

BOOK REVIEW

Galileo's Error: Foundations for a New Science of Consciousness by Philip Goff. Pantheon, 2019. 256 pp. \$24.49 (hardcover). ISBN 978-1-5247-4796-1.

REVIEWED BY GEORGE R. WILLIAMS

Takoma Park, Maryland
grwilliams@gmail.com

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A new book by Philip Goff, *Galileo's Error: Foundations for a New Science of Consciousness*, accomplishes a number of notable things. Perhaps foremost, Goff provides an excellent overview of the debate on consciousness for a wide audience with little or no background in philosophy. He guides the reader through the various frameworks that include dualism, physicalism, and panpsychism. Goff's *Galileo's Error* thus provides an excellent introduction for anyone with interest in the growing science of consciousness. However, Goff does promote a particular angle. As a professor of philosophy at Durham University, Goff has followed the arguments of David Chalmers and others that materialistic explanations ultimately fail to explain consciousness. Like Chalmers, Professor Goff believes that in order to find a successful explanation, we will likely choose a direction that takes consciousness as fundamental in some sense. Toward this end, Goff has also become a leading advocate for panpsychism, the view that the ultimate particles that constitute our world have a mental aspect.

However, Goff's book also provides an important contribution regarding the philosophy of science. By examining science's development at an early stage, especially Galileo's role, Goff addresses an important aspect to the current debate on consciousness. And attention on the role of philosophy in science is also important, given the recent bashing philosophy has been handed by some scientists. To

make progress on consciousness, Goff argues we will likely need to do some hard thinking and reexamine some of our core assumptions. He provides many examples to demonstrate that often what is required is time spent thinking and rethinking the problem, perhaps in contrast to voices who emphasize just getting on with the lab or field work.

But what exactly is Galileo's error, you might be wondering? Most of us recognize that Galileo played a pivotal role in ushering in the scientific revolution through emphasizing testing theories by observation. But as Goff notes, central to Galileo's contribution was his emphasis on specific characteristics that could be quantified—size, shape, location, and motion. And this meant removing such qualities that we experience directly, such as taste and smell, out of the domain of inquiry. That is, Galileo pragmatically sought to remove inherently subjective matters that could not fit into a quantitative framework. This has brought mixed fruit. Science, as conceived by Galileo, is widely seen as one of the most successful developments in the history of thought. The focus on subjects that could be analyzed mathematically has led to true triumphs in understanding as well as abundant applications that have transformed the physical world.

But the problem of consciousness remains. This is a bigger deal than is often recognized. All meaning and value in our lives are intimately bound with consciousness. All the wonders of the universe have no value if no one experiences them. And Goff argues that Galileo's contribution has arguably made making progress on consciousness more difficult. That is, conventional assumptions and methods stemming from Galileo's influence are designed to tackle particular domains in our world where they are best-suited. Thus, science has been most successful in areas that fit within the constraints suggested by Galileo. And these are areas where the behavior of objects can be carefully tracked and characterized quantitatively. However, Goff argues that any optimism that conventional theories and methods will eventually resolve the problem of consciousness is entirely misplaced. This is not to say that materialism must be wrong (although Goff does make this case later in the book). But it is to say that success in areas such as physics, chemistry, and geology by no means guarantees success in other areas, such as consciousness, where the qualitative play a more important role.

Stanley Klein (2015) has recently made a similar argument. He notes that the field of psychology relies strongly on quantitative and objective methods that remove crucial information around the inherently subjective aspects of experience. Arguing for “experiential realism,” Klein makes the case for treating mental experience on its own terms.

After establishing this important context, Goff then examines the various classes of explanations for consciousness as they currently stand, which include dualism, physicalism (materialism), and panpsychism. As I’ve noted, Goff does an excellent job of making the material accessible to a wide audience. Although its intended audience is much wider than philosophers, there is more depth and subtlety to the reasoning than you might expect. Goff presents an excellent introduction to a wide range of topics, theories, and schools of thought that hope to shed light on consciousness. These include integrated information theory, the Turing test, Searle’s Chinese Room thought experiment, quantum mechanics, and much more. He also introduces the reader to a wide range of philosophers with strongly differing views. These include committed physicalists (Daniel Dennett and Patricia Churchland), panpsychists (Thomas Nagel and Galen Strawson), and dualists (David Chalmers and Martine Nida-Rümelin). As Goff shares some of his debates with the likes of Dennett and Churchland, he often guides the reader on the subtleties for both sides of the argument. But Goff also eventually brings some emotional weight to his views—that is, why it all matters. This is very far from a dry treatise built around solely abstract reasoning.

Of all the approaches to account for consciousness, dualism has perhaps been the most important historically.¹ As Goff puts it, “According to dualism, a human being is a kind of composite entity: a combination of a physical body and a immaterial mind” (p. 27). As he notes, it is a very natural way to think about ourselves. Our experience of the world seems to include both physical and mental (or spiritual) aspects. And dualism appears to fit well with most religions, which posit a spiritual reality beyond this physical world. One common argument against dualism is the problem of explaining how two fundamentally different substances—matter and mind—interact. That is, how to explain the causal connection between the mind and the

brain. However, Goff explores the subtleties here that extend beyond undergraduate philosophy classes. He notes that physics, typically silent on fundamental causal explanations, still escapes modern explanations for gravity and electromagnetism. As the philosopher David Hume argued, we remain ignorant of fundamental causal relationships of the world. Thus, the inability to discern causal relationships is not confined to dualism; this remains a problem for physicalism as well.

Nevertheless, as Goff discusses, most philosophers and scientists do not favor dualism because of the widely held belief that the physical world is causally closed. As Goff explains, dualism implies that some immaterial entity, perhaps a soul or immaterial mind, somehow influences the neurons in the brain. This suggests that some electrochemical processes in the brain would occur without physical causes. But evidence for such anomalous activity without causes has not been found. Another unappealing feature of dualism is its uneconomical ontology; positing two fundamental substances (instead of one) does not present a relatively parsimonious framework.

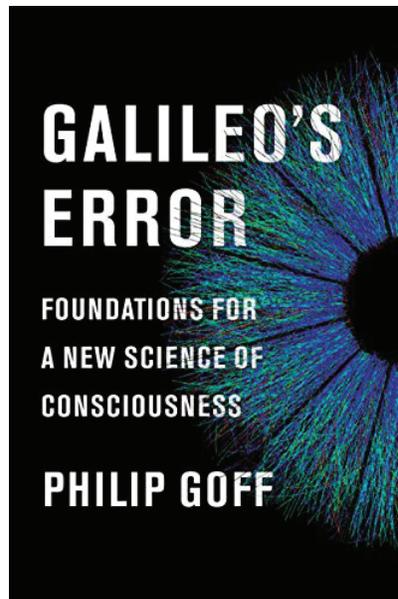
However, Goff does survey some scientists and philosophers sympathetic to dualism. As it happens, quantum mechanics remains poorly understood and suggests something of an opening for dualists. As Goff notes, the measurement postulate of the conventional (Copenhagen) framework is sufficiently vague that one might posit consciousness playing some role in the wave function's collapse. This theoretical possibility was first discussed in 1939 by Fritz London and Edmond Bauer, and later explored by Nobel Laureate Eugene Wigner in 1961. Later, in the 1990s, physicist Henry Stapp explored how the von Neumann split inside the brain triggers a wave function collapse. Most recently, David Chalmers and Kelvin McQueen presented an interpretation that posits some properties closely linked with consciousness never enter into quantum superposition. This section of Goff's book will likely be useful for those sympathetic to "consciousness collapses the wave function" style explanations of quantum mechanics.

I suspect that those familiar with the literature on psi and near-death experiences will object to Goff's claim that we lack anomalous data that would support dualism. And of course, Goff doesn't discuss such categories of anomalous data at all. (Few scientists or philosophers seeking a mainstream audience do.) However, when Goff here speaks

of anomalies, he is addressing only the lack of evidence for non-causally closed neuronal activity that might suggest immaterial mind or soul affecting the brain. Goff must assume that neuroscience is currently in a position to test the relationship between neuroactivity in the brain and some sort of nonphysical entity (soul perhaps). This might indeed be difficult to test in some cases. For example, let's consider a notion of the brain as filter, perhaps along the lines suggested by F. W. H. Myers and others. And let's consider further that the interface between this

brain as filter and some nonphysical entity is inherently holistic. Thus, we have not a narrow portion of the brain responsible for the link, but rather perhaps the brain as a whole. Such a prospect does not seem implausible to me if we are taking the prospect of dualism seriously. (Nevertheless, I do find the unparsimonious nature of dualism unpalatable.) In any case, Goff's view on this is most likely consonant with the vast majority of neuroscientists and philosophers of mind.

Goff then turns to materialism, which currently holds a dominant position among most scientists and (perhaps) philosophers. One particularly common view consistent with materialism is that the progress of neuroscience gives us compelling evidence that we will eventually understand consciousness as the result of processes within the brain. And he notes that advocates of this view are often dismissive of philosophical arguments, which often rely on thought experiments. But Goff notes that materialistic theories based on activity of the brain's neurons cannot disentangle correlation from causation. And he proceeds to make clear to the reader the potential power of thought experiments. Goff reminds us that thought experiments have played crucial roles in scientific breakthroughs, such as Einstein's imagined voyage riding on a photon. Less well-known, but perhaps more



powerful, is a thought experiment worked out by—drumroll, please—Galileo! Goff walks us through Galileo’s thought experiment that led him to cast aside Aristotle’s theory that heavier objects fall faster than lighter ones. Thus, Galileo did not usher in a new understanding of gravity by dropping balls from the Leaning Tower of Pisa (as the story goes) but by thought experiment. Arguably, the father of empirical science made one of his greatest achievements not by empirical testing but through thought experiment.

There are two primary thought experiments philosophers of mind have used against physicalism. These are known as the knowledge problem (about a brilliant neuroscientist named Mary who lives in a black and white room) and the conceivability problem (which invokes philosophical zombies that behave exactly like normal people but possess no conscious experience). As Goff demonstrates, these arguments flesh out how the conceptual resources of physicalism fall short of being able to explain consciousness. The elegant, yet objective, theories that explain the physical world simply provide no room for subjective experiences or the qualitative aspects of the world. This limitation was more or less the price of Galileo’s move to allow only a world that could be described in quantitative terms.

Goff also introduces us to illusionism, perhaps an unusual view among physicalists. Advocates of illusionism—the best-known is Daniel Dennett—argue that in an important sense, our conscious experiences are not real, but instead are best understood to be illusory. However, here they are not speaking about a tendency to be mistaken about the contents of our experience; instead, they assert that we are mistaken about whether we are actually having a truly phenomenal experience in the first place. (I confess, I still can’t quite wrap my head around this claim.) Another influential advocate of illusionism is Keith Frankish.² Unlike other physicalists, Frankish happens to agree with Goff that our conventional scientific understanding cannot account for conscious experience. However, from that point of agreement, Frankish chooses a radically different direction from Goff: He denies the reality of our conscious experience. Frankish, Dennett, and other advocates of illusionism deny conscious experience as a fundamental datum to be explained.³ They argue that we cannot put weight on this sort of data the way we can on that data gathered via conventional, third-person,

objective methods. They generally note that there are many ways we are mistaken about the contents of our experience. Given that the only sort of data we have on conscious experience is 1) inherently unreliable and 2) appears to fit our current theories poorly, the most prudent move is to dismiss the subjective nature of experience. For illusionists, a key advantage of this move is that radical moves, such as dualism or panpsychism, can be avoided. However, Goff argues that this view is ultimately incoherent, as we require our conscious experiences to obtain the data that all science is based on.

The third alternative framework Goff explores, and the one for which he advocates, is panpsychism. Recently, there has been a revival of interest in panpsychism, and a key reason for this is a renewal of attention on Bertrand Russell's arguments on the intrinsic aspect of matter. Less well-known is the contribution made by Sir Arthur Eddington, on whom Goff focusses greater attention. Throughout much of the 20th century, when materialism achieved dominance, these ideas of Russell and Eddington were mostly cast aside or forgotten. But with a growing acceptance of what philosopher David Chalmers has termed the "hard problem," these arguments are attracting considerable attention. For Goff, to achieve a post-Galilean science that can include consciousness, these arguments of Russell and Eddington will likely play a critical role.

The first component of the Russell–Eddington view has to do with a more perceptive understanding of physics than how it is often portrayed in the popular press. Physics is generally understood as providing a complete understanding of our world. Although it is rarely acknowledged, something important is left out. That is, our scientific methods leave us ignorant about the intrinsic aspect of our world. While the mathematical laws that constitute physics provide us with an excellent characterization of how such ultimate constituents as mass, spin, and energy behave, it does not reveal what such constituents ultimately are. In other words, physics tells us about the causal structure of the world, but leaves us ignorant about what ultimately the structure is based on.

Within general relativity, mass is captured in reference to the curvature of space. Within a more Newtonian context, mass is depicted as resistance to acceleration. That is, mass is ultimately defined in terms of other basic entities, which in turn also are defined relationally.

Thus, the most basic constituents are ultimately presented in terms of relationships to the other constituents. But this view leaves us empty about whatever grounds these relationships. In sum, physics gives us a sophisticated and useful framework to predict the behavior of the physical world, but it does not deliver for us an understanding of the intrinsic aspect of reality.

Russell had an intriguing insight about what this intrinsic element might be: consciousness. Our perception or direct experience is the only thing we have knowledge of outside the abstract relationships of physics. Russell argued that this most intrinsic aspect was neutral with respect to mental or physical properties. This view, known as neutral monism, was championed by Russell and his contemporary William James. However, Eddington took the view that this intrinsic element possesses mental properties, and this leads to panpsychism. Although a number of notable philosophers of mind currently advocate some version of neutral monism, I believe most find panpsychism more appealing. This leads them to consider the possibility that the particles that our world comprises may possess some degree of consciousness.

This framework on the intrinsic aspect of the world has some highly attractive features for those unsatisfied with physicalism. The Russell–Eddington argument escapes the previously mentioned problems faced by dualism and physicalism. We have good reason to think that the physical world is ultimately grounded by something, but physics does not reveal what this might be. We do have acquaintance with something intrinsic, our conscious experience, which, as it happens, we currently struggle to find a way to place in the physical world. An elegant solution is to solve both problems with one move: Place consciousness as the intrinsic aspect that grounds our world. But this framework also faces its challenges. Most applications of this argument lead us to consider whether subatomic particles possess some rudimentary degree of consciousness. The notion that even electrons might be conscious is unpalatable to many. However, many philosophers of mind are more concerned about the combination problem: How do we explain how sentient particles combine to create the rich conscious states with which we are familiar. Goff surveys a number of promising approaches that might help panpsychism overcome this obstacle.

I submit there is another area of panpsychism deserving of

attention that Goff omits here: cosmopsychism. This view builds on Schaffer's (2010) argument that we should understand the universe as a fundamental whole that is ontologically prior to all its parts. Schaffer's argument is based on our understanding of quantum entanglement, that the most basic properties and constituents that our reality comprises are ultimately nonseparable, a fundamental whole at the level of a universal quantum field. Arguably, applying the arguments of Russell and Eddington to this universal quantum field leads us to a universal consciousness; all conscious beings in the universe are thus aspects of this conscious cosmos.⁴ As it happens, Goff (2017) has done excellent work in this area as well, which he discusses in some depth in his more academically oriented book *Consciousness and Fundamental Reality*. Unfortunately, this version of panpsychism is left out of *Galileo's Error*. But to be fair, cosmopsychism is arguably a minority view within panpsychism, which in turn is currently a minority view among philosophers of mind. Perhaps Goff was a bit wary of drawing the "incredulous stare" in a book aimed at a broad audience.⁵

I suspect some readers will hold some interest in cosmopsychism. A framework where our consciousness is ultimately rooted in the nonlocal, higher-dimensional "space" of the quantum field holds some promise for understanding the psi data. Perhaps we might understand examples of anomalous cognition such as telepathy and remote viewing through such a nonlocal field through which we are linked. The physicist David Bohm (2006) suggested that precognition might be understood as an ability to be aware of potentialities from this foundational field. Bohm also speculated that the nonlocal, high-dimensional space of the wave function was likely a neutral foundation for both consciousness and matter (neutral monism).⁶

Given the deep problematic nature of determining the right framework for understanding consciousness, one might ask: Why does it matter? One of the pleasant surprises of Goff's book is his exploration of the contribution panpsychism might make toward a greater sense of meaning. He suggests that alternative frameworks such as dualism and materialism encourage a sense of disconnection with our world. In the case of dualism, our soul or consciousness is commonly depicted as tenuously connected to the physical world. Descartes famously believed non-human animals were mere mechanisms. Materialism

also arguably fosters a view of the world as mechanistic from which we feel separated. Goff suggests this sense of separateness from our environment has contributed to a crisis of meaning. But panpsychism appears to offer a profound reorientation, according to Goff. The world is teeming with consciousness, including in places we have not yet imagined. To explore this possibility, Goff briefly reviews a growing body of fascinating evidence on communication between plants within forests. Rather than being something of an anomaly occurring only in our brains, panpsychism supports a view where consciousness is ubiquitous.

For Goff, panpsychism has implications in other areas of vital interest. The possibility that consciousness exists at fundamental levels suggests that our experience of free will may not be illusory, as more conventional theories often suggest. First, he argues why conventional arguments against free will are substantially less compelling than is typically thought. Then, he explores how sentient particles may possess some degree of agency, and this in turn suggests that higher forms of life, who have richer conscious experiences, may possess free will. Goff also explores how panpsychism (depending on what physics theories turn out to be correct) may ultimately affirm what the mystically oriented have described as a deeper reality where our consciousness is connected. This suggests for Goff a stronger foundation for moral truth and ethics. That is, a deeper reality of nonlocality or oneness suggests a stronger basis for compassion and selfless acts than what can be obtained from more materialistic theories. Further, Goff raises the possibility that this deeper, more profound level of consciousness may support some aspect of our being surviving bodily death.

Overall, Goff provides a highly accessible wealth of ideas on consciousness that genuinely attempts to expand our notion of what science can be. And his explorations suggest this might bring not only a richer understanding of the world, but also a greater experience of meaning.

NOTES

- ¹ Goff here focuses on substance dualism, rather than on property dualism, and he characterizes property dualism as the view that all things are physical, but some of these physical things (such as our

brains) have physical and non-physical characteristics or properties. However, we should perhaps recognize alternative versions that arguably fit with such anomalous data such as OBEs and accounts of past life memories. For this, we might see some kind of intrinsically undifferentiated “stuff” that is the basis of the physical or the mental, neither of which reduces to the other. Thus, property dualism might remain monist (in contrast to substance dualism) while also avoiding privileging either physical or mental kinds of stuff.

- ² Frankish is good friends with Goff, although the two remain polar opposites in their respective theories. As of this writing, the two have aired quite a few debates on Twitter, providing their Twitter followers with contrasting perspectives on consciousness.
- ³ It might interest some to note that Frankish, in making his argument to deny the reality of consciousness, compares conscious experience to psychokinesis. Psychokinesis, Frankish argues, is more likely the result of a mistake or a trick rather than something real that needs to be explained through a radical change in our scientific understanding of the world. And it is similarly the case with consciousness, he argues (Frankish, 2016, pp. 12–13).
- ⁴ Arguably, cosmopsychism has the resources to avoid the combination problem. However, it faces another obstacle, which is the decombination problem: how different kinds of conscious states arise from a conscious cosmos.
- ⁵ To be doubly fair, Goff discusses what might be described as a close cousin to cosmopsychism later in the book in a section entitled *Spirituality Naturalized* (pp. 206–210).
- ⁶ I’ve recently explored a panpsychist version of Bohm’s implicate order that I believe fits well with the psi data (Williams, 2019).

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