main contribution: I identify a puzzle about philosophical progress whose proper resolution suggests that we are presently if not insuperably far from the end of methodological inquiry, then identify three cases of premature dogmatism in metaphysical theorizing.

   More specifically, I distinguish two forms of progress in philosophy—'vertical' progress, corresponding to development within a specific paradigm/framework for theorizing, and 'horizontal' progress. I note that philosophical progress seems to involve both vertical and horizontal dimensions, in a way that is puzzling: philosophers work in a number of competing frameworks, while typically maintaining that only one of these is correct. I diagnose this situation as reflecting that we are presently quite far from the end of inquiry into philosophical methodology. The good news is that we appear to be making advances on this score. The bad news is that failure to recognize or make explicit that our standards are in flux often leads to premature dogmatism, as I illustrate by attention to three poorly motivated assumptions presently operative in metaphysical and metametaphysical contexts, associated with acceptance of Hume's Dictum, the supposition that material composition must conform (one way or another) to the principles of classical mereology, and the supposition that the best way to approach metametaphysical issues is by attention to semantics, and more specifically by attention to what quantifier(s) might be at issue in ordinary or philosophical discourse.

3. 'Three Barriers to Philosophical Progress' (2017; *Philosophy's Future: The Problem of Philosophical Progress*, Damien Broderick and Russell Blackford, eds.: 91–104; 22 citations).

   Main contribution: I argue that the present (if not insuperable) lack of fixed standards in philosophy is associated with three barriers to philosophical progress, pertaining to intra-disciplinary siloing, sociological rather than philosophical determinants of philosophical attention, and the encouraging of bias.

   More specifically, I argue that a lack of fixed standards best explains why philosophers working on a shared topic often do so within incompatible frameworks, though only one framework is supposed to be correct. Unlike Carnap, I interpret this situation optimistically, as indicating that we are far from the end of methodological inquiry; still, the present lack of fixed standards poses three barriers to philosophical progress. First, it encourages intra-disciplinary siloing, where philosophers ignore work outside of their own paradigm, leading to dialectical and argumentative difficulties and misspent intellectual energy. Second, without fixed standards, which frameworks are embraced is often determined more by sociological factors having to do with elite influence and/or disciplinary inertia than by properly philosophical motivations. Third, lack of fixed standards encourages implicit and/or explicit bias—a general empirical fact which, applied to philosophy, provides a new explanation of why philosophy has a distinctively bad problem with bias as compared to other argumentative and technical fields.

4. 'The Question of Metaphysics' (2016; *The Philosophers' Magazine*, Summer issue; 5 citations).

   Main contribution: I identify and offer a positive answer to what I call 'the question of metaphysics': the question of whether there is any role for metaphysics to play on

which it is both non-redundant and capable of genuinely illuminating its target subject matter. **Note:** the first page of this article has a misleading blurb, expressing the opposite of the view I endorse in the article.

More specifically, I first canvas the two oft-stated concerns constituting the question of metaphysics, then focus and answer the question, in three steps. First, I argue that metaphysical methodology itself obliges metaphysicians to take the concerns about the redundancy and explanatory intelligibility of metaphysics seriously. Second, I observe that answering the question requires getting clear on what conception of metaphysics is at issue, and argue that the currently popular "hands-off" conception of metaphysical theorising is unable to provide a satisfactory answer to the question of metaphysics, especially when coupled with the common penchant for primitive posits. Third, I put my preferred "embedded" conception of metaphysics on the table, on which metaphysics has non-redundant jobs to do in assessing and systematising other disciplines, and in constructing meta-accounts, as part of this assessment, which are sensitive to the full range of data and theoretical desiderata; and on which metaphysical notions and posits, while typically somewhat more abstract, grow from, rather than float free of, more familiar notions, and as such are capable of illuminating the target subject matter.

3 Epistemology

My interests in modality and metaphysical methodology have led naturally to an interest in the epistemology of modality and, more generally, metaphysics. The bulk of my work in epistemology has been on the justificatory status and associated applications of abduction, or inference to the best explanation; I've also addresed the question of whether experience could disconfirm the propositions of arithmetic, and provided a novel response to Cartesian external world skepticism.

3.1 Abduction, A Priority, and the Epistemology of Modality

Stephen Biggs and I have co-authored several papers setting out or applying our view that abduction is an a priori mode of inference, that does better than conceiving as a basis for identifying modal truths (in the face of Kripke's results, in particular). We plan to co-author a book on this topic in the next couple of years.

1. 'The A Priority of Abduction' (with Stephen Biggs; 2016; *Philosophical Studies* 174: 735–758; 48 citations).

   Main contribution: Here we challenge the orthodoxy according to which abduction is an a posteriori mode of inference.

   More specifically, we start with a case study illustrating how abduction can justify a philosophical claim not justifiable by empirical evidence alone. While many grant abduction's epistemic value, nearly all assume that abductive justification is a posteriori, on grounds that our belief in abduction's epistemic value depends on empirical evidence about how the world contingently is. Contra this assumption, we argue, first, that our belief in abduction's epistemic value is not and could not be justified a posteriori, and second, that attention to the roles experience plays in abductive justification supports taking abduction to be an a priori mode of inference. We close by highlighting how our strategy for establishing the a priority of abduction positively contrasts with strategies

in Bonjour (1998), Swinburne (2001), and Peacocke (2004) aiming to establish the a priority of certain ampliative modes of inference or abductive principles.

2. 'Carnap, the Necessary A Posteriori, and Metaphysical Anti-realism' (with Stephen Biggs; 2016; in (*Ontology After Carnap*, Stephen Blatti and Sandra LaPointe, eds.: 81–101; 16 citations).

   Main contribution: We argue that the most promising (and most Carnapian) post-Kripke version of Carnap's semantics—abductive two-dimensionalism—presupposes an epistemology which undermines Carnap's metaphysical anti-realism.

   More specifically, we consider how a neo-Carnapian might best reconcile Carnap's supposition that modal claims are true in virtue of semantical rules alone, and so are a priori, with Kripke's influential arguments, in *Naming and Necessity* (1972/1980), that some modal claims are true a posteriori. Some (e.g., Chalmers and Jackson, in their 2001) have suggested that an extension of intensional semantics along lines of "epistemic two-dimensionalism" can accommodate Kripke's results while largely preserving commitment to the semantics-based a priority of modal claims. Here we argue that the best way to implement this suggestion, reflecting difficulties with a conceiving-based epistemology as well as better compatibility with Carnap's account of 'explication' as a guide to semantic intensions, is via an abductive epistemology of intensions; we then argue that this result has negative consequences for Carnap's metaphysical anti-realism.

3. 'Abductive Two-Dimensionalism: A New Route to the A Priori Identification of Necessary Truths' (with Stephen Biggs; 2017; *Synthese* volume on meta-ontology, Carlo Rossi, ed., 197:59–93; 11 citations).

   Main contribution: We argue that extant access-based criticisms of epistemic two-dimensionalism (E2D) are objections not to E2D per se but to the usually presupposed conceiving-based epistemology of intensions; we then argue that if abduction provides the operative guide to intensions, then E2D can meet access-based objections, and fulfill its promise to restore the desirable link between necessity and a priority.

   More specifically, we present E2D as a promising post-Kripke route to a priori knowledge of modal truths, then discuss several access-based concerns according to which conceptual indeterminacy and incoherence present barriers to our having armchair access to the requisite semantic intensions. We then argue that these concerns can be resolved if abduction provides the operative guide to intensions, leaving the way clear for E2D to fulfill its promise. Crucial to our project here is our view, sketched here and defended in our 2016 paper, that abduction, properly understood, is an a priori form of inference; as such, our discussion has application beyond the question of E2D's viability, providing the basis, more generally, for a new account of conceptual analysis.

4. 'Abduction versus Conceiving in Modal Epistemology' (with Stephen Biggs; 2018; *Synthese* volume on new directions in modal epistemology, Antonella Mallozzi, ed.; DOI=10.1007/s11229-019-02117-9); 14 citations.

   Main contribution: We argue that extant access-based criticisms of epistemic two-dimensionalism (E2D) are objections not to E2D per se but to the usually presupposed conceiving-based epistemology of intensions; we then argue that if abduction provides the operative guide to intensions, then E2D can meet access-based objections, and fulfill its promise to restore the desirable link between necessity and a priority.

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5. 'Does Anti-exceptionalism About Logic Entail that Logic is A Posteriori?' (with Stephen Biggs; forthcoming; *Synthese* volume on anti-exceptionalism about logic, Filippo Ferrari, ed.); 2 citations.

   Main contribution: We argue that the a priority of abduction undercuts the usual characterization of the contrast between exceptionalists and anti-exceptionalists about logic as turning on whether the justification of logical theories is a priori or rather a posteriori, and offer a new characterization of this debate.

   More specifically: The debate between exceptionalists and anti-exceptionalists about logic is often framed as concerning whether the justification of logical theories is a priori or a posteriori (for short: whether logic is a priori or a posteriori). As we substantiate (§1), this framing encodes the usual anti-exceptionalist thesis that logical theories, like scientific theories, are abductively justified, coupled with the common supposition that abduction is an a posteriori mode of inference. In past work, however, we have argued that this common supposition is incorrect: abduction is an a priori mode of inference (Biggs and Wilson 2017a, 2017b, 2019). After sketching our main argumentative strategies for this conclusion (§2), we go on (§3) to argue that whether logic is a priori or a posteriori, on an anti-exceptionalist view, ultimately depends on whether the data on which abduction operates is a priori or a posteriori. Since at least some anti-exceptionalists (e.g., Priest, 2016; Russell, 2014) allow that the data input into logical theorizing may be a priori, anti-exceptionalism is compatible with logic's being a priori. We go on (§4) to offer an alternative characterization of what divides exceptionalists and anti-exceptionalists about logic, as reflecting disagreement about which mode of inference is operative in logical theory choice. We conclude (§5) by drawing a general moral, according to which the justification of theories in every discipline has a broadly conditional structure, whereby an operative mode of inference takes relevant data as input and generates a preferred theory as output, and where the justificatory status of any such theory as a priori or a posteriori will reflect both the justificatory status of the relevant data and the justificatory status of the operative mode of inference.

3.2 Skepticism

1. 'The Regress Argument against Cartesian Skepticism' (2012; *Analysis* 72:668–773; 15 citations).

   Main contribution: I argue that Cartesian skepticism about the external world leads to a vicious regress of skeptical attitudes, the only principled and unproblematic response to which requires refraining from taking the very first skeptical step.

4 Philosophy of Mathematics

My interest in mathematics (as per my undergraduate degree) has led to two papers in the philosophy of mathematics.

1. 'Could Experience Disconfirm the Propositions of Arithmetic?' (2000; *Canadian Journal of Philosophy* 30:55–84; 4 citations).

   Main contribution: I argue that arithmetical propositions could not be disconfirmed by experience.

   More specifically, I consider and respond to Casullo's reasons for thinking that arithmetical propositions could be disconfirmed by experience ('Necessity, Certainty, and the A Priori', *Canadian Journal of Philosophy*, 1988). Casullo argues that arithmetical propositions could be disconfirmed by appeal to an invented scenario, wherein our standard counting procedures indicate that 2+2 != 4. Our best response to such a scenario would be, Casullo suggests, to accept the results of the counting procedures, and give up standard arithmetic. While Casullo's scenario avoids arguments against previous "disconfirming" scenarios, it founders on the assumption, common to scenario and response, that arithmetic might be independent of standard counting procedures. Here I show, by attention to tallying as the simplest form of counting, that this assumption is incoherent: given standard counting procedures, then (on pain of irrationality) arithmetical theory follows.

2. 'In Defence of Countabilism' (2022; with David Builes; *Philosophical Studies* 179:2199-2236; 10 citations).

   Main contribution: We motivate and defend Countabilism, according to which, necessarily, every infinite collection (set or plurality) is countable.

   More specifically: Inspired by Cantor's Theorem (CT), orthodoxy takes infinities to come in different sizes. The orthodox view has had enormous influence in mathematics, philosophy, and science. We will defend the contrary view—Countablism—according to which, necessarily, every infinite collection (set or plurality) is countable. We first argue that the potentialist or modal strategy for treating Russell's Paradox, initially proposed by Parsons (2000) and developed by Linnebo (2010, 2013) and Linnebo and Shapiro (2019), should also be applied to CT, in a way that vindicates Countabilism. Our discussion dovetails with recent independently developed treatments of CT in Meadows (2015), Pruss (2020), and Scambler (2021), aimed at establishing the mathematical viability, and therefore epistemic possibility, of Countabilism. Unlike these authors, our goal isn't to vindicate the mathematical underpinnings of Countabilism. Rather, we aim to argue that, given that Countabilism is mathematically viable, Countabilism should moreover be regarded as true. After clarifying the modal content of Countabilism, we canvas some of Countabilism's many positive implications, including that Countabilism provides the best account of the pervasive independence phenomena in set theory, and that Countabilism has the power to defuse several persistent puzzles and paradoxes found in physics and metaphysics. We conclude that in light of its theoretical and explanatory advantages, Countabilism is more likely true than not.