QUANTUM MIND AND SOCIAL SCIENCE

UNIFYING PHYSICAL AND SOCIAL ONTOLOGY

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Acknowledgments

Writing this book has been very much a "quantum" experience. On the one hand, locked in my own personal bubble of subjectivity, I have found it quite isolating to venture into and try to get a grip on literatures with which I often had no initial familiarity, and where an iconoclastic interloper could expect little systematic help from local guides. On the other hand, my experience has also been quite holistic in the sense that innumerable individuals have joined me along the way, whether in the form of written comments on parts of the text, meetings over lunch to discuss problems I was having, countless questions at seminars, references sent that I had not seen, and a striking number of random emails from people around the world who had heard of my work and either had something substantive to say or just wanted to offer encouragement. By no means has everyone agreed with me, but their comments were overwhelmingly constructive. I was not able to incorporate all of the input I received, but a great deal of it is now enfolded in one form or another within the final product, which is participatory epistemology at its best.

The journey to this book has been a long one, over ten years depending on how you count, and over the course of this period the logistics train carrying my records of all this feedback simply broke down. Thus, much to my regret I am unable to recall every individual who helped me to clarify and formulate my ideas – or even every institution where I have presented them. All the more reason, therefore, for me to begin by expressing my heartfelt thanks to everyone I have encountered along the way, and my apologies to those whose names are now lost in the sands of time.

Those whom I do recall fall into three groups: outside help, colleagues, and family. In the first category, Stuart Hameroff has been supportive of this project from its very inception. Stu not only commented twice on early drafts of my quantum brain chapter but also invited me – at the time a complete stranger – to be a plenary speaker at the 2004 Tucson conference on "Toward a Science of Consciousness." Being at this large and hugely stimulating conference showed me that while my thesis might be crazy, at least I was in good company.

I am very grateful to Stefano Guzzini and Anna Leander, who in a 2006 volume gave me the opportunity to crystallize my argument in the form of

an "auto-critique" in response to critics of my first book, *Social Theory of International Politics*. This led to the first published version of these ideas, and generated a number of subsequent comments that encouraged me to keep going with the project.

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Turning finally to family, Chris Wendt, my brother and a physicist by training, patiently answered my many naïve questions over the years about quantum mechanics, which was an invaluable resource that saved me from numerous elementary mistakes (though he bears no responsibility for those that undoubtedly remain).

My father, Hans Wendt, taught me that the way forward in science is to look for anomalies, not just patterns, which as you will see found its way into the structure of many parts of the book.

I owe a special gratitude to Jennifer Mitzen, who has been my companion the whole way, which means that more than anyone she had to deal with all the anxiety and stress that accompanied my undertaking. Despite her own many responsibilities and hesitation in the face of quantum theory she was always willing to drop everything to talk about my ideas. Jennifer also gave me extensive comments on several chapters, both line-by-line ones that sharpened many points and structural ones that forced me to recast whole sections. The final product would have been much the worse without her.

Quantum Mind and Social Science is dedicated to Emma and Otto, who have never known a day of their lives when I was not working on it, and who may live long enough to find out whether Daddy's conjecture is right.

represent only the probabilities of finding certain properties when they are measured. Moreover, these quantum probabilities, which are expressed by "wave functions," are completely unlike classical probabilities. Whereas the latter denote our ignorance about what is actually the case and as such are incomplete descriptions of reality, the former denote all that could even in principle be known about quantum systems. Despite its probabilistic character, in other words, the wave function is a *complete* description of a quantum system, until its measurement, at which point it "collapses" and just one, classical outcome is observed. So, unlike in classical physics, where we can safely assume that objects have, for example, a momentum or position even when we are not observing them, in quantum physics we have no basis for such an assumption. Wave functions are potential realities, not actual ones.[5]

Understanding how the indeterminate quantum world results in the determinate classical world – a process known as "decoherence" – is one of the deep mysteries of quantum theory. However, its immediate significance in the present context is that, although quantum mechanics subsumes classical physics, its practical applicability is generally thought to be confined to sub-atomic particles. Above that level, it has long been assumed that quantum effects wash out statistically, leaving the decohered world described by classical physics as an adequate approximation of macroscopic reality. That includes social life, the contemporary study of which, I argue below, is all based at least implicitly on the worldview of classical physics.

In this book I explore the possibility that this foundational assumption of social science is a mistake, by re-reading social science "through the quantum." More specifically, I argue that human beings and therefore social life exhibit quantum coherence – in effect, that we are walking wave functions. I intend the argument not as an analogy or metaphor, but as a realist claim about what people really are. Scholars have long pointed to a number of strong analogies between human and quantum processes: between free will and wave function collapse, the holism of meaning and non-locality, observer effects in psychological experiments and quantum measurement, and even double-entry accounting and quantum information.[6] These and other analogies are sufficiently suggestive that one might apply quantum thinking to social life simply on that basis.

While one could read this book entirely in that way, as an interesting analogy, my personal belief is that human beings *really are* quantum systems. I defend that belief explicitly only in the Conclusion, but the book as a whole

[5] While there is debate about the ontological status of the wave function, no one argues that it is real in the same sense as classical objects.

[6] See Brandt (1973), Rosenblum and Kuttner (1999), Bitbol (2002), Heelan (2004), Pylkkänen (2004), Filk and Müller (2009), Grandy (2010), Kuttner (2011) and – since you're probably wondering about the case of accounting – Fellingham and Schroeder (2006).

is written with a view toward showing how this hypothesis could possibly be true. This realist stance will take me into controversial, speculative and frankly dangerous territory that could be avoided by an analogical road to "quantum social science." However, it would also come at a cost, which is that it would make quantum theory just another tool for social scientists to pick up – or not – as they see fit, and bracket some of the theory's most profound potential implications. In contrast, if human beings really are quantum, then classical social science is founded on a mistake, and social life will therefore *require* a quantum framework for its proper understanding.

This is not the first call for a quantum social science. Already in 1927 – just weeks after the Solvay conference marking the culmination of the quantum revolution – the President of the American Political Science Association, William Bennett Munro, challenged social scientists to come to grips with the new physics.[7] Philip Mirowski argues that to a limited extent they did, in that its probabilistic "spirit" facilitated social scientists' embrace of statistical methods in the 1930s.[8] But until recently there has been almost no reflection on the significance of quantum theory itself for the social sciences. As if to drive home this neglect, the methods embraced in the 1930s were based on classical probability theory – which came from the *previous*, Newtonian revolution in physics – not quantum probability theory.

While the social sciences have prospered in the ensuing years, there is today a good reason to re-open the quantum question: growing experimental evidence that long-standing anomalies of human behavior can be predicted by "quantum decision theory." This is a quantized version of expected utility theory, which replaces the latter's either/or Boolean logic with the both/and logic of quantum probability theory.[9] Quantum decision theory predicts most[10] of the deviations from rational behavior found by Daniel Kahneman, Amos Tversky and others using expected utility theory as a baseline – order effects, preference reversals, the conjunction fallacy, the disjunction fallacy, and so on. Psychologists have devoted enormous energy to trying to explain these anomalies, but the results have been partial and theoretically ad hoc. In contrast, with a single axiomatic framework, quantum decision theory shows they are not anomalies at all, but precisely what we should expect. Prestigious journals like *Journal of Mathematical Psychology* (2009), *Behavioral and Brain Sciences* (Pothos and Busemeyer, 2013), and *Topics in Cognitive Science* (2014) have taken notice and devoted substantial space to this unfamiliar approach. While the theory is new and its larger reception remains to be seen, its findings are

[7] See Munro (1928). [8] See Mirowski (1989).

[9] See especially Busemeyer and Bruza (2012), which includes an accessible introduction to quantum theory, probability and logic.

[10] My sense is that this qualification is necessary only because the literature is so young that it has not been able to take up all the relevant anomalies; see Chapter 8.

extraordinary. Rarely in the social sciences has one theory explained so much that was so puzzling before.[11] Quantum decision theory seems as clear a case as one could hope for of progress in social science, not just within a research program, but from one research program to the next.[12]

But that's only the half of it. Quantum decision theorists have been cautious in speculating about the philosophical implications of their work, focusing instead on just proving that it predicts previously anomalous behavior. In doing so they have embraced what is known as "generalized" or "weak" quantum theory, which applies the quantum formalism to phenomena beyond the domain of physics – like social life – while remaining agnostic about what is going on underneath.[13] While this "as if" strategy has pragmatic attractions, it overlooks the fact that quantum decision theory's success at the behavioral level fulfills a key prediction of a controversial hypothesis about what is happening deep inside the brain: quantum consciousness theory, according to which *consciousness* is a macroscopic quantum phenomenon.[14] That could help solve one of the deepest mysteries of modern science: the mind–body problem, or how to explain consciousness in scientific terms.

Since the Enlightenment it has been assumed that to explain consciousness scientifically means showing how it is compatible with the worldview of classical physics. Classical physics implies a materialist ontology in which reality is ultimately made up of just matter and energy. It is therefore ironic that quantum wave functions are not *material* at all, at least not in any ordinary sense. This has led some philosophers of physics to argue that, far from materialism, quantum theory actually implies a panpsychist ontology: that consciousness goes "all the way down" to the sub-atomic level. Exploiting this possibility, quantum consciousness theorists have identified mechanisms in the brain that might allow this sub-atomic proto-consciousness to be amplified to the macroscopic level. Modern neuroscience can't test this claim yet, but one of its implications is that human behavior should have quantum characteristics, which quantum decision theory bears out. From this standpoint, in short, there is the possibility not only of a progressive problem shift in behavioral social science, but of a paradigmatic change in the modern scientific worldview.

Social scientists might reasonably doubt that a hoary philosophical controversy like the mind–body problem could be relevant to their work. Yet we have hoary controversies of our own. In social epistemology there is the

[11] Something similar may be starting to happen in the biological sciences with the emergence of "quantum biology," which I discuss in Chapter 7.

[12] See Lakatos (1970).

[13] See Atmanspacher et al. (2002) and Walach and von Stillfried (2011). Because it uses the formalism to make quantitative predictions I would say quantum decision theory goes beyond a purely analogical approach.

[14] See Chapter 7 and Atmanspacher (2011) for a recent overview.

"Explanation vs. Understanding" debate between naturalists or positivists,[15] who think there is no essential difference between physical and social science, and anti-naturalists or interpretivists who think there is because people act on meanings that must be interpreted.[16] In social ontology there is the "Agent–Structure" debate, between individualists who think that social structures can be reduced to the properties and interactions of individual agents, and holists who think they can't.[17] And then there is perhaps the biggest debate of all, between materialists who think social life ultimately can be explained by material conditions and idealists (or idea-ists) who think that ideas play an autonomous or even decisive role. This latter debate arguably subsumes the other two, since without ideas in play there would be no meanings to interpret or social structures to reduce. Moreover, this debate is not merely like the mind–body problem in seeming intractable, but of a piece with it substantively, because ideas are dependent on consciousness. Which is to say: some of the deepest philosophical controversies in the social sciences are just local manifestations of the mind–body problem. So if the theory of quantum consciousness can solve that problem then it may solve fundamental problems of social science as well.

I have put a lot of balls in the air and will not try to catch them all. First, except in Chapter 8, I will not deal extensively with quantum decision theory. Work in this vein is in full swing, and now spreading from psychology to the social sciences at large,[18] and with no formal training myself, I am in no position to contribute to it. My focus instead will be on its philosophical implications, which have been neglected so far. Second, only in the Conclusion will I take up the Explanation–Understanding debate. One reason is frankly practical; this book is so long already that to finish it I need to focus its argument as much as possible. Another is that pioneering contributions in this area have already been made by scholars such as Karen Barad, Michel Bitbol, Patrick Heelan, and Arkady Plotnitsky – although they are by no means all in agreement.[19] But most importantly, in my view we will not make clear progress on the epistemology of a quantum social science until we have a firm basis in its ontology, where little work has been done. That leaves just one – albeit still very large – ball to catch, the nature of ideas and consciousness, and its implications for the agent–structure problem.

[15] I will use these terms interchangeably, giving 'positivism' a broader meaning than it carries in much social scientific discourse, where it is often juxtaposed to scientific or critical realism. Realists are naturalists and thus positivists in my sense.

[16] See Apel (1984) and Hollis and Smith (1990) for introductions to this debate.

[17] See for example Wendt (1987), and Wight (2006) and Elder-Vass (2010a) for the state of the agent–structure art in IR and social theory respectively.

[18] See, for example, Haven and Khrennikov (2013) and Khrennikova et al. (2014).

[19] See Barad (2007), Bitbol (2002; 2011), Heelan (1995; 2009), and Plotnitsky (1994; 2010).

Since the start-up costs for thinking in quantum terms are high, my goal in this "preface" is motivational: to explain why it is necessary to turn to such an exotic theory to solve basic problems of social ontology. In particular, I show that the agent–structure problem stems from the fact that the ways in which social scientists have dealt with an essential feature of the human experience – namely experience itself – originate in classical assumptions about the mind–body problem. The chapter ends with an overview of the book's positive argument.

The causal closure of physics

There are at least two long-standing anomalies in social ontology: the existence of subjectivity, specifically its conscious aspect; and the unobservability of social structures. The two are related through the agent–structure problem, of which they are in effect opposite sides, and in the end I argue that the second is a function of the first. However, they involve distinct issues and literatures, and as such are treated separately below.

In social theory, subjectivity and unobservable social structures are usually referred to as "problems" rather than "anomalies," but this understates their significance. By calling them anomalies I mean that, given a classical world-view, they simply should not be there any more than the anomalies in physics which sparked the quantum revolution should have been there. To be sure, subjectivity and social structures cannot be seen with the naked eye or recorded on instruments, and as we will see this has prompted some philosophers to argue that they are illusions and thus *aren't* there. However, most social scientists, I suspect, think they are, so before we give in to philosophers of illusion it makes sense to explore all possible means to justify this belief.

But first, I need to do some work on the other side to convince credulous social scientists that subjectivity and social structures are anomalies at all. To do that, in this section I begin with a foundational principle to which all social scientists should agree, the "causal closure [or completeness] of physics" or "CCP."[20]

The CCP means that the social (and all other) sciences are subject to a physics constraint: no entities, relationships, or processes posited in their inquiries should be inconsistent with the laws of physics. The idea is that because physics deals with the elementary constituents of reality, of which macroscopic phenomena are composed, everything in nature[21] is ultimately just physics. This

[20] With apologies to the Chinese Communist Party; for good introductions to the CCP and its rationale, see Papineau (2001) and Vicente (2006; 2011).

[21] Or at least everything with causal powers in the temporal world; the CCP does not rule out the existence of God or other spiritual phenomena as long as they mind their own business; see Papineau (2001).

or might not confirm.[32] That preserves the historical continuity of 'materialism' with 'physicalism,' and also makes clearer what I am arguing against. Unless otherwise noted, I will use the two terms interchangeably below.

So accepting the CCP commits us neither to reductionism nor to a materialist physicalism – all we have to accept is that everything that exists and occurs in nature, including social life, is constrained by the laws of physics. It seems hard to disagree with that, since consider the alternative: things happen to which the laws of physics do not apply. But in that case, what – or *where* – are their extra-physical causes? One possibility is God, though in that case we are in the realm of faith and engaged in an altogether different enterprise. The other main historical answer was Descartes' substance dualism, according to which mind is its own reality entirely separate from matter, but still part of nature. But substance dualism is no longer widely seen as credible,[33] and it seems a second-best solution in any case, to be embraced only if a comprehensive physicalism (now in the broad sense) proves impossible to articulate. Since I do not think that this has yet been proven, insofar as we are committed to social *science*, I take it that the laws of physics constitute a basic constraint on what social objects can be and do.

I cannot think of any social scientist who does not accept the CCP. For positivists it is constitutive of the very idea of science, so this case is clear. However, it might not seem so for interpretivists. Interpretivists explicitly reject naturalistic approaches to social science on the grounds that intentional phenomena – mental states such as beliefs, desires, and meanings – play a central role in human life, and do not seem to be anything like physical objects or causes. Thus, if we want to capture the specificity of social life – what makes it essentially different than geology or chemistry – then looking to physics will at least be no help, and might positively hinder our understanding.

Still, I know of no interpretivist, post-modernist, or other critic of naturalistic social science who says that social phenomena can *violate* the laws of physics. To be sure, the people interpretivists study might believe in things that violate the laws of physics, like a God with powers to intervene in the physical world, and on that basis create institutions that have real effects. However, whatever their personal views about God, in their scholarship interpretivists would not

[32] See Montero (2003), Wilson (2006), Brown and Ladyman (2009), and Göcke (2009); for skepticism about the No Fundamental Mentality constraint on physicalism see Judisch (2008) and Dorsey (2011).

[33] Though see Göcke, ed. (2012) and Swinburne (2013) for recent exceptions, and Stapp (2005) and Barrett (2006) for arguments that dualism is implied by quantum mechanics. The skepticism toward substance dualism does not extend to *property* dualism, according to which complex forms of matter can give rise to irreducible mentality; see for example Koons and Bealer, eds. (2010).

treat such beliefs as true.[34] Interpretivists agree with positivists on the principle of "methodological atheism," which brackets the question of God's reality and temporal role.[35] As Jürgen Habermas puts it, "a philosophy that oversteps the bounds of methodological atheism loses its philosophical seriousness."[36] Similarly, in their work no interpretivist embraces the claims of astrology, divination, or other pseudo-sciences that contradict the laws of physics – or, for that matter, even of ESP, the reality of which is at least open to scientific debate.[37]

Notwithstanding their explicit anti-naturalism, in other words, implicitly interpretivists too seem to accept that social life is physically constrained and constituted. And why shouldn't they? Human beings have material bodies that think and interact with each other through thought, voice, sound, sight and touch, all of which seem indisputably subject to the laws of physics. Intentional phenomena might not be reducible to those laws, but they are still subject to them. From this perspective, therefore, interpretivists are not anti-naturalists but more like naturalists-*plus* – accepting the CCP at the level of fundamental ontology, while offering other, mostly epistemological arguments about what makes the social sciences special.

Classical social science

But the causal closure of *which* physics? Today the "P" in 'CCP' refers to quantum physics, which is universally acknowledged to be more fundamental than classical physics. However, quantum phenomena are also widely believed to wash out above the sub-atomic level, and so it might be thought that, for all practical purposes, the relevant principles of causal closure in social science are classical (call this the CCCP).[38] In this section I argue that this is indeed how social scientists have understood the constraints of the CCP with respect to their work.

Making this argument is complicated in two ways. First, few social scientists have written on the CCP. This is not for want of philosophical reflection more generally, since almost from the start issues of ontology and epistemology have been deeply contested in the social sciences. But since the turn of the twentieth century there has been almost no discussion of our relation to physics specifically,[39] so I am forced to infer implicit views about which CCP social

[34] Thanks to Ted Hopf for sharpening this point for me.
[35] For two provocative exceptions see Porpora (2006) and Gregory (2008).
[36] Habermas (2002: 160). [37] See Jahn and Dunne (2005).
[38] With apologies now to the former Soviet Union; these authoritarian associations of 'CCP' and 'CCCP' are of course entirely accidental . . .
[39] Though there has been some on our relationship to physical*ism*; see Neurath (1932/1959), Papineau (2009), and for a critical response to Papineau, Shulman and Shapiro (2009).

scientists see as the relevant constraint. Second, as we shall see, what social scientists might *say* about the CCP if asked and what we *do* in our research may be different things. Nevertheless, the simple answer to whether social scientists feel bound by a CCCP is yes. Both historical and substantive considerations point to this conclusion.

On the historical side, substantial scholarship has been done showing that from their origins in the seventeenth century to their consolidation in the late nineteenth the social sciences were deeply influenced by (classical) physics, the most successful and prestigious science of the day.[40] For both intellectual and political reasons, our Founders – Hobbes, Hume, Smith, Comte, Jevons, Walras, Marshall, Pareto, and others – borrowed frequently from physics in their thinking about society. Bernard Cohen shows that this took various forms – analogies, metaphors, homologies, and identities – and argues that efforts to establish homologies and identities usually failed, leaving the overt impact of physics on the social sciences mostly on the analogical and metaphorical level.[41] But even if classical physics was not fruitful for substantive theorizing about social life, at a deeper level its impact was profound. By the early twentieth century the metaphysical assumptions of the classical worldview – materialism, determinism, locality, and so on – were deeply ingrained in the minds of social scientists. These assumptions were taken to be true of reality as a whole, and thus fundamental constraints on social scientific inquiry.

That this history is still with us is suggested by what happened next – or didn't. At the same time that the quantum revolution was transforming physics in the early twentieth century, in the social sciences "physics envy" went out of fashion. Whether because borrowing from physics yielded few insights, because social scientists had become more self-confident, or because they thought quantum effects washed out at the macroscopic level, the effect was that until quantum decision theory came along social scientists had almost never considered the significance of quantum physics for their inquiry.[42] Thus, by default if nothing else, I think social scientists today would appeal to the CCCP as the relevant constraint on their work.

On the substantive side, in turn, classical thinking permeates the ontology of positivist social science. Since it would require a long detour to show this, consider instead the following classical assumptions about social life: 1) mental

[40] See for example Mirowski (1988), Cohen (1994), and Redman (1997) with reference mostly to economics, and Gantt and Williams (2014) on psychology. Note that the moniker 'classical' was only added after the emergence of quantum physics.

[41] See Cohen (1994).

[42] There are exceptions – including Matson (1964), Brandt (1973), Weisskopf (1979), Schubert (1983), Karsten (1990), Becker, ed. (1991), and Peterman (1994) – but they were not cumulative and are little known today.

states are set by our neural constitution; 2) neural states are physically well defined; 3) human behavior obeys the laws of classical probability theory; 4) consciousness is epiphenomenal and thus not relevant to explaining human behavior; 5) the mind is a computer; 6) reasons are efficient causes; 7) there is no action at a distance; 8) social structures are reducible to the properties and interactions of individuals; 9) time and space are objective background conditions for action; and 10) in principle we can observe social life without interfering with it. I think positivists would accept most if not all of these principles unhesitatingly, as simple common sense. As evidence, consider the methods training that graduate students across the social sciences are given in formal theory and statistics. It's all based on classical logic and probability theory, which assumes that the world our students will be studying in their careers is a classical one, and in my experience is so taken for granted that the question never even comes up.

On the other hand, interpretivists would reject many if not most of these assumptions.[43] But if social life is not subject to the CCCP then are interpretivists saying it is to the CCQP? Certainly not explicitly, since the question has almost never been raised;[44] yet as I suggested above, neither have interpretivists said social life can violate the laws of physics. Instead, they have opted for epistemological arguments that while the assumptions and methods of the physical sciences may be useful for studying rocks and glaciers, they are not appropriate for studying the intentional phenomena that constitute society. This "Two-Sciences Settlement"[45] makes sense as a pragmatic defense of the autonomy of the social sciences, but it seems to concede that, ontologically, at the end of the day the social world is all just matter and energy. And if that's right, then why are intentional phenomena not amenable to the methods of the physical sciences? In short, what are intentional phenomena *physically*? The problem here is that, like positivists, interpretivists have implicitly equated naturalism with classical naturalism, and so their rejection of naturalism is framed by the classical worldview as well. This is not to say that interpretivism is classical in the same way as positivism, since as we will see its focus on meaning is hard to square with a materialist ontology.[46] Indeed, an important goal of this book is to legitimate that focus, which in the social sciences is

[43] As would critical realists like Roy Bhaskar (1979; 1986) and his followers, who espouse a kind of hybrid interpretivist naturalism (also see Wendt, 1999: Chapter 2). The interpretivist aspect of critical realism is subject to the question raised here about interpretivism more generally, whereas its naturalist aspect, especially its concern with identifying unobservable deep structures, is dealt with below.

[44] See Apel (1984) for an exception, though his discussion is focused more on epistemology than ontology.

[45] See Ephraim (2013).

[46] For that matter, as I suggest below, in practice even much positivist social science does not observe a classical physics constraint.

intellectually marginalized. But to do that, intentional phenomena need to be made consistent with the CCP.

The anomaly of consciousness

Even if it is accepted that social life is governed by the laws of classical physics, it may be objected that the constraint is so loose that it is irrelevant to either the content or practice of social science. Positivists are interested in the behavior of people, who are subject to different laws than matter and energy in their simplest forms. And even assuming that interpretivists grudgingly conceded that human action is constrained by the laws of classical physics, so what? It still doesn't tell us anything about meaning, discourse, and other intentional phenomena.

As a social scientist myself I find such skepticism understandable – after all, what do physicists know about social science? So the burden of proof is on me to show that physics could matter to social science in any interesting way. As a first step, in this section I argue, by way of the mind–body problem, that if we approach social science under a classical physics constraint, then intentional phenomena have no place in our work. I develop this suggestion in three stages. I first define the mind–body problem, and more specifically the problem of consciousness, and show how it constitutes an anomaly for the classical worldview. Second, although social scientists might not care about consciousness, I argue it is presupposed by intentional phenomena, which we routinely invoke in our theories. Third – and here's the kicker – if consciousness cannot be reconciled with the classical worldview, then intentional phenomena no more belong in a classically conceived social science than vitalism's *élan vital* belongs in a classical biology.

The mind–body problem

In its most general form, the mind–body problem is how to understand the relationship between mental states, which are subjective, and brain states, which are objective. However, this general formulation has traditionally been twisted by an assumption that brain states must be understood in classical and therefore materialist terms.[47] According to materialism, the elementary constituents of all macroscopic objects are purely material. "The problem" is thereby recast in narrower terms as how to explain mental states by reference to brain states, *the bases of which contain no trace of mentality.*

[47] This made sense when the modern mind–body problem was framed by Descartes in the seventeenth century, but such is the grip of materialism that even after quantum physics it continues to be a mostly unquestioned assumption today.

Or at least that is what I take away from philosopher of mind Jerry Fodor's sobering assessment of his field: "[n]obody has the slightest idea how anything material could be conscious. Nobody even knows what it would be like to have the slightest idea about how anything material could be conscious. So much for the philosophy of consciousness."[59] To which he might have added, "and so much for neuroscience too," since the problem Fodor is pointing to is not scientific, as if our modern theory of the brain is on the right track but just not there yet in terms of explaining consciousness.[60] The problem is philosophical. As long as the brain is assumed to be a classical system, there is no reason to think even *future* neuroscience will give us "the slightest idea how anything material could be conscious."

Faced with such a long-standing anomaly, contemporary materialists are in disarray, and some are even beginning to think that something has gone wrong in their framing of the problem.[61] But what? One suggestion, in a Wittgensteinian spirit, is that the hard problem is a pseudo-problem caused by philosophical confusion. David Papineau, for example, argues that the supposed "explanatory gap" is due to our inability to stop thinking in dualistic terms; if we could get over dualism then the gap would disappear.[62] Perhaps, but this is a minority view even among materialists, who one might expect to be receptive to it. Another materialist, Colin McGinn, thinks the problem is genuine but argues that beings with our limited brains are "cognitively closed" to ever solving it.[63] That too might be right, but it's a fishy argument that says materialism can't explain consciousness yet leaves materialism intact as our ontology,[64] so before we go down this road we should be sure that all others have been tried. And then there is the most recent materialist re-think, which is that consciousness (and for good measure, free will too) is actually an *illusion*.[65] I discuss this view in Chapter 9, so here let me just say that it seems a singularly unattractive answer. First, denying the reality of experience is highly counter-intuitive; as

[59] Quoted in Kirk (1997: 249). See Levine (2001), Bitbol (2008), Majorek (2012), Nagel (2012), and Lewtas (2014) for good overviews of the challenges facing a materialist solution to the mind–body problem.

[60] My sense is that many philosophers share Noë and Thompson's (2004) doubts that neuroscience alone will solve the problem. However, neuroscientists continue to try; see for example Feinberg (2012).

[61] Another fresh approach is offered by "New Materialists" coming mostly out of the humanities, who are trying to bring a kind of materialism into fields long dominated by social constructivism; for a good overview see Coole and Frost, eds., (2010b). By virtue of its re-thinking of matter, New Materialism has some affinities with my own argument that I address in Chapter 7, but since its proponents are not engaged with the philosophy of mind literature I will bracket it here.

[62] See Papineau (2011), and for more explicitly Wittgensteinian approaches to similar effect see Bennett and Hacker (2003), Overgaard (2004), and Read (2008).

[63] See McGinn (1989; 1999).

[64] Lewtas (2014: 337) likens it to theists' response when confronted with the problem of evil.

[65] See Noë, ed. (2002), Wegner (2002), and Sytsma (2009).

one critic puts it, "believe it if you can."[66] Second, rejecting the explanans (consciousness) rather than the explanandum (classical brain states) is in effect to reject uncomfortable data, which is not rational and makes it unclear how materialism could ever be falsified.[67] Illusionism about consciousness seems moved more by blind faith in materialism than anything else.[68]

Yet illusionism, I take it, is an advance in our understanding, since it seems the logical culmination of the materialist approach to the mind–body problem: given the problem's persistence, *if* materialism must stay then consciousness must go, because like the soul there is no place for it in nature. Unfortunately, given that consciousness is widely seen as essential to the human condition, that means there is no place for *us* in nature either – that we are not "at home in the universe." Thus, many materialists still hope a materialist way to explain consciousness without denying its reality will be found. And perhaps it will.[69] In the meantime, however, the failure to make progress on this issue suggests a worldview in deep paradigmatic crisis.[70] It's not for nothing that consciousness is considered one of the deepest mysteries facing the modern mind.

Intentionality and consciousness

But is it a mystery that should concern social scientists? Judging from our practice the answer might at first seem to be no. Although the elementary objects of social science, human beings, (I think most of us would agree) are conscious, social scientists mostly take that for granted, such that the term 'consciousness' is largely absent from our discourse.

On the positivist side, the ambition is to make social science as much like physical science as possible, generalizable and objective. Since consciousness is idiosyncratic and inaccessible to third-person observation, it is best left aside. Thus, while most positivists routinely attribute intentional states to human beings, the fact that these states are conscious is rarely considered, except perhaps as a methodological barrier to objectivity.[71]

On the interpretive side, matters are less clear, but there is definitely a reluctance to thematize consciousness. Interpretivists mostly focus on what

[66] O'Connor and Wong (2005: 674).

[67] See Lewtas (2014) on the irrationality of materialism at this point in history.

[68] On commitment to materialism as a faith see Montero (2001: 69), Velmans (2002: 79) and Strawson (2006: 5).

[69] Though in the absence of reasons to expect such a breakthrough it is unclear why we should still hold out hope for it; see Lewtas (2014: 329).

[70] See Nagel (2012) for a particularly eloquent statement of the crisis, ranging well beyond the mind–body problem to evolutionary considerations and more.

[71] Though if human beings were not conscious then requiring scholars doing research on human subjects to get their work approved by an "Institutional Review Board" would presumably not be necessary.

is public and *shared*, like language and norms, not on what is experienced by individuals. To be sure, many are interested in subjectivity, a concept closely related to consciousness. Yet outside phenomenology, psychoanalysis, and feminist theory, which have always taken experience seriously, the experiential aspect of subjectivity is mostly extruded in interpretivist work, in favor of distinct concepts like *inter*subjectivity, the *discursive production* of subjectivity, and subject-*positions* that do not foreground experience per se.[72] Although I lack the space for exegesis here, consider three giants of interpretivist philosophy: Wittgenstein, Foucault, and Habermas – each in different ways trying to *get away* from a "philosophy of the subject" that they associate with a bankrupt Cartesianism.[73] So despite engagement with the problematic of subjectivity (sic), interpretivists exhibit at least a serious ambivalence about what makes it *subject*-ivity in the first place, namely its conscious aspect. In short, in most of contemporary social science there seems to be a "taboo" on subjectivity.[74]

However, while most social scientists neglect consciousness, we do care about intentional phenomena, which I shall now claim presuppose it. If that is right, then our work makes at least implicit assumptions about consciousness and its place in nature.

Intentionality refers to the fact that mental states like beliefs, desires, and meanings are intrinsically "about" or directed toward things beyond themselves, whether real objects in the world, fictional objects in one's own mind, or the minds of other people.[75] This is in contrast to the states of objects that lack minds, like rocks and glaciers, which are not "about" anything. Although social scientists rarely cite this technical, about-ness meaning of intentionality, it pervades the purposive, folk psychological discourse that we use throughout our work. This is not to say that explaining intentional action is always the goal of social science, much of which studies *un*intended consequences – but those are only meaningful in relation to what was *in*tended. Even self-consciously non-intentional approaches like structural and evolutionary social theories assume purposive action at the micro-level, and insofar as institutions are *collective* intentions, intentionality is present at the macro-level as well.[76] This reliance of social science on intentional discourse is hardly surprising, since in everyday life we routinely attribute intentional states to other people.

[72] See Scott (1991) for a particularly sophisticated discussion of experience that I think illustrates this point.

[73] The neglect of subjectivity in modern social theory has led to a number of recent efforts to "bring the subject back in," for which the argument of this book may be seen as providing a physical basis. See for example Frank (2002), Freundlieb (2000; 2002), Henrich (2003), Ankersmit (2005), Ortner (2005), Archer (2007), and Heelan (2009).

[74] See Wallace (2000).

[75] See Jacob (2014) for a good introduction to the philosophical literature on intentionality.

[76] See especially Gilbert (1989) and Searle (1995).

A social science that could not accommodate this fundamental fact would be an impoverished social science indeed.

The relationship between intentionality and consciousness has long been debated by philosophers. Some think that consciousness is dependent upon intentionality, others that intentionality is dependent upon consciousness, and many just ignore one while focusing on the other. However, in recent years the balance of opinion seems to have shifted toward the view that "consciousness is the irreplaceable source of intentionality and meaning."[77] As John Searle puts it,

> I now want to make a very strong claim . . . The claim is this: Only a being that could have conscious intentional states could have intentional states at all, and every unconscious intentional state is at least potentially conscious. This thesis . . . has the consequence that a complete theory of intentionality requires an account of consciousness.[78]

To me at least, intuitively this makes sense. Could a machine have genuine intentional states – i.e. of its own rather than ones attributed by us – if it did not also have consciousness?[79] We can program a machine to act *as if* it had intentional states – in the way that a thermostat may be said to be "goal-directed" – but the real intentionality resides in the designer, who is conscious, not the thermostat. Nonetheless, Searle's "very strong claim" is still very much contested.[80] This poses a threat to my narrative if you too have doubts, since if Searle cannot convince his fellow philosophers, then even if I went through all his arguments I should not convince you either.

In the interest of pressing my attack, therefore, I am going to expose a flank here by resorting to stipulation: intentionality depends ontologically on consciousness.[81] Note, with Searle, that this is not to deny the existence of unconscious intentions, as long as they could in principle be made conscious. And nor is it to deny the existence of collective intentions, which are grounded in individual intentions and as such derivatively dependent on consciousness. It is to affirm only that where there is no consciousness there is no intentionality, and so by attributing intentionality to human beings social scientists are also attributing to them consciousness.

[77] Siewert (2011: 17).

[78] See Searle (1992: 132), quoted in Kriegel (2003: 273); also see McGinn (1999) and Strawson (2004).

[79] On really having vs. merely ascribing intentional states see Dennett (1971: 91), and Gamez (2008) and Gök and Sayan (2012) for contrasting views on the possibilities for machine consciousness.

[80] See Siewert (2011: 16–19) for an overview of the debate, and Kriegel (2003) for a concise analysis of Searle's (and McGinn's) arguments for the consciousness-first view.

[81] If you'll pardon the military metaphor, blitzkrieg is the only way to wage this campaign, concentrating all of my argument on the weak point in the opposition's lines (the mind–body problem), breaking through, and then bypassing local resistance in the hopes that global success will render it moot.

The threat of vitalism

Nevertheless, the fact that the origin of consciousness and therefore intentionality is a mystery has not stopped social scientists from doing their work, which might suggest that the mind–body problem doesn't matter to us after all. I want to argue now that it does, because the questionable reality of consciousness puts explanations that invoke intentional phenomena into question as well, on the grounds that they are analogous to vitalism.

Vitalism is a theory of what makes life "life," and was widely held in the nineteenth and early twentieth centuries. Against materialists, vitalists argued that the only way to explain life is by reference to an unobservable, non-material *élan vital* or "life force." Materialists were withering in their philosophical criticism of this idea, but what really turned the tide against vitalism were revolutionary scientific advances in biology like genetics, which seemed to eliminate the explanatory need for an *élan vital*. As a result, there are few recently respectable theories that are today as totally discredited as vitalism, which is now considered to be a pre- if not pseudo-scientific doctrine.

What makes vitalism instructive in the present context is that two of the main reasons that scientists and philosophers rejected it apply to explanations that invoke intentional phenomena – and by implication consciousness – as well. First, just as we have no public evidence for the *élan vital*, which vitalists claimed was inherently unobservable, we have no public evidence for consciousness either, only our own experience. Second, as an extra-material force the *élan vital* conflicts with the CCP – or more precisely, the CC*C*P. It's not just that we can't see it because it's unobservable; the *élan vital* can't *be* there because classical physics tells us that no such thing exists. By the same token, if consciousness cannot be reconciled with the CCCP then it cannot *be* there either (whence illusionism).

These similarities suggest that a strong analogy exists between the status of consciousness in modern science and the debate a century ago over the *élan vital*. Indeed, Daniel Dennett uses this analogy to criticize those such as Chalmers who think materialism can't explain consciousness. He argues that if that were right then vitalism could be true as well – and since "we all know" that vitalism is false, there must be a material basis for consciousness.[82] Chalmers tries to deflect the criticism by rejecting the analogy, arguing that the vitalists sought to explain only the form and functioning of organisms – akin to the easy problems of mind – which we have since learned can probably be explained by material forces alone; as such, there simply is no "hard problem" of life analogous to consciousness. But that is not so clear. Brian Garrett shows that, historically, some vitalists were concerned with more than

[82] See Dennett (1996).

Students of domestic politics are more likely to conceptualize the state explicitly as a social structure, as a set of institutions that enable collective action on behalf of the common good. Yet our ET friends would not find any states in this sense either. Not just because states are really big and thus difficult to see in their totality, but because institutions are no more material objects than states as agents are.[90] It might be objected that modern states do have well-defined boundaries marked with fences and barbed wire. But how could the ETs distinguish these boundaries visually from the fences and barbed wire which surround cattle ranches or gated communities? Perhaps by plotting the movements of millions of individuals, but in a globalizing world those patterns might be as likely to cross territorial boundaries as to coalesce within them.

Finally, the state may also be seen as a practice. Here it is not being an agent or a structure that constitutes the state, but the material practices of policemen pulling over speeding drivers, diplomats talking to other diplomats, and soldiers shooting enemy soldiers. The ETs might do better seeing states in this sense, since their cameras would at least pick up *something* that is literally the state – its individual agents. But how could they know who those people are without first knowing the (invisible) social structure that constitutes their identities as members of a state?

So where then *is* the state, physically in space? If the question seems strange it is because normally we do not think of the state as something that should have a location or be visible in the first place, like a car or cat. Instead, it is a collective intention, an object of *thought* to which our beliefs and desires may be directed, but is not in itself a material object.[91] The state is a state of mind, in other words, before it is an agent, structure, or practice. Nor is it unique in this regard. The Catholic Church, capital markets, and universities are all collective intentions that can only be "seen" if you already know they are there. Whereas with material objects seeing is believing, with social structures believing is seeing.

Of course, some material objects cannot be seen with the naked eye either, like viruses, distant galaxies, and infrared light. But in these cases, there is no question of their being directly observable at least *in principle*, as the inventions of the microscope, telescope, and infrared glasses attest. That is because they are classical material phenomena and as such mind-independent. In contrast, social structures are mind-dependent, and so no as yet un-invented technology

[90] Also see Coulter (2001: 33–34).

[91] For a contrary perspective readers should consult Paul Sheehy's (2006: 97–130) systematic defense of the idea that groups actually are material objects, by virtue of consisting of individuals organized in relations that create causal powers. Overall I am in strong agreement with Sheehy's holist theory of groups (see Chapter 12), but the relations that constitute groups are ultimately mind-dependent and as such in my view cannot be reconciled with a classical understanding of physicality *as materiality*.

will enable ETs to see them. Indeed, even if ETs could scan our brains they would not see them, since social structures are not "in" our brains either, but in our minds.[92] This is not to say that, through careful study of our behavior and perhaps extrapolation from their own experience, ETs could not infer the presence of states. But that would mean coming to see them as we do, by learning to read our minds. Short of that, the ETs would have to report back home that while Earth was teeming with life, perhaps even intelligent life, nowhere were there any states.

The threat of reification

Practically speaking the "location problem"[93] in social ontology is not difficult to solve, since most of us can find states and other socially structured systems when we want to. Moreover, critical and scientific realists have built an entire philosophy of science around the idea that we can know unobservable entities at least theoretically. Nevertheless, given their mind-dependence, it is not clear how social structures are consistent with a materialist ontology. If reality really is nothing but classical matter and energy, then unobservable social structures should not be there, any more than consciousness should be there. So if the latter is ultimately an illusion, then *social structures must be illusions too*.

This poses a threat of reification to those who insist on positing social structures anyway. By 'reification' I mean "the socially induced illusion of thinglikeness."[94] The idea here is that although we often treat social structures as objects out in the world, from a classical standpoint there can be no such objects. Of course, the shared belief that social structures exist makes them real *for us*, since we will act upon those beliefs much like believing in witches will induce people to act as if there are witches. Moreover, social theorists routinely warn against reifying social structures into things in a material sense. But that is precisely the point, for if social structures are not things in a material sense then in a classical world in which everything *is* material, what could they be *if not* illusions? In other words, if we accept a classical physics constraint, then to posit the existence of unobservable social structures is necessarily to reify them.

In saying this I am not trying to suggest that social structures do not, in some sense, exist and have causal powers. Rather, it is that the CCCP provides no grounds for such a claim, and so if we want to retain them in our ontology then it will have to be on a quantum basis instead.

[92] As McGinn (1995) points out there is a similar problem in locating consciousness.
[93] The phrase is Hindriks' (2013); cf. Sheehy (2006: 104–107).
[94] Hull (2013: 54); also see Maynard and Wilson (1980). Although originally a Marxist idea, the concept of reification has since been appropriated by other social theories; see Hull (2013) for an excellent, theory-neutral conceptualization.

As if explanation and unscientific fictions

It might be objected that this argument presupposes a realist epistemology. For realists the purpose of science is to disclose the world as it really is and so to invoke intentional phenomena – whether at the agent or structural levels – in social explanations is to posit them as at least provisionally real. As the philosopher of mind Jaegwon Kim puts it, referring to the related issue of mental causation in psychology,

> [t]he possibility of psychology as a theoretical science capable of generating law-based explanations of human behavior depends on the reality of mental causation: mental phenomena must be capable of functioning as indispensable links in causal chains leading to physical behavior. A science that invokes mental phenomena in its explanations is presumptively committed to their causal efficacy; for any phenomenon to have an explanatory role, its presence or absence in a given situation must make a difference – a *causal difference*.[95]

However, many social scientists today subscribe to non/anti-realist epistemologies, from post-structuralism on the one end to empiricism and pragmatism on the other. From their perspective, it might appear that explanations invoking consciousness or social structures only lead to the threats of vitalism and reification if we insist on treating them as real – which there is no need to do.

Consider, for example, how an empiricist or pragmatist might think about explanations that invoke intentional states. On their view, theory should be judged not by how well it discloses the world as it really is – which ultimately cannot be known – but by how well it enables us to predict, solve problems, or otherwise get by in the world.[96] Theory is a tool or instrument, not something to be taken as literally true. Since the assumption that people act *as if* they have intentional states helps us explain their behavior, then even if they are ultimately illusions, it would be a significant loss of knowledge if such states were excluded from our theories a priori while we wait for proper materialist accounts to come along.[97] Thus, whatever the problems that consciousness and social structures might pose for realists, from an instrumentalist or "as if" perspective we should not let ourselves be bullied by philosophers into giving up our best tools, threats of vitalism and reification or not.

Indeed, one might press this objection further against the whole idea of a physics constraint on social science, by pointing out that even in the physical sciences it is common to make assumptions, such as ideal gases and frictionless

[95] See Kim (1998: 31), emphasis in the original; also see Maul (2013).
[96] Friedman (1953) is perhaps the most well-known exposition of such a view, but in different forms it is widely held across the social sciences.
[97] See also Dennett (1971; 1987) on the "intentional stance."

planes,[98] which are explicitly fictional. If fictions are essential to the practice of all science, as Hans Vaihinger argued in his "philosophy of the As If,"[99] then why should social scientists eschew reference to consciousness or social structures just because philosophers cannot explain them? As long as they advance knowledge, they should be countenanced just like any other scientific fiction.

Yet, while advocating a liberal attitude toward fictions in science, empiricists and pragmatists nevertheless want to hold the line against fictions that cannot possibly count as scientific,[100] such as God or ghosts, and here the threats of vitalism and reification still have force. What defines an "unscientific" fiction? This has received surprisingly little attention in the literature,[101] perhaps because as methodological atheists modern scientists are not generally inclined to bring supernatural forces into their theories in the first place. But why not? Some Christians think that evil behavior is caused by the Devil. This explanation is coherent, parsimonious, and even supplies a causal mechanism. Yet I suspect most social scientists would reject it a priori. Or take the *élan vital*. It might not explain organisms' functioning, but it does purport to explain the nature of life, the riddle of which materialists themselves have not solved. Yet in today's debate about life, no one considers the *élan vital* a valid construct, *even* as a convenient fiction.

The implicit reason for these exclusions seems to be that in modern science, fictions are legitimate if they refer to something that at least in principle could fall within the CCP, which is to say, is *physical*.[102] As Peter Godfrey-Smith describes fictionalized models, "each model system itself is something that would be concrete if real; it would be an arrangement of physical entities."[103] That makes sense, and as such I too would reject the Devil as a legitimate scientific fiction. However, there is still the question of what 'physical' means, which turns on which physics we are talking about. In quantum physics physicality can encompass mentality, which opens the door to intentional states (and, I will argue, the *élan vital* as well). In classical physics, physicality means materiality, and there seems little prospect that materialism will ever be able

[98] Godfrey-Smith (2009: 101). For recent discussions of the value of false models in the social sciences see Rogeberg and Nordberg (2005) and Hindriks (2008).

[99] Vaihinger (1924); see Fine (1993) for a contemporary revival of Vaihinger's ideas, and Contessa (2010) for recent discussion in light of Fine's article.

[100] So much so that Giere (2009) worries that in today's "cultural climate," embracing too eagerly the idea that scientific models are fictions may provide succor to creationists and others who threaten to break the distinction down. Also see Sklar (2003: 438).

[101] Though see Janzen (2012), who draws the line at ghosts.

[102] Such an assumption seems to be implicit in Bokulich's (2012) sophisticated defense of the view that fictions can be explanatory, for example, as it is also in Schindler's (2014) critique of Bokulich.

[103] Godfrey-Smith (2009: 104).

to explain consciousness. Even from an "as if" perspective, in other words, as long as social science is thought to be constrained by a classical CCP, intentional states and social structures have no more place in our work than the Devil or *élan vital*.

My central question, and answer in brief

My point in raising the threats of vitalism and reification is not to suggest that social scientists should abandon intentional phenomena in our explanations, as behaviorists and eliminative materialists would have us do. First, theories that assume intentionality work much better than the alternatives. Behaviorism told us little, and neuroscience is still young (and even when it matures, what about Mary?), so at this point intentional phenomena are the only explanatory game in town. A second reason to keep intentional phenomena in the mix is ethical.[104] It is through attributions of intentionality that our subjects – conscious individuals – make an appearance in our work. Insofar as social science is addressed to those subjects, in the form of normative implications for their behavior, it is important that their subjectivity not be written out altogether – for otherwise who is our addressee?[105] Part of the point of social science I take it is to give meaning to events, by taking what seems inexplicable and fitting it into a pattern that is relevant to people's lives, which will be hard to do if we deny the subjectivity of our audience.

Yet, given a classical CCP, the result is then a de facto dualism between mental and material phenomena.[106] In ontology we face "two incompatible ontologies . . . the ontology of subjectivity and free agency, on the one hand, and that of things or objects and their relations in the external world, on the other."[107] And in epistemology the best we can do is a Westphalian Settlement, in which positivists and interpretivists live and let live with irreconcilable differences. Since there is only one reality, from a naturalist perspective such dualisms should be accepted only if we have no choice, and indeed going back to the behavioral revolution social scientists have long called for transcending them.[108] However, if the argument above is correct, such efforts are doomed to failure as long as we retain a classical framing of the mind–body problem.

[104] Also see Wight (2006: 211–212).
[105] See Frank (2002: 391). For a sampling of views on the link between consciousness and moral cognition see the special issue of *Review of Philosophy and Psychology* edited by Phelan and Waytz (2012).
[106] See for example Wendt's (2006) trenchant critique of Wendt (1999).
[107] Freundlieb (2000: 238).
[108] See Jackson (2008) for a particularly sophisticated recent effort.

of consciousness could be true, one could easily retort there is no way a classical one could be either!

Quantum brain theory takes known effects at the sub-atomic level and scales them upward to the macroscopic level of the brain. However, by itself this would not explain consciousness, since it does not tell us why any physical system, even one as mind-bogglingly complex as a quantum computer, would be conscious. This question is addressed by the ontology of panpsychism (Chapter 6).

Panpsychism takes a known effect at the macroscopic level – that we are conscious – and scales it downward to the sub-atomic level, meaning that matter is intrinsically mind*ed*. With this principle of Fundamental Mentality panpsychism opposes not only materialism but also idealism and dualism. Against idealists who privilege the mind panpsychists see mind as only an aspect of matter, not something to which matter can be reduced. By the same token, while panpsychists agree with dualists that mind and matter are distinct, against dualists they do not think that matter is purely material and thus that mind is a substance over and above it. Mind and matter constitute a duality, not a dualism, one that I will argue emerges from an underlying reality that is neither mental nor material (a view known as neutral monism).

Panpsychism can be traced to the ancient Greeks, but it also finds expression in the great modern philosophical systems of Spinoza, Leibniz, Schopenhauer, Whitehead, and others. However, like vitalism, after the 1940s panpsychism became an object of ridicule in Western philosophy, and as such for decades was ignored in the literature on the mind–body problem. It is therefore perhaps symptomatic of the contemporary crisis of materialism that since the 1990s there has been a strong resurgence of the idea within philosophy of mind and – interestingly – the philosophy of physics.[113] For unlike classical physics, there is a clear place in quantum mechanics for mind – the collapse of the wave function. As physicist Freeman Dyson put it, "mind is already inherent in every electron, and the processes of human consciousness differ only in degree but not kind from the processes of choice between quantum states which we call 'chance' when they are made by electrons."[114] To be clear, quantum theory does not *imply* Fundamental Mentality, but it *allows* for it physically, and results in quite an elegant interpretation of the theory. As such, quantum consciousness theory suggests that two of the deepest mysteries confronting modern science – how to interpret quantum theory and how to explain consciousness – are two sides of the same coin. Although I will not be primarily concerned with the former here, I argue that putting them into conversation enables us to bootstrap a solution to the latter.

[113] See Malin (2001), Primas (2003), Pylkkänen (2007), and others cited in Chapter 6.
[114] Quoted in Skrbina (2005: 199).

This puts the threat of vitalism in a new light (Chapter 7). Earlier I used this threat to develop a *reductio* of intentional explanation: since "we all know" there is no such thing as the *élan vital*, intentional explanations are no more scientific than vitalism. Now it appears that the vitalists were right all along. Extrapolating from the rapidly growing literature in quantum biology, I argue that there *is* an irreducible "life force," quantum coherence, which can only be known from the inside, through experience. In this "quantum vitalism"[115] we end up with an updated version of the *Lebensphilosophie* of Goethe and the nineteenth-century Romantics, and later Schopenhauer, Nietzsche, Merleau-Ponty, and others. Such a perspective calls into question a basic metaphysical assumption of modern science, that all ultimate explanatory principles must be "dead."[116] By suggesting that experience goes all the way down, quantum consciousness challenges this philosophy of death, echoing the great physicist Eugene Wigner's intuition that it is through biology that the deepest problems of physics will eventually be solved.[117] Far from excluding intentional states from social science, quantum vitalism would be their very basis.

If quantum consciousness theory is true then the physics constraint to which human beings and society are subject is quantum rather than classical. This matters, because in a quantum world lots of things are possible that aren't in a classical one, and so a quantum perspective presents an opportunity not only to overcome dualism in social science, but to expand our conception of social reality altogether.

The basic directive of a quantum social science, its positive heuristic if you will, is to re-think human behavior through the lens of quantum theory. To this end, in the second half of the book I explore some implications of quantum consciousness theory for social ontology, and specifically the agent–structure problem. In doing so I cannot hope to engage properly the vast literature on that problem, which has been framed to date by implicit classical premises. Instead, my goal is to theorize the agent–structure problem through the quantum, as if we were theorizing it for the first time.

In Part III I focus on human agents in isolation from their social context, in order to unpack what individual quantum minds bring to the social table. I devote a chapter each to three mental faculties – Cognition, Will, and Experience. In Chapter 8 I summarize quantum cognition, decision, and game theory, where the evidence for a quantum model of man (sic) is strongest. The upshot is that, in contrast to the classical view that people have a portfolio of actual mental states in their heads upon which they then act, these states exist only as

[115] The phrase is Hameroff's (1997).
[116] See Montero (2001: 71); as Schopenhauer put it, materialism "carries death in its heart even at its birth" (quoted by Hannan [2009: 11]).
[117] See Wigner (1970), and also Matsuno (1993).

"superpositions," or wave functions of potential states, until they are elicited in interaction. I link this to the performative view of agency developed by post-structural theorists, arguing that quantum mind is its physical basis. In Chapter 9 I take up Will, arguing that a quantum model supports two claims that comport with common sense but are anomalous from a classical standpoint: that Will is inherently free, and that its causal power is teleological rather than mechanical. Finally, in Chapter 10 I address Experience, in particular our experience of time, which I argue exhibits temporal non-locality. This suggests that, in certain respects, it is possible to change the past, not just narratively, but literally.

In Parts IV and V I turn to the nature of social structure. Notwithstanding my treatment of agents in Part III in isolation from each other, the key idea running through these chapters is that, by virtue of our entanglement from birth in social structures, human minds are not fully separable. Non-separability refers to the fact that the states of quantum systems can only be defined in relation to a larger whole. It is the basis of non-local causation in quantum mechanics, and what makes quantum phenomena irreducibly holistic.

In Part IV I focus on the special case of language, which is the medium of all other social structures. Here I draw on the rapidly growing literature on quantum semantics, which shows that concepts exhibit "semantic non-locality." I draw two major implications from this work. First, against the dominant view that linguistic meaning is compositional, built up out of separable elementary units, semantic non-locality implies that meaning is irreducibly contextual (Chapter 11). Second, this in turn provides a new perspective on the Problem of Other Minds, or how human beings can know each other's thoughts. Building on an analogy to light, which enables non-local "direct perception" of visual objects, I argue that language enables us to do the same with other minds – that language is like light (Chapter 12).

Finally, in Part V I address the agent–structure problem more directly, challenging both the emergentist ontology associated with critical realism and the reductionist ontology associated with rational choice theory. Against the former, I argue in Chapter 13 that social structures are not actual realities existing somewhere above us in space, but potential realities constituted by inherently non-local shared wave functions. In this way, quantum theory underwrites a "flat" rather than stratified social ontology, in which individuals are the only real realities. While that might seem to vindicate individualism, the holism and non-locality of quantum theory belies that conclusion. The key here is the unique character of emergence in quantum contexts. When applied to social life, quantum emergence leads to a solution to the agent–structure problem not unlike the recent "practice turn" in social theory, according to which agents and structures are both emergent effects of practices. In Chapter 14 I suggest that all this points toward a vitalist sociology. Taking the state as an

example, I argue that the state is a holographic organism endowed with collective consciousness.

Re-inventing the wheel?

The social ontology developed in Parts III–V recapitulates many ideas that are already held in the social sciences, in some cases widely (such as intentional explanations being legitimate). This is not surprising. Despite my suggestion above that, if asked, most social scientists would say their work is ultimately grounded in classical mechanics, they don't think very often or explicitly about that constraint. Instead, they have pressed ahead with trying to make sense of social life with whatever tools seem to work best, most of which originate in folk psychology rather than physics. Folk psychology relies heavily on intentional phenomena in its accounts, and since I have argued that such phenomena cannot be reconciled with the classical worldview, a good deal of extant social science must at least implicitly have a quantum aspect.

However, that then raises the question of whether taking an explicitly quantum approach to social science will just re-invent the wheel. By the end of this book I hope you will be convinced that the answer is no, that there is real value added in such an exercise, so for now let me just highlight six contributions that I think it can make.

First, by providing a naturalistic basis for consciousness and intentional phenomena, the argument seeks to unify physical and social ontology. If it is correct, that would not only justify theoretical practices that social scientists often take for granted but are illegitimate from a classical point of view. It would also point well beyond the social sciences to philosophy and more, by creating the possibility of giving the human experience a home in the universe.

Second, even when it affirms extant theoretical practices a quantum approach may force a re-thinking of how they are understood. For example, intentional explanations will not be seen as a mechanical unfolding of preexisting mental states, nor will unobservable social structures be seen as really real.

Third, by virtue of these changes phenomena that are currently considered anomalous would be explained. The clearest example to date is the success of quantum decision theory in explaining the Kahneman-Tversky effects, but as we will see there are many other anomalies for classical social science that are predicted from a quantum perspective.

Fourth, and more prospectively, the conceptual, logical, and methodological tools of quantum theory offer the potential for revealing new social phenomena. Consider structural power, a concept often invoked by critical theorists but which from a classical perspective is impossible to see as anything other than a concatenation of local power relations – and thus can only be illusory. Conceptualizing structural power as a form of non-local

causation suggests that it is indeed quite real, at least in the quantum sense of the term.

Fifth, if quantum consciousness theory is taken as an explanation for consciousness, then the concept of complementarity could resolve the controversy between positivists and interpretivists. Although I will not address epistemology much in this book, given how bitter and intractable the dispute has been, this may be one of the most important pay-offs of a quantum social science.

Finally, there would be significant normative implications as well. Most mainstream normative theorizing about social life today, especially in the liberal tradition, assumes a world of separable, constitutionally pre-social individuals who then struggle to achieve sociability (the state of nature and all that). It is not hard to see the imprint of the classical worldview on this atomistic and competitive picture, but either way, quantum phenomena are marked by their holistic and "cooperative" character. That points toward a more communitarian and relational starting point for normative theory, which suggests that sociability is less a hard-fought achievement than the pre-condition and norm of human existence, and if so, that our obligations to others run correspondingly deeper. As with the epistemology question, I will only gesture in this direction, but if trying to make society a better place is one of the main reasons social scientists do what they do, then it is a thematic that needs to be developed down the road.

In sum, although the idea that social life is quantum mechanical may seem bizarre at first, and some of the arguments I make are indeed radical, I hope to show that it is actually quite intuitive, far more so than treating social life on the classical model of clashing billiard balls. And not only that, as I argue in the Conclusion, it is *too elegant not to be true*. For the price of the 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 that have dogged the social sciences from the beginning. These claims are admittedly speculative, but neither is precluded by what we currently know about the brain or quantum physics, and given the classical materialist failure to make progress on the mind–body problem, at this point they look no more speculative than the orthodoxy – and the potential pay-off is huge. If classical social science is in fact founded upon a mistake, then far from re-inventing the wheel a quantum social ontology would give our wheels the right ground on which to roll.

Having said that, however, I should emphasize that this book may be read in an "as if" rather than realist way. My personal belief in the argument certainly helped make it possible to spend ten years of my life working on it. But the test of my narrative is not that you come away thinking that social life really is quantum mechanical. After all, many of the experts upon whose work I draw, like quantum decision theorists, are themselves agnostic about the philosophical

Part I

Quantum theory and its interpretation

Introduction

Chapter 1 dealt with one of the deepest mysteries in modern science: how to explain consciousness. This Part deals with another mystery: how to make sense of quantum mechanics. Both involve a problem of reconciliation with the classical worldview, which is one hint that the two mysteries might be related. A second is that, unlike classical physics, which makes no reference to or allowance for consciousness, quantum theory raises the issue of consciousness and its relationship to the physical world in a very direct way. These hints do not necessarily mean there *is* a connection between the two mysteries, but by the end of this Part I hope to have shown why it would be natural to look for one.

My more immediate aim here is to give the social scientific reader an introductory understanding of the experimental findings of quantum theory, its key concepts, and the debates about its interpretation. The discussion assumes no prior knowledge of quantum physics and makes no use of mathematics. Quantum theory without equations might seem like an oxymoron, and certainly reading this Part will not enable anyone to *use* quantum theory. But to a perhaps surprising degree it is possible to understand quantum theory without being able to use it. Its findings can be communicated in ordinary language, and the same goes for its main concepts and interpretive debates. One consequence of this has been the emergence of a virtual cottage industry of books on quantum theory for a lay audience. Most are written by physicists, and many are quite good.[1] However, it is not just popular treatments that do without equations: much of the professional philosophical literature does as well. (I draw on both kinds of literature below.) Philosophers of physics are trained to understand the math, of course, which is necessary for a full appreciation of the issues. But the primary questions about quantum theory are about metaphysics,

[1] See for example Zukav (1979), Herbert (1985), Friedman (1997), and Rosenblum and Kuttner (2006); also see A. Goff (2006) on "quantum tic-tac-toe," which was written as an aid for teaching students with no background in the area. For braver souls Haven and Khrennikov (2013) provide an excellent technical overview of quantum theory aimed at social scientists.

not physics. Once we understand the basics we should be in a position to have a reasonably well-informed discussion.

That said, "understanding" in this context is something of a misnomer, since no one, not even physicists, *understands* quantum theory, if by that we mean what it is telling us about reality. Richard Feynman has often been quoted as saying that anyone who claims to understand it clearly doesn't know what he is talking about. It would seem, then, that just as it is possible (within limits) to understand quantum theory without being able to use it, it is possible to use it without fully understanding it. As such, my real goal here is to give readers an understanding of why we do not understand quantum mechanics. It will take most of this Part to do that, but let me summarize the problem here in two ways, one from a common-sense perspective and the other more theoretically.

The simplest characterization of the problem is that the reality quantum theory depicts is nothing like the macroscopic material reality described by classical physics. This is not because its constituents are so much smaller than everyday objects; scale is not the issue. It is because the properties of quantum systems seem fundamentally inconsistent with macroscopic reality: material objects dissolve into fields of potentiality, larger objects cannot be reduced to smaller ones, events seem not to have causes, and so on. Put another way, since the classical worldview is the basis of what we today take to be common sense about the world, at a gut level quantum theory just doesn't make sense – indeed, so much so that John Bell, one of the great physicists of the twentieth century, argued that whatever picture of reality eventually emerges from quantum theory will surely "astonish us."[2]

A more precise characterization of the problem is that the predictions of quantum theory are probabilistic, yet the outcomes of experiments on quantum systems are always definite, classical events. Of course, most social scientific theories are probabilistic as well, but *if* the macroscopic world is classical, then there must be an ontologically deterministic process underlying those probabilities about which we are simply ignorant at present. In the quantum world such an assumption is problematic. Quantum probabilities behave quite differently than classical ones (whether objective or subjective),[3] and although there are ways to make quantum theory deterministic, these are contested and come at a high price in other respects. As such, most physicists today believe that quantum theory is "complete," in the sense that there is no deeper, as yet undiscovered, classical theory or "hidden variable" that could explain its predictions deterministically. Hence the mystery: how to explain the transition

[2] The quote is in Rosenblum and Kuttner (2002: 1291).

[3] For a good overview of philosophical questions pertaining to quantum probability theory see the special issue on the topic in *Studies in History and Philosophy of Modern Physics*, June 2007.

from the quantum to the classical world? Is it a real process, and, if so, how does it happen? If not, then what is it?

In short, quantum theory does not answer crucial questions about the reality it describes, and strongly suggests that they *cannot* be answered even in principle by science. As Steven French puts it, we face an "underdetermination of metaphysics by physics."[4] Understanding the theory is therefore a philosophical rather than scientific problem, of "interpreting" it to produce a coherent picture of reality. Since the 1930s over a dozen interpretations have been proposed that make strikingly – indeed, wildly – different ontological and epistemological assumptions (Chapter 4), and once proposed they never die because of the under-determination problem. As they are designed to explain the same data, it is difficult if not impossible to discriminate among them empirically.[5] Fortunately, this does not prevent scientists from *using* quantum theory, which means the philosophical debate is actually of little interest to practicing physicists. But in considering its relevance to *social* science the debate is harder to avoid, since some interpretations suggest there are no such implications, while others suggest there are many.

So we are in something of a bind: unable to determine which interpretation of quantum theory is correct, and unable to determine quantum theory's relevance to social science as long as that is the case. This might seem to call into question my decision to set epistemological questions aside in favor of ontology, and to reduce the question of social ontology to a matter of personal metaphysical taste, but I don't think so. The fact that physicists cannot (yet?) adjudicate scientifically among interpretations of quantum theory does not mean there is no other way to do so: the criteria are simply more philosophical. The philosophy of quantum theory is full of arguments for and against each interpretation. Reasonable people disagree about these arguments, but that is true in any area where the data do not yield definitive answers. No doubt you the reader, when encountering some of these interpretations below, will make judgments about their relative plausibility, and even though you could not prove your judgments empirically, you could offer principled considerations on their behalf. The interpretive debate about quantum theory is about how to weigh those considerations, which thanks to the debate are much clearer today than they were eighty years ago. Moreover, we have an ace in the hole: quantum consciousness theory (Part II). As an independent, ontological reason for

[4] French (1998: 93).

[5] However, on the plus side this may account for the mutual respect and relative lack of polemic evident in the debate; strong opinions notwithstanding, almost everyone seems to understand that their preferred interpretation is speculative and could be totally wrong. At least in their writings, in my experience philosophers of physics are the most open-minded academics in the world (though admittedly this is a low bar!).

thinking that the two great mysteries of modern science are linked, it suggests what a correct interpretation of quantum theory should look like.

This Part is organized into three chapters. Chapter 2 summarizes three of the major experimental findings of quantum theory and key concepts that have been developed to describe them. In Chapter 3 I consider six challenges that the theory poses for the classical worldview, which might be considered its "negative" implications, or what it tells us the world is *not* like. Finally, in Chapter 4 I address a sample of five positions in the interpretive debate about the theory's "positive" implications, or what the world *is* like. I concentrate on the debate between materialist and idealist interpretations, with a view toward setting up the panpsychist argument of Part II.


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increased the energy of electrons emitted should go up proportionally as well; it also predicted that the photoelectric effect should occur at all frequencies as long as the intensity is sufficiently high. But experiments had shown that this was wrong – the intensity increased the number of electrons that were emitted but had no effect on their energy, and the photoelectric effect disappears when the wavelength exceeds a cutoff. Why? Einstein showed that this could be explained by Planck's model. Energy varies according to wavelength and not intensity, and at short wavelengths the energy of particles of light (photons) is higher, enabling them to dislodge electrons in the metal, whereas at long wavelengths the energy of the photons is too weak to produce this effect.

In short, Planck and Einstein's findings implied light was not a wave but a "shower of particles,"[4] suggesting that Newton's corpuscular theory had been right all along. However here's the rub: Young's results still stood. Planck and Einstein had shown that in *their* experiments, which were designed to answer different questions than Young's, light behaved as if it were a particle, not that Young was wrong about *his* experiment, where light still behaved as if it were a wave. Thus, rather than vindicating Newton, the implication of Planck and Einstein's work seemed to be that light was *both* wave *and* particle, which makes no sense in the "either-or" world of classical physics.

If light or energy can behave like a particle, or matter, it soon turned out that the reverse was also true, that matter can behave like a wave. This was predicted theoretically in 1924 by Louis de Broglie in his doctoral dissertation, and confirmed experimentally for electrons two years later. In contrast to the long-accepted view that electrons were tiny objects, it now appeared that they could also be "standing waves."[5] Normally we do not see this wave-aspect of matter because the "matter waves" of ordinary objects are so small relative to the size of the objects that their effect is negligible, but at the sub-atomic level the waves are sufficiently large to have a measurable effect.[6]

That *all* matter-energy can behave like both waves and particles has since been proven in modern, quantum versions of the Two-Slit Experiment. In these experiments a particle "gun" shoots a stream of electrons (or any other type of particle) toward a screen with two slits. They pass through the slits and the location of their hits is recorded on a photographic screen.[7] If we first close one slit, then the distribution of hits is concentrated directly across from the open slit, with a small tail on either side. If we then close the open slit and open the other one, we get a similar result across from the second slit. These results are what we would expect if electrons were particles. That might suggest that if we leave both slits open then the result should be a simple sum of the two

[4] See Herbert (1985: 57–58).
[5] Zukav (1979: 122); the phrase is Schrödinger's. [6] Zukav (1979: 119).
[7] The following discussion draws on Albert (1992: 12–14), Friedman (1997: 53–54), and Nadeau and Kafatos (1999: 46–51).