


BOOK SYMPOSIUM

‘Truth’, ‘justice’, and the American wave... function: comments on Alexander Wendt’s *Quantum Mind and Social Science*

Fred Chernoff 

Department of Political Science, Colgate University, 13 Oak Drive, Hamilton, NY 13346, USA
Corresponding author. E-mail: fchernoff@colgate.edu

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Abstract

This paper examines several aspects of Alexander Wendt’s *Quantum Mind and Social Science*. The paper questions the nature of the task, as ontologies are debated in a scientific field once there is a widely accepted substantive theory that stands in need of interpretation, as with Newtonian physics or quantum mechanics; doing this job for international relations (IR) is highly questionable given that there is no widely accepted substantive theory of IR that needs an interpretation. Second, the paper questions Wendt’s view of the consequences for ontology of quantum theory being replaced in the future; Wendt the interpretation of the history of science maintains that in the physical sciences a new theory subsumes the older theory, including its ontology. But, this seems to misread history, while the empirical content of classical physics is subsumed by relativity theory, it is far from true that the former’s ontology was subsumed. The ontologies are in sharp contrast. The paper raises questions also about the notion of ‘truth’ and of the meaningfulness of evaluative concepts like ‘justice’.

Keywords: Consciousness; interpretations of quantum theory; IR theory; monads; ontology; philosophy of science; pragmatism; theory of truth

Alexander Wendt’s book *Quantum Mind and Social Science* is a major accomplishment. It takes on a formidable list of scientific and philosophical problems, including some of the most enduring and solution-resistant, and works toward an integrated answer by drawing on views about numerous fields, starting with particle physics. *Quantum Mind* builds on a variety of claims, some of which Wendt says are clearly true, while others, he acknowledges, are merely plausible; but taken together they are, he argues, a good bargain, yielding a ‘huge’ intellectual payoff.¹

Wendt describes the bargain by saying, ‘For the price of two claims of quantum consciousness theory – that the brain is a quantum computer and that consciousness inheres in matter at the fundamental level – we get solutions to a host of intractable problems... [though] the claims are admittedly speculative’.² As readers

¹Wendt 2015, 35.

²Ibid.

move through the text, assessing Wendt's bargaining skill, they are rewarded with an extraordinary stream of side-payoffs of creativity and insight.

Wendt describes *Quantum Mind* as a work in philosophy, and specifically metaphysics. He says, 'unlike my first book, which was half philosophy and half IR, this one is all philosophy'.³ Wendt frequently reaffirms this point, for example, 'this book is about ontology'⁴ and the subtitle: *Unifying physical and social ontology*. Some may see the core of the argument as showing the empirical results in quantum decision theory and related areas as demanding changes in social science reasoning and international relations (IR) theorizing. I take Wendt at his word – that the main point of the book to produce a conclusion about social ontology. Thus Wendt's argument is or is not acceptable principally based on its ability to stand up to standards of philosophical evaluation. The aim of this paper is to examine, albeit briefly, its ability to do so.

Significant achievement of the book

Accomplishments

Although this paper offers some criticisms of, and reservations about, Wendt's argument, we must keep in mind that *Quantum Mind* displays exceptional strengths. It provides fertile ground for generating new hypotheses for social scientists to investigate. It also brings to our attention recent research in a variety of areas of empirical science and Western analytic philosophy that are useful for thinking about the social world. Third, the book draws a connection between IR and physical theory showing how the latter can be a model for theorizing in the former. Fourth, the book makes explicit the set of criteria that it uses. Citing Mackonis,⁵ Wendt lists: explanatory unification, parsimony/simplicity, coherence with background knowledge, ontological unification, range of phenomena, and esthetics/elegance.⁶ Furthermore, the argument might gain persuasive force in the future if the claims Wendt draws on from the sciences and philosophy should acquire stronger support within their disciplines – and shed their 'speculative' status. But, the reliance on alien areas of study poses risks, as well; if the reverse happens, the overall argument loses force.

Advantages of structure of the argument

At first glance, the argument may appear to be rather frail because it draws on claims that are not known or widely supported. For example, Wendt begins by endorsing one of the many competing philosophical interpretations of the accepted mathematization of quantum theory, namely 'multiple minds'. Chapters two through four do a very good job of providing an introduction to the vast array of explanations of what quantum theory says, if anything, about reality. There is wide divergence among manifold interpretations. In some cases a unique, main

³Wendt 2015, 2.

⁴Wendt 2015, 249.

⁵Mackonis 2013.

⁶Intellectual progress is greatly enhanced when authors draw on the same criteria, see Chernoff 2014. And when authors do not use overlapping criteria, they should at least be explicit about which criteria they use, since transparency about criteria allows disputants to see whether disagreement arises from substantive principles, evidence, analytical methods, or metatheoretical issues like criteria.

contending interpretation is taken into multiple different directions by different authors.⁷ Presumably, a supporter of any of the many non-‘multiple minds’ interpretations could not even get to the second step of *Quantum Mind*. Hence, the ‘multiple minds’ premise may motivate some readers, as Andrew Kydd suggests in his contribution to this forum, to get off the bus at the first stop.⁸

The argument is not, however, as frail as it looks, since there are different ways in which premises can lend support to a conclusion. For example, in a deductive argument the truth of the premise set guarantees, *salva veritate*, the truth of the conclusion. In inductive arguments, known premises (‘Swan 1 is observably white’) work with other known premises (‘Swan 2 is white’) to support a reliable (or probable) broader conclusion (‘All swans are white’, or ‘Ninety five percent of swans are white’). We also use arguments with less-than-certain statistical (inductively generated) premises (‘It is 0.833 likely that the next roll of the die will not be a six’). But, the more such premises the argument has, the less likely is the conclusion (and Wendt’s argument has many). Ten mutually independent premises, each of which is 90% likely yield a conclusion just over a third probable (35%). Wendt’s argument may look something like this, since it rests on a long string of claims (from quantum physics, neuroscience, quantum decision theory, quantum semantics, and so on) not known as true. But, I believe he intends that the argument be read as more of an emergence argument.

In his emergence-argument structure, the premises are related to the conclusion in such way that the strength of the argument as a whole is greater than the strength of any of the premise-parts (and has more content, unlike inductive). Many of the essential premises of Wendt’s argument lack substantial *prima facie* plausibility. But, each gains force when viewed as part of the complex comprising the full set. This parallels the way an esthetically pleasing picture of a Waikiki sunset might emerge from many jigsaw puzzle pieces, each of which appears to be randomly colored, oddly shaped, and, individually, without esthetic value. (It is not surprising that Wendt, who uses this form of argument, would endorse *simplicity* and *elegance*⁹ as justifying criteria, and think that human ‘lives are like works of art’.¹⁰) Thus, the complex of quantum structures in each of these fields, where the various specific conclusions are in a linked relationship to social structures, produces an overall conclusion that is more compelling than any of the premises. Elegance can be emergent, like beauty, and Wendt’s summary assessment, in defending a realist conclusion about the ontology of the social world, is that the argument is ‘too elegant not to be true’.¹¹

Central reservation – focusing on a problem IR does not have

My principal reservation about Wendt’s core argument is that there is no well-formed problem for *Quantum Mind* to solve.

The job quantum mind claims to do is not one that can be done (yet?)

Consider the following points.

⁷Folse 1986. ⁸Kydd 2022. ⁹Wendt 2015, 293. ¹⁰Wendt 2015, 207. ¹¹Wendt 2015, e.g. 293.

- (1) Philosophers and scientists debate the ontology of physical theories *only after* they have agreed on the correct substantive physical theory.

Newtonian physics yielded a set of ontological claims that were debated by philosophers who defended different metaphysical perspectives.¹² The observable, empirically corroborated mathematical formulae of Newton were the basis for debate about the unobservable implications. Over time, none of the disputants questioned that $f = ma$ or that falling objects accelerated at the rate of $32'/s^2$. And it was only when there was an accepted physical theory that scientists and philosophers were able to engage in coherent debate about ontology. The reason physicists and philosophers are energetically debating ontologies today, and disagreeing about the best interpretation of quantum theory, is *precisely because* they agree that there is a formal theory that accounts for all observations at the subatomic level.

- (2) Wendt is offering an ontology for scholars in the field of IR.
 (3) But, there is no accepted substantive theory in IR, as Wendt himself recognizes, when he says, in contrast to the theoretical agreement in the natural sciences, 'In the social sciences there is no such consensus'.¹³ Institutionalists, neorealists, post-structuralists, and many others have contending theoretical principles that they believe satisfy the appropriate social science criteria of theory choice better than other substantive theories – and each has its own ontological posits.
 (4) Hence, it is not clear that there even can be 'an ontology' for the field of IR, since different IR theorists posit different ontologies.

My own view is that any attempt to present an ontology for the field of IR *in toto* is entirely misplaced, a goal that cannot (yet, if ever) be pursued.

Points 1–4 lead to the question, what exactly is it that *Quantum Mind* claims to be doing?

Dilemma: either dismiss past ontological discussion in IR or stifle future theorizing

There seem to be two possibilities as to the potential impact of the book: either it is presenting an ontology to which all current (and future) IR theories coincidentally happen to conform or it is presenting the *One True* ontology to which all proposed IR theories must conform or face automatic banishment.

The first option entails a description of IR that views all extant theories as in ontological agreement. This agreed-upon ontology, furthermore, can be reduced to, or somehow subsumed by, the view laid out in *Quantum Mind*. But, this is inconsistent with the obvious existence of a vigorous debate in IR about ontology, to which Wendt has contributed. This debate in IR seems to show that there is not a single, current ontology in IR.

The other possibility would seem to be a normative one, according to which *Quantum Mind* shows the reader the True Ontology of the social world, which thereby becomes a *sine qua non* of any acceptable future IR theory. Thus, when a

¹²See the correspondence, Leibniz and Clarke 2000. Newton's letters were signed by Samuel Clarke. Cf. also Chernoff 1981; Slowik 2013.

¹³Wendt 2015, 1–2.

new theory comes along in IR with new posits, like *soft balancing* or *democracy deficits*, or perhaps even something much less familiar, if its theoretical posits do not conform to the ontology of *Quantum Mind*, the theory would have to be rejected. The rejection would occur without any empirical examination simply because it does not conform to a prior ontological doctrine that IR has inherited from physics. Acceptance of the argument of *Quantum Mind* thus limits substantive IR debate (forever) to a range of theories whose theoretical posits are demonstrably compatible with theories extant in third decade of the 21st century. We are far more likely to produce good theories if new candidates are evaluated on their comparative abilities to satisfy various criteria – which would include empirical criteria and not solely philosophical.

What if we overlook these reservations?

If we overlook all of the above and accept that a social ontology of IR can be based on a physical ontology, there are still substantial problems with the confidence Wendt displays in the conclusion of *Quantum Mind*. Consider the following two points:

- (1) As Wendt acknowledges, *his preferred interpretation of quantum theory is but one of many popular interpretations* and there is no majority support for it *(although he believes momentum is building).¹⁴ It is important to note that Wendt describes the debate about interpretation as one that can *never* be solved empirically. Any resolution that might arise will result from one of the many sides triumphing in philosophical argument. First, a consensus around one of the many interpretations other than Wendt's preferred 'many minds' would pose a problem for *Quantum Mind*. But, second, although empirical study cannot credit any one interpretation, empirical study can discredit all with the rise of a new theory. So, we may ask, will quantum theory itself stand up to future empirical and theoretical investigation rule indefinitely?
- (2) *It is possible that another theory will replace quantum theory.* It seems very probable that this will happen, an eventuality that Wendt acknowledges.¹⁵ As we know, all past physical theories have encountered problems, which have led to replacement. And, unlike Newtonian physics a century after its advent, today (a century after the advent of quantum theory) there are known inconsistencies – both internal to quantum theory, as Penrose¹⁶ describes in detail, and fundamental inconsistencies with general relativity.¹⁷ And of course general relativity is every bit as well-confirmed as quantum theory. So, despite its exceptional record of empirical corroboration at this point, it seems indeed possible that replacement, at some point in the future, is a genuine possibility. But maybe this does not pose a problem for Wendt.

Overconfidence thanks to an erroneous history of science

Wendt's confidence in his ontological conclusion is not dampened by the prospect of a replacement of quantum theory. This is because, he says, new theories have a

¹⁴Wendt 2015, e.g. 30.

¹⁵Wendt 2015, 30.

¹⁶Penrose 2011.

¹⁷See, e.g. Ashtekar 2005.

pattern of ‘subsuming’ existing theories.¹⁸ However, what is historically subsumed is the *unrefuted empirical content* of the theory, that is, the observational correspondence to empirical laws. Paradigm shifts or fundamental theory-replacements in the history of science have often involved rejecting, rather than subsuming, the theoretical posits of the old ontology. Relativity theory retained the correct mathematics of classical physics, but dispatched Newton’s theoretical posits of absolute points of space and time. Thus, contrary to Wendt’s remarks, basic-theory change poses a significant threat to his argument.

Overselling the bargain’s payoff: do we achieve a ‘deeper understanding’ of consciousness?

The structure of Wendt’s argument is to show that readers who accept two speculative claims gain a huge payoff: explanations of anomalous choice-behavior, a unified ontology, and so on, and especially a solution to the mind–body problem, with an explanation – or deepened understanding – of consciousness. My concern here is that it is hard to see in Wendt’s argument any radical solution to mind–body relationship and any lessening of the mystery of consciousness. Wendt’s solution to the mind–body problem seems more a variation on the mind–brain identity thesis than a significant new solution.¹⁹ Wendt claims to provide a deepened understanding of human consciousness but he does so by positing that all physical objects have some sort of consciousness. Although I see no inherent difficulty with panpsychism,²⁰ I do not see how it removes the mystery of consciousness. The problem is perhaps obscured in the text because of the long chain of inferences linking one discipline to another. But for Wendt the way consciousness can arise in a world of physical objects results from his positing the consciousness of all physical objects, which includes human brains.

At one point Wendt recognizes that what he has done may not rise to the level of ‘explanation’. He backs up slightly and says that he has at the very least ‘deepened our understanding of consciousness’.²¹ There are good reasons to back up. Suppose I tell my smartest friend, MiaMaria, that I am puzzled as to why the ball I threw into the air fell to the ground. She replies that all unsupported objects fall to the ground. Where does that leave me in terms of explanation and understanding? I began with one question, why my ball fell. Now I have many questions – about all other balls, all rocks, all apples, all water bowls, and so on. My single question has multiplied. And it is not clear that there is any real deepening of my understanding of the ball’s behavior. Although at least I know there is a general observable behavioral regularity. Similarly, if I ask MiaMaria how it is that I experience consciousness, and she answers that she also experiences consciousness, and the ball I threw in the air experiences consciousness, and the moon experiences consciousness, she has turned my single question into many questions. This seems to offer even less ‘deepening’ than the ball question, as the latter at least included an *observable* regularity, which this does not.

¹⁸Wendt 2015, 3, 30.

¹⁹The modern version of this doctrine was developed by Vienna and Berlin empiricists and later Place 1956 and Feigl 1958.

²⁰E.g. Chernoff 1981.

²¹Wendt 2015, 125–26.

In sum, Wendt provides a long chain of descriptions of the way the world is, a set of interpretations of empirical scientific research, and scores of occurrences of the terms like ‘consciousness’, ‘subjectivity’, ‘Will’, ‘Experience’, and so on. But, they do not provide an explanation, or even a deepened understanding, of what consciousness is. Wendt has posited that all physical objects, down to the sub-atomic, have consciousness. Even for those of us comfortable with panpsychism, it seems that Wendt’s argument does not explain, or deepen our understanding of, consciousness. So, although Wendt argues that consciousness develops upward, emerges, and inheres in us and our institutions (which all may the case), it does not seem to make *what consciousness is* any less mysterious. The quote Wendt invokes in the text²² and in his reply in this forum by Jerry Fodor²³ – that no one understands consciousness – seems to stand, even after careful readings of *Quantum Mind*.

Justice, goodness, and the moral-normative dimension

Wendt says that social structures cannot be said to have causal powers on a classical physical framework.²⁴ Wendt thus requires a *physical basis* for the justifiable employment of any concept (however, widely-used they may be) in rigorous social science. What then might be the basis for our use of moral-normative concepts like *justice* and *goodness*? Although Wendt acknowledges that he does not provide an analysis of the standing of these notions, he does invoke them at times.²⁵ Given Wendt’s physical-basis requirement, it seems that, in whatever ways he works to extend his argument in the future, he will be unable to admit them into social science. This inability would entail that, despite Wendt’s denial, *goodness* and *justice* are chimeras or illusions.

What is ‘justice’ or ‘goodness’ if everything real of which we speak are wave functions? Smythe’s thought processes are physical things. Let us assume that there are no moral qualities in Smythe’s thoughts or statements about the height of his garden wall. But on Wendt’s ontology, all Smythe’s thoughts, no matter the content, are made of the same stuff. Thus if Smythe is thinking about, or verbally condemning, the moral crime of torture, all that there is, then, are wave functions with the same sort of composition as the thought about the garden wall. Thus it would seem that there is no genuinely moral-normative (not-purely-descriptive) character to the act of torture, or to statements condemning it.²⁶

If moral-normative questions have a legitimate place in IR alongside empirical and interpretive questions, then any metaphysics that leads to the *a priori* rejection of genuinely normative discourse in the social sciences is problematic.²⁷ Although

²²Wendt 2015, 17.

²³Ibid. Wendt cites Fodor 1974 and Fodor 2000.

²⁴Wendt 2015, 25, Wendt 2022; see also the concluding comment of Kratochwil 2022 on ‘the world’.

²⁵Wendt 2015, e.g. ‘cruelty’ (117), ‘building norms’ (171).

²⁶Wendt 2015 (e.g. 28) draws on moral-normative concepts, but this only clarifies that there is a need for a moral dimension to language and thought. And in the account of language Wendt endorses, language, which is inherently contextual, is physical; this includes words and sentences, that is, not just ‘tokens’ but ‘types’. Given this account of thoughts, words, and concepts, it is hard to see what moral qualities might amount to, especially as ‘intrinsic value’ is discussed in the ethics literature.

²⁷On this point see Hutchings 2022 and Chernoff 2005, 2007.

the arguments of ‘intrinsic value’ theories in ethics may ultimately be wrong, and utilitarian or others emerge as right, quantum physics would not seem to have any particular authority to decide such core issue in moral theory.

The meaning of ‘truth’ in scientific theories

Wendt makes many claims in *Quantum Mind* about ‘realism’ in the context of scientific theories. It may seem to the casual reader of *Quantum Mind* (pardon the oxymoron) that, in evaluating the book, a discussion of Wendt’s realist metaphysics of scientific theories may be inappropriate and an irrelevant anachronism, left over from his 1990s publications. But Wendt’s central claim in *Quantum Mind* is that he has identified the ontology of the social world. Unifying the ontology of the physical and social world is the subtitle of the book. And, as noted above, Wendt says the ‘book is about ontology’.²⁸ Wendt often states that his efforts are aimed at showing the *truth* of a unified physical and social ontology. In *Quantum Mind* Wendt thus explicitly endorses realism as a doctrine about science, and he reaffirms it in his response in this forum below.²⁹

Wendt correctly recognizes there that there are different conceptions of *truth*, a term Wendt often predicates of scientific theories.³⁰ However, in typical IR debates on trade, security, and so on, the meaning of the term ‘truth’ is entirely unproblematic, since the IR arguments are consistent with any prominent account of ‘truth’ found in metaphysics, semantics, and the philosophy of language. When we move into discussions of philosophy and metatheory, an author might wade into areas where the particular understanding of ‘truth’ makes a difference as to whether an argument does or does withstand scrutiny. Such is the case with *Quantum Mind*. Wendt makes many consequential statements about the nature of the physical sciences. The book is replete with locutions like, ‘if quantum consciousness theory is true...’.³¹

The doctrine of realism is usually presented in conjunction with a correspondence theory of truth. This is, of course, a problem for realist views of science. Although space considerations preclude extensive probing, we should at least note that correspondence theories claim that truth is *correspondence with reality*, or *fitting the facts*. But as many philosophers note, the ‘correspondence’ relation, as well as the notions of ‘reality’, ‘fitting’, and ‘fact’ do not solve the philosophical problem because they are all as problematic as ‘truth’.³²

Whatever value the correspondence theory has for systematic metaphysics, there are special complexities involved in connecting it to scientific knowledge because the unobservable external reality, by definition, eludes observation. All we can know, qua scientific investigators, is that one theory satisfies the criterion of yielding predictions and retro-dictions that conform to our actual observations better than any available alternative theory. We draw conclusions about which theory is

²⁸Wendt 2015, 249.

²⁹Wendt 2022. Although, interestingly, Wendt’s strong endorsement of a realist account of science in Wendt 1999 is coupled with a move away from his earlier extension to the social sciences, 2015, 287.

³⁰Most empiricists would see this as question-begging because they deny that ‘truth’ is applicable to theories.

³¹Wendt 2015, 32.

³²E.g. Horwich 2010.

best theory strictly on the basis of which one most fully satisfies this and our other criteria of theory choice.³³

A brief, further comment on Wendt's general metaphysics of natural science

Wendt's argument for a unified ontology relies on a realist account of scientific theories, which Wendt straightforwardly acknowledges. Wendt is certainly right that empiricists and other opponents of realism can gain a great deal from the book. Nevertheless, those readers are unlikely, for several reasons, to accept the core conclusion about a unified ontology; reservations begin with the very first step of the argument, endorsement of the multiple minds interpretation of quantum theory.

Wendt says that his preference for a realist account of science is a matter of 'personal disposition', for which he offers a 'personal justification'.³⁴ Given the range of topics covered, it is unfair to expect a robust defense of this doctrine in *Quantum Mind*. Nevertheless, since Wendt offers arguments in the text both for realism and against anti-realism, which I believe are misleading, a few comments are in order.

Wendt's positive argument is that that only realism can sustain scientific progress, as it 'is more likely to yield hypotheses... that might advance our knowledge down the road'.³⁵ I believe that *Quantum Mind's* survey of recent work and philosophical argument will lead to useful hypotheses formation. But Wendt's claim about anti-realism's inability to sustain such advances is empirically false. Mach, Poincaré, Bridgman, and Einstein, all made major contributions to modern physics while embracing rigorous forms of empiricism.³⁶

Furthermore, Wendt's attack, in chapter 3, on empiricism and pragmatism are simply straw-man arguments. He cites a number of opponents of realism, but he omits all of the most powerful empiricist and pragmatist voices in the philosophy of science, especially Bas Van Fraassen, WVO Quine, and Charles Sanders Peirce. More glaring still is Wendt's rejection of instrumentalist, 'as-if' empiricism. He says empiricists and instrumentalists have no way to choose between a genuinely scientific theory and one that explains everything with great simplicity by invoking gods or demons. Since scientists in fact avoid taking the easy gods-and-demons path, empiricists have no account for this other than to claim that scientists have an arbitrary convention of remaining methodologically atheist. But there is not a single philosopher who holds that theory choice can be based on one criterion; simplicity is always one in a set of criteria. And we need not look farther than Karl Popper and *falsifiability* as the demarcation criterion of science, accepted by many empiricists, to find a principle that dispatches with ease any theologically based scientific explanations.³⁷ One might have reservations about Popper's overall view of science. But clearly the falsifiability criterion and similar principles in the philosophy of science easily take care of Wendt's demons.

³³See Chernoff 2009 and conclusion below. Wendt does discuss a non-realist reading of *Quantum Mind*.

³⁴Wendt 2015, 290.

³⁵Wendt 2015, 284.

³⁶Einstein, for example, said, 'The type of critical reasoning required for the discovery of this central point was decisively furthered, in my case, especially by the reading of David Hume's and Ernst Mach's philosophical writings'; Mach 1970, Einstein 1970, 53. See also Craig 2001, 127; Bridgman 1938.

³⁷Popper 1959. Major pragmatist texts include Van Fraassen 1980, 1989, Quine 1953, and Peirce 1932.

Conclusion

Although this paper has sketched some of the problems I see with Wendt's argument in *Quantum Mind*, such as the lack of 'an' existing IR ontology (to unify with natural sciences), the endangering of normative discourse, the pitfall of *a priori* rejection of new theories, and so on, the book brings important ideas to the attention of the IR community. Indeed, the argument draws on a powerful intuition that the social sciences and particle physics are more like one another than either is like macro-level physical sciences, since both in particle physics and IR there is no simple characterization of the distinction between observer and object, and in both many of our fundamental laws – owing to the nature of our subject matter – are inherently statistical rather than deterministic.³⁸

Generating hypotheses that will spur the growth of knowledge

Wendt's *Quantum Mind* will surely begin serious debates about new ways of enhancing the growth of knowledge in IR and other social sciences. It will bring to the attention of many scholars work that is being done in many related fields in which quantum approaches have proven useful. It will inspire debate and hypotheses,³⁹ both about empirical theory and about philosophical grounds for theory choice.

Wendt's own theory choice is justified in part by 'inference to the best explanation',⁴⁰ which is sometimes equated with, or as he notes, conflated with, 'abduction'.⁴¹ These concepts stem from Peirce in the late 19th century,⁴² although their meanings have changed considerably over the past century and a half. For Peirce abduction works in sequence with deduction and induction to keep science progressing. It involves use of the best existing explanatory theory, which is not thus taken as true, but is taken as the best basis on which to generate new hypotheses to test experimentally. I believe Wendt has made a powerful case that quantum methods and concepts are, and will be, very fruitful in the social sciences. These should be fully embraced as advancements in social science. They represent advances so long as they confer observable empirical advantages. But Wendt's argument highlighting them does not warrant abandoning classical approaches throughout the social sciences.

IR entertains many kinds of questions

Innovative methods and hypotheses stemming from *Quantum Mind* are almost sure to follow. However, if Wendt's argument has other consequences for theorizing, like ruling out some theories or methods, then there is trouble. This is not an occasion to dilate on methodological pluralism in IR. But since our field entertains

³⁸The argument also fits with an intuition that if there is to be a real breakthrough in the mind-body debate, it is likely to come from some unexpected quarter.

³⁹With regard to inspiration, while off my feet for some weeks, recovering from a broken ankle, I had the advantage of having already read *Quantum Mind*; accordingly, Wendt's insistence that we are all *walking* wave functions was a source of inspiration.

⁴⁰Wendt 2015, 290–93.

⁴¹Wendt 2015, 290.

⁴²Peirce 1932, 374–75.

a wide array of questions – including empirical-causal, interpretive, moral-normative – it is important to note that many IR scholars⁴³ will be reluctant to accept a metaphysical argument as the basis for limiting legitimate theorizing.

As discussed above, physicists, astronomers, and other natural scientists work from observations to develop theories that solve problems on which they are focused. They do not start with a metaphysical structure and then pursue theories *(and policy-implications) that conform to a *priori* metaphysics. Why should this same scientific latitude not be permitted to IR researchers?

Thinkers as diverse as Thomas Kuhn and Nancy Cartwright⁴⁴ see the history of science as including the simultaneous acceptance of mutually exclusive theories, since local problem-solving is historically more of a driving force than across-the-board scientific consistency. According to Kuhn, those working in specific areas of physics focus on their own problems, and other scientists largely pursue their community's specialized problems without primary regard for consistency with the over-arching discipline. Cartwright describes scientists historically as advancing theories that are 'local' and never completely accurate as literal descriptions.⁴⁵ The theories do important work, despite their lack of complete literal accuracy and genuinely global reach. Wendt's presentation of an 'inconsistency-preventing' ontological pre-condition for IR theories puts IR and social sciences at a seemingly unwarranted problem-solving disadvantage *vis-à-vis* the physical sciences.

Complementarity not displacement

Classical theories and methods should and will survive a quantum turn – even a quantum revolution – in the social sciences.⁴⁶ For the many scholars in IR who regard theory-development to be problem- and question-driven, Wendt's argument should not lead to abandonment of classical forms of theory. Even the model of the physical world shows that universal acceptance of quantum theory in particle physics does not interfere with engineers' and architects' reliance on Newtonian principles. Wendt's argument, even its various vulnerabilities aside, does not warrant abandonment of classical approaches.

So what is, as Wendt asks, the value added?⁴⁷ Wendt says that a quantum approach yields several consequences that many IR scholars will find agreeable, especially those relating to a foundation for cooperation and the existence of social institutions. But this physical basis for our interconnections and cooperation would seem to make it hard to explain the obvious fact that some leaders are capable of acting with extreme selfishness. Furthermore, IR's liberal, institutionalist, and interpretivist theories also provide grounds for believing in cooperation. Wendt could

⁴³E.g. Hutchings 2022.

⁴⁴Kuhn 1970; Cartwright 1983.

⁴⁵Cartwright began this project in 1983 with *How the Laws of Physics Lie*, and has advanced it elsewhere, e.g., Cartwright 1994 and 2005. See also Vickers 2013, and Kratochwil 2022 with regard to problems the consequences of requiring social research to a 'world' comprising a single set of consistent propositions.

⁴⁶Classical methods will retain their proper place. I welcome into the dice game anyone who rejects the classical axioms of probability theory. Also, one must be careful, in advocating a quantum revolution, to avoid, as I believe Wendt does, any wave-function fallacy of composition reasoning, as with: 'Smythe is entirely composed of cells. Every cell has a nucleus. Therefore, Smythe has a nucleus'.

⁴⁷Wendt 2015, 260.

point out that his book shows that those theories are formulated in a classical, non-quantum, framework, and thus run into serious philosophical problems, for example, trying to explain intentions, consciousness, the mind–body problem, and so on. But in assessing Wendt’s bargain, the reader of *Quantum Mind* must weigh those reservations against any that the reader notes along with those offered by contributors to this forum.

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