

JYX



This is a self-archived version of an original article. This version may differ from the original in pagination and typographic details.

Author(s): Prozorov, Sergei

Title: Otherwise than quantum

Year: 2022

Version: Accepted version (Final draft)

Copyright: © The Author(s), 2022. Published by Cambridge University Press

Rights: CC BY-NC-ND 4.0

Rights url: <https://creativecommons.org/licenses/by-nc-nd/4.0/>

Please cite the original version:

Prozorov, S. (2022). Otherwise than quantum. *International Theory*, 14(1), 159-168.
<https://doi.org/10.1017/s1752971921000051>

Sergei Prozorov

OTHERWISE THAN QUANTUM

Introduction

Among the many achievements of Alexander Wendt's *Quantum Mind and Social Science*, the most impressive one must be its bold affirmation of ontological reasoning in social science. Wendt's attempt to 'unify' physical and social ontology seeks to explicate the ontological ground of social phenomena, including politics, be it domestic or international. This is an ambitious task indeed: while the number of references to ontology has certainly increased since the IR meta-theoretical debates of the 1990s, the use of the term has been all too general, often equating ontology with grand social theory, philosophical anthropology or simply ideology. In contrast, Wendt proposes an explicitly scientific ontology for social science as a means of moving beyond the worn debates between 'positivists' and 'interpretivists'. While the former embrace the idea of a physical ontology of the social, their physics is far too outdated to be able to address the main concerns of social science. While the latter venture to overcome the limits of positivism, they do so through bracketing off the ontological question altogether, implicitly presupposing the 'classical' ontology of the positivists but denying its relevance for their enterprise. Since the debate between the two positions is of less and less interest even to their practitioners, it is certainly about time we advanced beyond its terms.

Wendt's solution should satisfy both camps: IR (and every other social science) has an ontological foundation in physics and it is hence defensible as a science, yet the quantum character of this

scientific ontology makes it possible to incorporate most, if not all of the interpretivist claims, thereby endowing them with the scientific status that their mainstream detractors have long denied. It is as if we finally arrive at a happy ending of the ‘second debate’: yes, IR is a science but inclusive enough to allow all kinds of ostensibly non-scientific approaches (be they traditionalist or ‘postmodern’) a place at the table. This is certainly an admirable resolution that promises to lead us out of the current ‘post-debate’ situation of entrenchment increasingly lamented in the discipline.¹ Yet, while I consider Wendt’s book the most significant intervention in IR since, well, his previous book, I keep wondering about the price to be paid for the unification of physical and social ontology. In what follows I will focus on two aspects of this price: Wendt’s reduction of the variety of worlds to the *physical* universe and the presentation of the features of this world in terms of a general *ontology*. These remarks are not intended as a critique of Wendt’s project: since everything I know about quantum theory I learned from his book, I am certainly not qualified to evaluate its substantive claims. While I am happy to take these claims for granted, what I am interested in is the cost of rethinking politics on the basis of a new physicalism that grants it an ontological foundation.

Is there a quantum unicorn?

Let us begin with the logic underlying the unification of physical and social ontology on the basis of quantum theory. It is easy to see that this unification comes at the cost of a quite remarkable reduction of the infinite plurality of worlds to the physical universe, which ends up the only world there is. At the beginning of the book Wendt notes that despite their lack of interest in natural-scientific foundations no interpretivist scholar has yet argued that the social realities s/he studies

¹ See Dunne, Hansen and Wight 2013.

can possibly violate the laws of physics,² which makes the search for their foundation in non-classical physics a legitimate enterprise. While certainly legitimate in principle, this line of reasoning clearly reduces the existing worlds to the physical world as their ultimate reality. In fact, the boldest ontological claim of the book, advanced as an article of faith, is that human beings ‘really are quantum systems’.³ We are not dealing with analogy (what human beings are *like*) but with ontology in a strict sense (what human beings *are*), and the answer locates human beings definitely in the physical universe described in quantum terms. It is important to bear in mind that this universe is strikingly different from the physical universe described by classical physics and is for this reason capable of including intentional and conscious phenomena without unduly reducing them to dead matter. Nonetheless, while it explicitly renounces (vulgar) materialism, Wendt’s quantum ontology remains naturalist and monist: ‘there is only one nature, a domain unified by laws of nature. Nature is the domain of objects of the natural sciences, the universe. Accordingly, nothing exists that is supernatural or goes beyond nature. For what is supernatural or beyond nature would necessarily violate natural laws.’⁴ Indeed, it is only in relation to the natural world that it makes sense to even pose the question of the violation or abidance by the laws of physics. What would it mean to ask of the unicorn whether it violates the laws of physics, quantum or otherwise? And what about Antman or Hamlet, Westeros or Rivendell? The argument may be easily extended to actually existing entities such as scientific communities, terrorist organizations or heavy metal bands: how helpful would it be to define ISA, Isis or Megadeth by the particles they are composed of or even the wave functions whose collapse they result from? While it might be possible to reduce these phenomena to some

² Wendt 2015, 13.

³ *Ibid.*, 3.

⁴ Gabriel 2015, 106.

physical objects obeying the laws of physics, such a reduction would tell us nothing about the identity of these phenomena themselves.

In his recent *Why the World Does not Exist?* Markus Gabriel discusses the problems involved with the identification of the concept of the world with the physical universe, arguing instead for the multiplicity of 'object domains', 'fields of sense' or simply plural 'worlds' that cannot be incorporated into the all-inclusive universe:

There is a basic difference we must acknowledge whenever we are speaking about living rooms or planets. Planets and galaxies are objects of astronomy and in that regard of physics, while living rooms are not. It pertains to the difference between living rooms and planets that we furnish living rooms, eat there, iron or watch television, while we observe planets, measure their chemical composition through applied experiments, determine their distance from other astronomical entities, and much more. Physics concerns itself not with living rooms, but, at best, with physical objects in living rooms, insofar as these fall under natural laws. Living rooms are simply not found in physics, though planets are.⁵

Thus, Gabriel is able to conclude that as 'something in which everything is found that is subject to experimental investigation using the methods of the natural sciences', 'the universe is not everything, for it is just the domain of objects or the domain of investigation of physics. Because physics, just as every other science, is blind to everything that it does not investigate, the universe

⁵ Ibid., 22-23.

is smaller than the whole.⁶ As should be clear from the book's title, Gabriel's point is that there is in fact no whole at all, no world of all worlds, no domain of all objects. There is a multiplicity of worlds that neither obey nor violate physical laws, but are regulated by laws of different kinds, whose general logic Alain Badiou has described in terms of the notion of the transcendental. In any world, be it a ballet troupe, a mafia gang, an academic community, a beach café or a protest march, there is always some form of order regulating the appearance of its elements, but since these elements need not be part of the physical universe, this order similarly need not take the form of physical laws, classical *or* quantum. Religious doctrines, artistic conventions, codes of honour, commodity prices and fluctuations of taste succeed in regulating the existence of the beings of these worlds just as well as the laws of physics.

Are governments supernatural objects which violate the laws of nature? If the criterion of the natural consists in the capacity to be investigated by the natural sciences, then governments are just as supernatural as God or the soul. Hypotheses or even knowledge about governments is just not to be expected from the natural sciences.⁷

None of this is meant to question the validity of these laws or undermine natural science in the name of obscurantist relativism. The question is rather whether we must reduce the infinite plurality of worlds with their own immanent orders to the one world ordered by the laws of physics that either affect the beings of these worlds very indirectly (if they have a physical correlate) or not at all

⁶ Ibid., 25.

⁷ Ibid., 110.

(if they are fictive or imaginary).⁸ Even leaving aside the logical paradoxes involved in any postulation of one over-world embracing all there is,⁹ why is *one* world better than *many* and why is the physical world better than all the others? Wendt's unification of physical and social ontology actually proceeds through the *subsumption* of the social under the physical, much as the German reunification in 1990 actually subsumed the hapless GDR under the Federal Republic. Yet, while there were indisputable advantages in the latter move, they are not so self-evident in the former case, even if we opt for a non-materialist form of physicalism.¹⁰ Even though quantum theory expands the reference of the laws of the physical universe to cover consciousness and intentionality, any such expansion would eventually arrive at a halting point, since there undeniably are worlds, in which unicorns exist to a far stronger degree than the laws of quantum physics themselves. In short, a vitalist physicalism of quantum theory remains a physicalism and continues to face the problem of the physical not being all there is.

Neither wave nor particle

Let us now proceed to the second set of reservations, which have to do with Wendt's presentation of his quantum social science as an exercise in *ontology*. In terms of our argument above about the infinite multiplicity of worlds, this is a bold claim indeed: how can the immanent ordering principles of a particular world (the physical universe) be translated into the discourse on being *qua* being as such? Yet, rather than quarrel with Wendt's preference for a physicalist ontology, I would prefer to

⁸ Cf. Hutchings 2021.

⁹ Badiou 2009, 111-12; see also Prozorov 2013.

¹⁰ Wendt 2015, 9-10, 132-35.

ponder the problems involved in postulating a unified, if not a totalizing, ontology, for our understanding of politics, domestic or international. I will focus on two notions central to any political philosophy, whose subsumption under the quantum ontology seems to me to be problematic. The first is the *event*, understood in the radical sense as something that ontologically should not be, that violates ontological laws yet still somehow *is*. Alain Badiou has provided the most systematic meta-ontological doctrine of the event in *Being and Event* and subsequently elaborated it in the phenomenological theory of *Logics of Worlds*. For Badiou, the event is unrepresentable in the ontological terms that for him are provided by axiomatic set theory. The event is strictly ‘supernumerary’ and may only be identified retroactively through the effects, which its irruption produces in the situation.¹¹ In Badiou’s technical definition, an event is a set, composed of the elements of the singular ‘evental site’ and *itself*. While the ‘material’ of the event is provided by the unrepresented elements of the site, the event remains entirely irreducible to its site, since it also figures as its *own* element. This characteristic of self-belonging entails that the event does not belong to being *qua* being, as the axioms of set theory explicitly prohibit self-belonging. For this reason, ‘ontology has nothing to say about the event.’¹²

If quantum theory serves as a physical ontology for political science and IR, does it mean that all things political now obey ontological laws that are also the laws of physics? In this case, is the event in the Badiouan sense conceivable in quantum terms? It is important to note that what is at stake here is not whether a theory can accommodate and explain change and transformation – indeed Wendt’s quantum theory might be better at this than most others, having found a way to reconcile

¹¹ Badiou 2009, 403-10; see also Badiou 2005, 173-99.

¹² Badiou 2005, 190.

free will and physical ontology. The question is rather what this theory does when faced with the 'evental' change that *cannot* be explained with reference to the ontological laws *at all*, let alone freely willed on their basis. Having spent a few hundred pages elucidating his mathematical ontology, Badiou eventually turns the tables and proclaims that everything important that happens in politics, art, science and love actually violates the basic laws of this ontology. I wonder if there is a similar move to be made with quantum theory.

What is the relevance of this move for politics? The paradigmatic example of the event for Badiou is revolution, which he conceives of as entirely irreducible to its economic, social or political conditions (its site), yet adding to them nothing other than its own name as a marker of its own ontological impossibility: 'Of the French Revolution it must be said that it both presents the infinite multiple of the sequence of facts situated between 1789 and 1794 and, moreover, that it presents itself as an immanent resume and one-mark of its own multiple.'¹³ Since this relationship of self-belonging is proscribed by ontology, it becomes impossible to decide from an ontological perspective on whether the Revolution really was an event, 'the arrival in being of non-being, the arrival amidst the visible of the invisible'.¹⁴ This is why it is so easy to demonstrate, as revisionist historians do, that the French or any other revolution was actually not a revolution at all, that all its facts taken together do not amount to the revolution – of course, they do not, because the revolution must add itself to itself to become itself. Yet, the same undecidability also entails the extraordinary power of past revolutionary events in our present, their capacity for reactivation or

¹³ Ibid., 180.

¹⁴ Ibid., 181.

resurrection: as something that in some sense never was in the first place, the revolutionary event is never truly past and possesses unlimited potential for repetition.¹⁵

While Badiou's terminology is admittedly idiosyncratic, his argument is not. In fact, his account of the revolution as an ontologically undecidable event accords with Hannah Arendt's classical reading of revolution as the paradigm of all authentic political praxis. The key point in Arendt's analysis is that the revolution is reducible to neither causes nor ends,¹⁶ i.e. to none of the four Aristotelian modes of causality that are retained in Wendt's quantum ontology.¹⁷ The revolution is not caused by an external agent, its material composition (or site), formal design or immanent telos - it is a rupture of contingency in the world that testifies to the non-necessary character of all its ordering structures. One of the reasons why this account of the revolution has been relatively uncontroversial in political theory is that most political theorists have tended to bracket ontology off in the manner of Wendt's 'interpretivists', as something irrelevant to the concerns of a specifically social science. From that perspective, the fact that a key concept of political thought happens to violate ontological laws is not at all surprising, but only proves that the bracketing of ontology was the right decision in the first place.

Now, in the quantum social science proposed by Wendt, such a dismissal clearly would not suffice. If our political theory now unfolds on the basis of quantum ontology, we must be able to account for the ontological status of the revolutionary event. Yet, if I understand Wendt's presentation of

¹⁵ Badiou 2009, 21.

¹⁶ Arendt 1976, 18-25.

¹⁷ Wendt 2015, 119-23, 260-66.

quantum theory correctly, the only thinkable notion of the event in it would be the collapse of the wave function, whereby the potential would become actual, the indeterminate would be determined and the undecidable decided. Yet, by Badiou's definition this is no event at all, but a mere modification of the situation on the basis of the virtual possibilities already prescribed by its transcendental.¹⁸ Such an 'event' would merely mark the actual happening of something that already *could* happen in the world in question. Similarly to Badiou's own mathematical ontology, quantum ontology does not seem to have much to say about the event. If it can describe it, it no longer appears properly evental since its being is presupposed at least as a virtuality, as something that *could* happen. But if it cannot describe it, the event appears to lack any being in the quantum world and, to recall the argument in the previous section, if the quantum world is the only world there is, it appears definitively impossible.

What would a proper event look like in the quantum world? It would be something like the appearance of a new particle independently of any wave or the appearance of a new wave altogether – in short, an appearance that transcends the way things usually come to appear in the world in question. Such a concept might appear strictly absurd from a quantum-theoretical perspective, but unless we are willing to abandon the idea of a revolutionary event, we are stuck with this absurdity, which, moreover, remains the best bet for political subjects, insofar as it affirms the radical contingency of the world, which is the source of any meaningful experience of freedom, not *according to* any given worldly order but *in excess of* it.

¹⁸ Badiou 2009, 363-75.

The nature of this experience of freedom brings me to the second reservation, pertaining to the problem of potentiality. Of course, potentiality is a key concept in quantum theory and we encounter it early on in the description of the collapse of the wave function. A wave function consists only of potential outcomes of particle hits and does not describe any actual state of affairs. These potential states exist simultaneously in 'superposition'. When the measurement is performed, the wave function collapses and all but one of these potentialities end up effaced, while one of them is actualized in the form of a particle. In Wendt's analysis this structure of the wave-particle duality actually founds the entire quantum model of life, since cognition, will and experience are all grasped in its terms as a 'macroscopic instantiation of quantum coherence'.¹⁹ Cognition is a state of quantum coherence prior to the collapse of the wave function, whereby no potentiality is yet actualized. Will is the force that collapses waves into particles, potentialities into actualities. Experience is the internal manifestation of this collapse. In short, life is about the actualization of potentialities. What is then the ontological status of potentialities in quantum theory? On the one hand, they are definitely *there* as attributes of the wave in the state of superposition, yet on the other hand they are by definition not (yet) *actual* and, moreover, not all actualizable, only one of them attaining proper being in the event of the wave function collapse. Thus, potentialities certainly exist, 'but only' as superpositions, in something like an ontological deficit.²⁰

This account of potentiality both resonates and conflicts with the Aristotelian discussion of potentiality, recently revived and elaborated by Giorgio Agamben. For Aristotle, something is potential not simply because it is capable of being, but, more importantly, because it has the

¹⁹ Wendt 2015, 137.

²⁰ *Ibid.*, 32-33.

capacity *not* to be. To be worthy of the name, potentiality must retain its potential for being 'impotential', for *not* passing into actuality. Thus, potentiality necessarily 'maintains itself in relation to its own privation, its own *steresis*, its own non-being'.²¹ Yet, it is evidently not equivalent to non-Being as such, but rather consists in the paradoxical 'existence of non-Being, the presence of an absence'.²² While this understanding of potentiality might at first glance appear esoteric, it is precisely this potential 'not to' that the philosophical anthropology of the 20th century deemed constitutive of human existence as open, contingent and indeterminate:

[Beings] that exist in the mode of potentiality are capable of their own impotentiality; and only in this way do they become potential. They *can* be because they are in relation to their own non-Being. Human beings, insofar as they know and produce, are those beings whom more than any other, exist in the mode of potentiality. This is the origin of human power, which is so violent and limitless in relation to other living beings. Other living beings are capable only of their specific potentiality: they can only do this or that. But human beings are the animals that are capable of their own impotentiality.²³

In contrast to animals whose potentiality is restricted to the specific possibilities prescribed by their genetic code, human beings are constitutively lacking in such prescriptions, retaining throughout their lives the possibility of being otherwise than they are. Thus, human potentiality is never

²¹ Agamben 1999, 182.

²² *Ibid.*, 179.

²³ *Ibid.*, 182.

exhausted in actuality but rather ‘passes fully into it [and] preserves itself as such in actuality’.²⁴ For Agamben, it is precisely this *actual existence of the possible* that defines human freedom:

To be free is not simply to have the power to do this or other thing, nor is it simply to have the power to refuse to do this or other thing. To be free is to be capable of one’s own impotentiality, to be in relation to one’s own privation. This is why freedom is freedom for both good and evil.²⁵

It is important to highlight the differences between the notions of freedom in the two ontologies. What is privileged as a moment of freedom in Wendt’s account is not the existence of the potential prior to actualization but rather the movement of actualization *itself*, the collapse of the wave function as an act of *will*. Potentiality is not valorized in itself but only in its hypothetical actualization, which extinguishes it *as* potentiality. In contrast, for Agamben the potential is what exists precisely insofar as it is *not* actualized and freedom has nothing to do with actualization and even less with will. ‘[P]otentiality is not will, and impotentiality is not necessity. To believe that will has power over potentiality, that the passage to actuality is the result of a decision that puts an end to the ambiguity of potentiality (which is always potentiality to do and not to do) – this is the perpetual illusion of morality.’²⁶ This illusion is traced by Agamben to medieval theology, which distinguished between *potentia absoluta*, God’s potentiality to do anything whatsoever, and *potentia ordinata*, by which God can only do what is in accordance with his will. ‘[Will] is the principle

²⁴ Ibid., 183.

²⁵ Ibid., 182-83.

²⁶ Ibid., 254.

that makes it possible to order the undifferentiated chaos of potentiality. A potentiality without will is altogether unrealizable and cannot pass into actuality.²⁷ In contrast, for Agamben the dissociation of 'absolute potentiality' from will does not resign it to non-existence, whereby the possible becomes impossible. What is at stake in his thought is rather precisely the translation of potentiality into actuality *as* potentiality, whereby the possible would exist as real. In quantum terms, Agamben's affirmation of potentiality may be grasped as the valorization of *superposition in actuality*, not in a state of deficient, in-actual being but rather as the manifestation of the contingency of being as such, which makes freedom possible. Similarly to Badiou's concept of the event, it is doubtful whether quantum ontology could even allow a condition like this, since it would ultimately amount to attributing a wave the *same* ontological status as the particle, if not to erasing all distinctions between them. And yet, it is just as difficult to give up on this concept without reducing freedom to mere acts of will rather than the experience of the possible.

Is being all there is?

For all the difference between Badiou's concept of the event and Agamben's idea of potentiality, there is something important in common between them, which the context of quantum ontology actually helps illuminate. In both cases we are dealing with the paradox of the 'existence of non-being', whereby something that ontologically *is not* (the event as a self-belonging set, potentiality as split between its possible being and not-being) nonetheless comes to presence within a world (through revolution, the experience of freedom, etc.), denying its necessity and demonstrating its

²⁷ Ibid., 255.

transformability. In my understanding, quantum ontology cannot handle this paradox, which threatens to make its constitutive wave-particle duality indiscernible.

It is important to note that this objection differs from the previous one that dealt with the totalization of the physical world as the only one there is: here it is not a matter of quantum theory excluding other worlds that indubitably *exist*, but rather of its capacity to respond to what appears, arrives or becomes without being graspable as a being. While the advantages of a scientific ontology are indisputable, the price we pay for it is a certain sense of *ontological captivity*, whereby everything that is definitely is so, being and non-being rigorously distinguished and separated with nothing between them. Besides reducing the existing worlds to the physical universe, quantum ontology also deprives us of *spectres* of all kinds, beings that are there and yet not, like the really existing potential or the undecidable event. Even if quantum theory itself certainly valorizes the undecidable and the indeterminate much more than classical physics did, this valorization ultimately ends up in the affirmation of being *itself* as somehow undecidable and indeterminate. While this might be a liberating thought, it remains within the ontological horizon entirely distinct from the experience of radical contingency associated with what Emmanuel Levinas termed 'otherwise than being'.

Of course, Levinas is best known for opposing ethics to ontology as 'first philosophy'. What is important for our purposes is less the well-known content of his ethics, than the reasons for this opposition, which are by no means merely theoretical. Levinas followed Heidegger in understanding ontology in terms of factual existence: being is not an abstract concept but the being of beings 'here

below'.²⁸ Moreover and in contrast to Heidegger, for Levinas ontology does not describe human being in terms of ecstatic transcendence of its temporal worldly existence but rather in terms of being irreparably stuck with this existence: 'Ontology is not accomplished in the triumph of human beings over their condition but in the very tension where this condition is assumed.'²⁹ Being is not the ecstatic horizon of the open in which we stand out but the burden we vainly try to drop off our backs until we die. This is why Levinas's analysis of being proceeds through brilliant descriptions of insomnia, shame or nausea – the conditions in which we are ill at ease and which we try desperately to evade, usually without much success. Being is what we *would like not to be* but cannot escape: we would like to fall through the floor and disappear rather than suffer that shameful presence to ourselves, but we just can't: 'Nausea reveals to us the presence of being in all its impotence, which constitutes this presence as such.'³⁰ This disappointment in being poses the question of whether there is something otherwise than being, which would not be non-being or nothingness but precisely the arrival in being of something other than it. This is where ethics comes in, not because Levinas was a particularly virtuous or prudish person, but because in his theory the encounter with the other, which constitutes ethical experience, is something that breaks the cycle of our failing attempts at self-transcendence and leads us out of the disappointing finitude of being. This line of reasoning may be generalized beyond specifically Levinasian ethics to suggest that ontology is not fundamental,³¹ that being, paradoxically, is *not all there is*, because there is something in it that is otherwise than it, be it the event, potentiality or the other, which ontological discourse cannot grasp

²⁸ Levinas 1996, 3.

²⁹ Ibid.

³⁰ Levinas 2003, 68.

³¹ Levinas 1996, 1-11.

other than negatively. Ethics is then not about the relationship to the self or any particular other but to whatever is otherwise than the being that I am and cannot but be. For quantum ontology 'ethics' would therefore stand for all that is *not* quantum.

Having written this sentence, I googled 'quantum ethics' in some trepidation and was not entirely surprised to discover millions of results, ranging from the respectable to the bizarre. Just like Levinas's subject who is stuck with its being, it appears that you just can't escape quantum theory, as whatever you think is otherwise ends up describable in quantum terms and recuperated by quantum ontology. This might grant quantum theory an almost infinite explanatory power, but what I would like to emphasize instead is a certain *powerlessness* of being before the otherness that comes to delimit it and hold it captive. Perhaps, this otherness is the limit beyond which the unification of physical and social ontology cannot advance and quantum ontology remains, as every other ontology, *not-all*.

BIBLIOGRAPHY

Agamben, G. 1999. *Potentialities: Selected Essays in Philosophy*. Stanford: Stanford University Press.

Arendt, H. 1976. *On Revolution*. New York: Penguin.

Badiou, A. 2005. *Being and Event*. London: Continuum.

Badiou, A. 2009. *Logics of Worlds*. London: Continuum.

Dunne, T., Hansen, L. and Wight, C. 2013. "The End of International Relations Theory?" *European Journal of International Relations* 19 (3): 405-425.

Gabriel, M. 2015. *Why the World Does not Exist*. London: Polity.

Hutchings, K. 2021. "Empire and Insurgency: The Politics of Truth in Alexander Wendt's Quantum Mind and Social Science: Unifying Physical and Social Ontology." *International Theory* 13 (3): 000–000.

Levinas, E. 1996. *Basic Philosophical Writings*. Bloomington: Indiana University Press.

Levinas, E. 2003. *On Escape*. Stanford: Stanford University Press.

Wendt, A. 2015. *Quantum Mind and Social Science: Unifying Physical and Social Ontology*. Cambridge: Cambridge University Press.