

## Making new tools from the Toolbox of metaphysics

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**Abstract** In this review, I specify the metametaphysical background in which Alastair Wilson's "*The Nature of Contingency*" (Oxford University Press, 2020) should be properly understood. Metaphysics, as a philosophical discipline, is standing on thin ice. The caricature of the situation is polarized, and is often presented as follows: metaphysics is either entirely extracted from science or it is entirely independent of science. There is a recent trend that focuses on the middle ground between these extremes, searching the philosophical literature for metaphysical theories that can fill the gap, i.e., leaving metaphysics as a free discipline to produce spoils for the eventual needs of philosophers of science. We can appreciate it better with the following distinction between the tasks of ontology and metaphysics, as complementary disciplines. If, on the one hand, we understand ontology as dealing with what exists, we can somehow extract the entities that are existentially postulated by scientific theories. Metaphysics, on the other hand, would be located as an extra layer, in charge of investigating questions about the nature of the entities obtained in this "naturalized ontology". As a tailor, Wilson adjusts a metaphysical theory in order to perfectly dress the physical and ontological nuances of Everettian quantum mechanics, thus creating a metaphysical the-

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ory that gives us intelligibility, with the concept of modality, in two areas: in quantum mechanics, and analytic metaphysics.

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## 1 A brief outline

The greatest contribution of Wilson (2020) in this book is twofold: at the same time, physics gains a new venue for us to understand Everettian quantum mechanics (EQM) in metaphysical terms; whereas metaphysics gains a new understanding of the concept of modality motivated by EQM. As I argue in this review, it also teaches us a metametaphysical lesson: how to conceive a productive relationship between physics and metaphysics. In this book, Wilson (2020) stands upon the shoulders of giants: Hugh Everett and David Lewis. The former is the notable physicist who famously proposed what is conventionally called the “many-worlds interpretation of quantum mechanics”—which Wilson (2020) equates with EQM.<sup>1</sup> The latter is the philosopher who famously proposed the genuine reality of an infinite number of possible worlds—as real as the one in which you read this review. Strategically, Wilson (2020) proposes a new type of modal realism, where not everything that is metaphysically or logically possible exists in a parallel universe (as the Lewisian worlds), but only the *physical* possibilities branched out from EQM in the context of the Schrödinger equation and situations involving quantum superpositions. This new type of modal realism is called ‘quantum modal realism’ (QMR). Let’s schematize the book.

In Chapters 1, 2, and 3, Wilson (2020) employs Lewis’ modal metaphysics to understand EQM, and shows how it can go even further to develop the principles of QMR, framing the worlds of EQM as “Everett worlds”. The important point here is to acknowledge that Lewis’ “possible worlds” are understood entirely in terms of Everettian worlds; the metaphysically possible worlds are Everett worlds, worlds that come to existence in every situation in which EQM’s superposition principle applies. This has implications for how we should understand the notion of modality, as Wilson articulates throughout the book. For example, this enables him to make sense of the notion of probability and the Born rule with many worlds, a major issue in EQM, with what he calls “Indexicality”. In turn, he argues that probability can only be understood once we have an appropriate metaphysics of modality—and that (only) QMR fits the bill. So on the one hand, Wilson proposes a new understanding of modality in Everettian terms, thus contributing to the aforementioned project for the naturalization of metaphysics. On the other hand, it uses Lewisian metaphysics to help solve problems with EQM itself (e.g., to argue for “divergence” rather than “overlap” account of Everettian worlds, something that is done by the author elsewhere Wilson, 2017).

<sup>1</sup> Equating the EQM with the many-worlds interpretation is by no means consensual (see Barrett, 2011; Conroy, 2012, 2018), but we will not discuss that here.

He takes this hook to defend, in Chapter 4, a QMR-account of laws of nature, in which “fundamental laws” are the same in every Everett world, *i.e.*, the laws of EQM are fundamental “across the whole Everett multiverse” (Wilson, 2020, p. 170). But what is also fundamental is the universal quantum state; each branch, such as the macroscopic world in which we live, is emergent—thus non-fundamental. Chapter 5 tackles the traditional question of metaphysical fundamentality, now applied to EQM. Adopting a foundationalist stance in metaphysics, to Wilson (2020) the universal quantum state is metaphysically fundamental and the Everettian worlds are understood as emergent entities; quantum indeterminacy does not apply to the former, only to the latter (the indeterminacy of branched worlds *e.g.* the number of worlds): “[f]undamental reality remains fully determinate in QMR: all that is indeterminate is the number and nature of the non-fundamental macroscopic Everett worlds, one of which we inhabit” (Wilson, 2020, p. 184).

Finally, in the last chapter (6), after bringing metaphysics to the aid of physics, Wilson (2020) proposes that his metaphysical theory can be used to discard a cosmological argument about intelligent design, concluding; therefore, the “choice between interpretations of quantum mechanics turns out to be indirectly evidentially relevant to the existence of a cosmic designer” (Wilson, 2020, p. 197). We know that the present situation in choosing interpretations of quantum mechanics is largely voluntary. Thus, it is great to have more reasons available for us to better inform our choice (even if it is ultimately voluntary).

## 2 The metametaphysical background

Whether or not you are an Everettian or a modal realist, *The Nature of Contingency* is an invaluable source of how to properly do *scientific metaphysics*.<sup>2</sup> Having presented the content of the book schematically, I will focus on the metametaphysical background on which Wilson’s (2020) work should be situated.

Metaphysics, as a philosophical discipline, is standing on thin ice. The caricature of the situation is polarized, and is often presented as follows: metaphysics is either entirely drawn from science, or it is entirely independent of science. What is at stake in a recently rekindled debate is the epistemic value of metaphysics as a discipline. On the one hand, if metaphysics is reduced to physics, then it does not play a relevant role in the search for objective knowledge of physical reality. This is the case defended by Ladyman and Ross (2007), and Maddy (2007). On the other hand, if metaphysics is free from science (if it “floats free” from physics, just as French (2011) worries), we return to the old problem of justification of the discipline. Current debates on metametaphysics, specifically on metaphysics methodology, have shown themselves to be averse to the latter proposal (see Bryant, 2020, and references therein for a

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<sup>2</sup> To employ the taxonomy offered by Guay and Pradeu (2020).

discussion of this topic), whereas the first proposal leaves some people feeling that something is missing (see Chakravartty, 2007; French, 2018a; Arenhart, 2019).

That *something* is the so-called *metaphysical gap*, which is eloquently enunciated by Chakravartty (2007, p. 26): “[o]ne cannot fully appreciate what it might mean to be a realist until one has a clear picture of what one is being invited to be a realist about”. We have some basic guidelines that a healthy relationship between science and metaphysics should obey (see Morganti and Tahko, 2017): (i) we must not leave the metaphysical gap untouched, that is, it is the role of the philosophy of science to fill it; (ii) but not with the motto of *anything goes*: if metaphysics is supposed to be useful for the purposes of philosophy of science in the context of the Viking/Toolbox approach, then metaphysical theories must obey certain constraints of scientific theories and its accompanied ontology. If the theory says that “multiverses exist” (as EQM is often taken to say, see Wallace, 2012), the metaphysics should cope with such a feature. What use can Cartesian-dualist metaphysics of the mind be for the metaphysical understanding of Everettian worlds and Everettian multiverses? It seems that there is none. It’s like trying to hammer a nail with a rope: it’s just not the right tool (see Arenhart and Arroyo, 2021b, for other examples). If we want to understand what the worlds of EQM are in metaphysical terms, we need to employ a metaphysical account of worlds (not minds).<sup>3</sup> So the lesson learned is that we cannot use metaphysical theories that have no treatment of possible worlds to metaphysically interpret the many worlds of EQM.<sup>4</sup>

With an appropriate distinction between “ontology” and “metaphysics”, there is a conceivable “middle way” between a reductionism from the radical naturalization of metaphysics to physics and a metaphysics uninformed about current science: what is “extracted” from scientific theories is its ontological component (what exists), which will provide the conditions for the possibility of attributing a metaphysical profile to the entities existing in the ontology of this scientific theory (see Hofweber, 2016; Arroyo and Arenhart, 2019; Arenhart and Arroyo, 2021a). Organized in this way, we can understand the role of naturalization: what *exists* can be naturalized i.e. extracted from scientific theories, so we have something like a “naturalized ontology”; but things are not the same with metaphysics, as scientific theories are silent about the *nature* of what exists. In this sense, metaphysics has relative freedom from science (it indeed “floats free” from science, see Arroyo and Arenhart, 2021).

It remains to be investigated how we can fill this so-called metaphysical gap. One way of doing this is to follow the heuristics, advocated by French

<sup>3</sup> One can understand Everett’s ‘branching’ process employing an ontology of minds—hence the “many-minds interpretation of quantum mechanics” (see Albert and Loewer, 1988; Lockwood, 1989)—but recall that Wilson equates EQM with the many-*worlds* interpretation of quantum mechanics.

<sup>4</sup> See Arroyo and Arenhart (2019) for a case of incompatibility between metaphysical and scientific theories, using collapse-based quantum mechanics and mind-body dualism as an example.

(2013, 2014), of the “Viking approach to metaphysics”: instead of producing metaphysical theories, we can resort to the philosophical literature and extract theories from there to interpret scientific theories. In French’s (2014, p. 50), “[...] the products of analytic metaphysics can be regarded as available for plundering!”. This Viking approach was later renamed as the “Toolbox” approach (French and McKenzie, 2012, 2015). Here, the philosopher of science (sometimes called a ‘scientific metaphysician’, see Guay and Pradeu, 2020) appropriates strategies from analytic metaphysics to come up with something that may be of interest for interpretive purposes in science. So in a Toolbox-like rummaging, there is room for creativity and maneuver to come up with something new—although this novelty is constrained to the available tools, as French (2018b) himself acknowledges.

But one may ask: ‘after all, why do we need a *quantum* modal realism? Isn’t *Lewisian* modal realism enough to interpret the Everettian worlds?’ This kind of question may stem from a failure to appreciate what the Viking/Toolbox approach amounts to e.g. it misunderstands that the philosopher of science should only point out existing metaphysical theories to interpret scientific theories. As the philosophy of quantum mechanics has shown, this kind of strategy is not a good one. Take for example the attempts to give a “metaphysical flesh” to the bones of the “many worlds” of (some)<sup>5</sup> Everettian interpretations of quantum mechanics using *Lewisian* metaphysics of modality (see Lewis, 2004). One could say that the attempt to metaphysically interpret the Everettian worlds as *Lewisian* worlds is problematic, to say the least. For instance, there are *far more* *Lewisian* worlds than Everettian worlds, as the former accounts for metaphysical and logical possibilities, and the latter accounts for (quantum) *physical* possibilities. Papineau (2004, p. 153) summarized this difficulty as follows: “[...] the extra “branches” that Everett adds to reality all lie within the actual world that evolves from the actual initial conditions in line with the actual laws of physics—these branches by no means include all possibilities”.

Nevertheless, Lewis’s modal realism can teach us something about the nature of the Everettian worlds, if certain adjustments are made. It is precisely in this metametaphysical background that Wilson’s (2020) work makes a great contribution to the debate concerning the methodology of metaphysics—even though the author deliberately distances himself from this type of debate (Wilson, 2020, pp. 15–21). Since it turned out to be ineffective to interpret the Everettian worlds as *Lewisian* worlds, Wilson’s strategy is to turn the table: he proposes that *Lewisian* worlds should be understood as Everettian worlds. Before Wilson’s work, there was no “clear picture”, as demanded by Chakravartty, that faithfully represented the Everettian worlds. Still, Lewis’ metaphysical framework is a valuable source for the metaphysics of science, since no one would benefit from the “reinvention of the wheel” (French, 2018a, p. 404), so the Toolbox analogy is relevant here: Wilson draws on David Lewis’s modal metaphysics to propose his “quantum modal realism”. In that sense, the

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<sup>5</sup> As there are one-world ontologies for the same formalism presented by Everett (see Conroy, 2018).

author uses the Toolbox. Wilson uses Lewis’s metaphysics as an inspiration. Nothing is done from scratch: Wilson takes the tools available in the Toolbox—i.e., Lewis’s (genuine) modal realism—to build his QMR; on the other hand, in doing so, Wilson also brings elements out of the Toolbox.

Given that metametaphysical landscape, we can now better appreciate what Wilson did in his *The Nature of Contingency*: by rummaging in the Toolbox of metaphysics and drawing on extant tools, he was able to develop new tools that: on the one hand, take into account the ontological guidelines obtained in EQM, thus serving the interpretive purposes of science and filling the metaphysical gap; on the other hand, offers a newfangled metaphysical profile for the metaphysical notion of “modality” (a new *tool* on the Toolbox)—which Wilson (2020, p. 5) sees as an “embarrassment to metaphysics”, since previous to his QMR “no extant theory” accounting for the nature of modality was “credible”. So Wilson uses the Toolbox (the main tool being the Lewisian framework) to create a new tool (QMR), thus expanding the Toolbox. With that, Wilson produces the first metaphysical profile legitimately applicable to the Everettian worlds. This is, I believe, the greatest contribution of this book to physics and its greatest contribution to metaphysics is the new understanding of the concept of modality motivated by EQM. Whether the objective is sufficiently achieved, is an open question for future debate. But it is certainly a metaphysical option to join the list of available metaphysics, both to interpret the notion of “many worlds” in quantum mechanics and to interpret the notion of “modality” in metaphysics.

David Lewis was not ready to receive philosophical lessons from quantum mechanics; but, according to Wilson (2020, p. x), we should pay attention to the philosophical lessons given by quantum mechanics and by David Lewis—albeit with due adjustments offered throughout his outstanding book.

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