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On the Evolution, Science, and Metaphysics of Consciousness

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Abstract

In this article, I defend and expand my evolutionary account of consciousness developed in *A Philosophy for the Science of Animal Consciousness* against four critical replies. I respond to de Weerd's challenge to the evolutionary bottom-up approach, clarifying what it entails. I address Sachs's discussion of autopoiesis and enactivism, distinguishing my naturalistic framework from these alternatives. I engage Frankish's concerns about my remaining Cartesian commitments. I reply to Suzuki's prediction-based alternative to my evaluation-first view of consciousness, his criticism of my discussion of disunity, and his scepticism that consciousness is an adaptation. Finally, I address Chincarini's comments on the connection between the pathological complexity thesis and animal welfare science.

Keywords

consciousness, adaptive behaviour, evolution, subjective experience, pathological complexity

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Introduction

This article offers a defence of the ideas of my book *A Philosophy for the Science of Animal Consciousness* (Veit, 2023a) against five critical commentaries by Christian de Weerd, Carl Sachs, Keith Frankish, Daichi Suzuki, and Matteo Chincarini.

Because the special issue on my book has been spread across two issues, Sachs's (2024) commentary can be found in *Special Issue*: *Pathological Complexity and the Function of Consciousness in Nature*: *Part I* (Volume 33, Issue 3, June 2025 of Adaptive Behavior), whereas the commentaries by de Weerd, Frankish, Suzuki, and Chincarini, can be found in *Part* 2, that is, the present Volume.

I am very thankful to their contributions, and I will begin by responding to de Weerd's challenge to very idea of an evolutionary bottom-up approach, clarifying what such an approach entails and correcting several mischaracterizations. In the subsequent section, I turn to Sachs's discussion of autopoiesis and enactivism, using it as an opportunity to articulate more explicitly what distinguishes my views and the naturalistic philosophy of nature motivating the pathological complexity thesis. In section after that, I address Frankish's concerns about the metaphysical commitments of an evolutionary explanation of consciousness centred on hedonic valence, explaining why my framework does not rely on the problematic Cartesian assumptions he identifies. Across the following three sections, I engage with Suzuki's prediction-based view of consciousness as an alternative to an evaluation-first view of consciousness, his criticism of my views on the disunity of consciousness, and his scepticism about consciousness as an adaptation. Finally, I reply to Matteo Chincarini's commentary concerning animal welfare science, expanding on how the framework can guide welfare assessment across species. Together, these exchanges provide me with an opportunity both to clarify and to develop the pathological complexity thesis further.[1]

On the Very Idea of an Evolutionary Bottom-Up Approach to Consciousness

Scholarly engagement with and interest in the pathological complexity thesis (PCT) has largely come from animal researchers interested in animal consciousness and other researchers working on the evolution of consciousness (Veit, forthcoming). This is why, to my initial surprise, I have encountered relatively little pushback on the very idea of using an evolutionary bottom-up approach to

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consciousness. Biologists like Sinha (in this special issue) readily embraced my proposal to "investigate other-than-human consciousness from an evolutionarily bottom-up perspective, casting aside our obsessive preoccupation with the complexities of human consciousness, and seeks to understand the adaptive origins of even the most minimal forms of subjective experience" (Sinha, 2025, p. 2). However, I expected more philosophers to question the very idea of an evolutionary bottom-up approach for consciousness research since philosophers have historically been quite hostile to the idea that evolutionary reasoning had anything to contribute to philosophical problems. So I am glad that Christian de Weerd has taken this opportunity to articulate a philosophical challenge to an evolutionary bottom-up approach to consciousness (De Weerd, 2025; de Weerd & Dung, 2025).[2] Because this issue concerns the very motivation not only of the pathological complexity thesis but of the broader project of situating the mind within a Darwinian view of the world, I shall address these fundamental objections to my work first.

In his essay on my book, de Weerd is correct to describe what I try to achieve as a "*Copernican shift* in consciousness science" (De Weerd, 2025, p. 1) that aims to fundamentally change how we study consciousness:

> The book is engaging and contributes to what is, in my mind, one of the most well-developed and compelling explications, and defenses, of a bottom-up evolutionary (BE) approach to scientifically studying consciousness so far. Moreover, not only does Veit develop a methodology for studying consciousness, the cherry on top is that he also puts it to use to motivate hypotheses about the origin (i.e., consciousness arose during the Cambrian explosion), function (i.e., that the function of consciousness is to enable animals to deal with high pathological complexity), and nature (i.e., consciousness is fundamentally associated with a particular evaluative system that utilizes [valenced] consciousness as a common currency). (De Weerd, 2025, pp. 1–2)

However, while de Weerd agrees that evolutionary considerations have received too little attention in the field, that we should focus more on the contents of animal experience rather than merely on whether a species is conscious at all, and that we cannot rely solely on human research to understand consciousness, he disagrees with the more radical shift I advocate. He believes that a top-down experimental approach (TE-approach) can adopt many of my ideas in a more moderate fashion without having to be abandoned, and that it is not inherently incompatible with a "gradualist and evolutionary treatment" (De Weerd, 2025, p. 2). One immediate response is that I am quite happy to see people move away, in any way or form, from the human-centric study of consciousness that currently dominates the field, even if they do not fully embrace my own views. There are, after all, many positions between a radically human-centric top-down approach and a radically bottom-up one, and I am optimistic that the field is gradually moving towards treating consciousness no differently from other biological phenomena. But de Weerd also maintains that the evolutionary bottom-up approach isn't even in a better position to make "progress on questions about consciousness' function, distribution, and origins" (De Weerd, 2025, p. 2), which I believe is misguided and rests on several misunderstandings about the nature of such an approach. So, I will aim for something stronger here to convince readers that a bottom-up approach to consciousness is the correct approach after all and criticize what I believe is a mischaracterization of it.

The Non-Evolutionary Top-Down Approach to Consciousness

As de Weerd acknowledges, consciousness research is dominated by a top-down experimental approach based on human studies focused on verbal reports, though he also includes work on closely related species such as chimpanzees. What he fails to note is that this already reflects a significant shift the field has undergone over the past several decades, moving away from the earlier assumption that animal consciousness could not be studied and would forever remain elusive.

But he is right to describe the top-down approach as essentially ahistorical: it attempts to understand the past (if at all) through the present, rather than the other way around. We construct a theory of human consciousness through experimental paradigms that distinguish conscious from unconscious brain processes, develop mechanistic accounts based on ideas such as information integration, prediction, or global broadcasting, and then apply these accounts to non-human cases, whether animals or AIs.

De Weerd is also right to emphasize that there is a moderate strategy under the top-down banner that is gaining increasing popularity described as *iterative natural kind reasoning* (Bayne et al., 2024; Mckilliam, 2025) or *theory-neutral approach* (Birch, 2020). Here, we begin by treating human introspective reports as a provisional anchor point and then examine which behavioural capacities or neural patterns reliably accompany those reports, such as trace conditioning and cross-modal integration (Birch, 2020). By repeatedly testing these associations in new targets, including diverse non-human species, we can both broaden the set of traits linked to consciousness and refine or revise the indicators we previously relied on, all without committing to a full theory of consciousness. Yet because this strategy remains anchored in a human starting point, de Weerd is correct to identify these approaches as still fundamentally top-down.

Integrating Consciousness into Biology

I suspect it is partly the presence of these more moderate views that leads de Weerd to misunderstand the evolutionary

approach. He portrays a bottom-up framework as if it must be entirely disconnected from evidence about human consciousness, and then expresses surprise when I draw on such evidence. But this is no more coherent than claiming that a Darwinian account of the evolution of eyes, immune systems, skeletal structures, or culture is not truly Darwinian because biologists continue to rely on human data. Evolutionary explanations have always integrated evidence from humans alongside evidence from other species; the bottom-up approach to consciousness is no different. I also disagree with what de Weerd characterizes as *the* essence of a bottom-up approach:

> The defining feature of the BE-approach (de Weerd & Dung, 2025, p. 13): On a BE-approach, our understanding of human consciousness should ultimately foundationally and primarily be informed, or anchored in, an understanding of consciousness most humble beginnings based on evolutionary evidence as an independent source of evidence. (De Weerd, 2025, p. 4)

Again, no Darwinian holds that an evolutionary study of a biological trait must overturn our understanding of the human version of that particular trait. Of course, it is possible and often likely that the evolutionary history of the immune system will illuminate features of the human immune system, but that is not the primary motivation. Studies of the human immune system yield a theory of the human immune system, not of immune systems as a broader natural phenomenon more generally. Similarly, a top-down approach to consciousness may well continue to advance our understanding of human consciousness. But a bottom-up approach does not preclude making use of human evidence; such evidence can inform historical evolutionary reasoning. The question, then, is why consciousness should be treated differently from other biological phenomena. After all, the study of biological phenomena has been revolutionized precisely by the Darwinian tools that distinguish biology from physics and chemistry: the historical study of natural selection, functional analysis, and phylogenetic diversity.

To deprive consciousness science of these resources puts it in the same position as pre-Darwinian biology, which was of course a much more impoverished field. I don't object to the mainstream approach because it must fail to elucidate human consciousness, but because it will leave us with a mistaken understanding of consciousness as a much broader natural phenomenon, and that is a problem similarly shared with the more moderate iterative natural kind reasoning approach.

Thus, it seems to me that de Weerd is attacking a strawman version of the bottom-up approach, much as if one were to argue that evolutionary biology has little relevance to understanding biological traits in general. I argue that frameworks built around features of consciousness that are inevitably unique to human consciousness mainly highlight traits that shape our distinctively human experiences. Those features do not reveal much about the more rudimentary kind of consciousness that preceded and eventually gave rise to ours. If we ground our general theories of consciousness too heavily in human data, we risk mistaking what is unique to us for what is basic to consciousness itself, including its simplest manifestations. One of the reasons I discuss a lot of work in human consciousness is to demonstrate that the faulty assumption that consciousness is an all-or-nothing property is mistaken, and that its diversity even in our own species should make us pause to think about how it may differ in other species.

Another reason to draw on evidence from humans is to use a biological reverse-engineering approach. It is not the case that the "evidence from the lifestyle changes or organisms during the Cambrian explosion support the PCT" entirely "independently, without relying on any evidence from the experimental paradigms that TE-theories appeal to, and without relying on other antecedent assumptions about consciousness' function" (De Weerd, 2025, p. 3). While de Weerd acknowledges that I make use of evidence coming from the experimental paradigms developed in the top-down human-centric tradition, as well as experimental work on living animals, he is almost suggesting that these sources of evidence become irrelevant when the shift towards an evolutionary bottom-up approach is taken. But that is a mistake.

Reverse engineering is bottom-up in that it seeks to explain the gradual emergence of complex phenomena by breaking them into their constituent parts or layers. But this does not preclude drawing on experimental research in complex systems to inform that process. I do not assert that the top-down approach "fails to gain *any* traction on consciousness-related questions" (De Weerd, 2025, p. 3). Nor do I advocate that we should "abruptly remov[e] the influence of insights about human consciousness by suggesting that hypotheses about the function and origin of (minimal) consciousness can be independently justified by various bottom-up evolutionary considerations" (De Weerd, 2025, p. 3). The ultimate goal, however, is to shift attention to questions of function, phylogenetic diversity, and evolutionary origins: questions that must be central to any genuinely biological study of consciousness.

For the evaluation of alternative proposals on these questions, evolutionary considerations do indeed provide "independent and credible source of evidence that can directly support hypotheses about the function and origin of minimal consciousness" (De Weerd, 2025, p. 4). Of course, proposals on the function of consciousness should take into consideration our best evidence about what the lifestyles of animals in the past involved that would have required consciousness to evolve. Explanations of consciousness that fail to explain how different types of experiences could have evolved from earlier ones, have prima facie less going for them than other such accounts. If an hypothesis on the origins of consciousness can become an explanation and

predictive tool for significant changes in the history of animal life, rather than just a strange (epi-)phenomenon we may wish to explain out of curiosity, but with no real relevance to the rest of biology, than such a theory of consciousness would be much better embedded within and coherent with existing biology. There should be nothing "ultimately problematic and unconvincing" (De Weerd, 2025, p. 7) about this.

The demand that this approach must provide independent evidence "without also directly or indirectly relying on insights about consciousness in humans, and without making any controversial assumptions about consciousness' nature" (De Weerd, 2025, p. 4) is an artificial straw-man. It is akin to insisting that evolutionary biologists would not really explain the gradual evolution of the eye in a bottom-up manner if they continued to draw on experimental, mechanistic, and developmental research on human eyes. Yet, it appears that de Weerd wants to insist that bottom-up approaches are not allowed to make use of evidence generated by other means since he criticizes that I evaluate alternative evolutionary scenarios by "resorting back to relying" on evidence generated by the traditional top-down approach, suggesting that it "is hard to see how he can in principle" (De Weerd, 2025, p. 4). Of course it is hard. No evolutionary biologist would tie their hands behind their back to do research. Science doesn't work in a vacuum but within the context of a complex network of theories and data, and all of the evolutionary reasoning involved in a bottom-up approach can and should draw on this network. In contrast, it is the top-down approach that seeks to insulate consciousness research in order to avoid the very resource that has enabled biology to make progress on complex phenomena: the theory of evolution. It is the top-down strategy that foolishly aims to preserve objectivity and avoid speculative evolutionary reasoning by distancing itself from biology itself. But that is not how consciousness research could ever become an integrated, interdisciplinary, and successful science. Thus, the spear is turned around. Contrary to de Weerd's assertion, it is the traditional human-centric approach that fails to provide a convincing case for why we should treat consciousness differently from all other biological phenomena.

I suspect the hesitance to take this Darwinian turn in consciousness science is due to the historical and still existing scepticism against the field as a whole, with consciousness 'science' really only recently gaining a status of acceptability among the cognitive sciences. The field has long been incentivized to appear as objective as possible to avoid the charge of being based on pure speculation. Since evolutionary reasoning about the origins of complex phenomena always begins with theorizing that is inherently speculative to some extent, it is no surprise that consciousness researchers wanted to avoid putting it centre-stage. But the speculative nature of evolutionary biology is not unscientific, it is inevitable given sparsity of data about the distant past. What is important, is to accumulate more evidence to support alternative hypotheses and models as I explain in my introductory book to modelling in evolution (Veit, 2025a). Yet, de Weerd maintains a strong aversion for such reasoning:

> What the BE-approach seems to lack, and where the TE-approach clearly seems to have an edge, is the tools to disentangle conscious from non-conscious processing directly without making too many controversial assumptions about consciousness. For instance, the aforementioned experimental paradigms that TE-proponents use to directly disentangle conscious from unconscious processing rely on fairly modest assumptions, such that consciousness (in humans) contributes to verbal reports or that consciousness facilitates some cluster of cognitive abilities (Birch, 2020). On a TE-approach, these fairly innocent assumptions are enough to get the disentangling project off the ground. But none of this is available to Veit, at least if he wants to maintain the claim that evolutionary considerations independently support the PCT. (De Weerd, 2025, p. 4)

Again, the bottom-up approach has access to all the resources available to the top-down approach. What must be distinguished, however, is the additional role that evolutionary considerations, such as facts about the Cambrian explosion, the evolution of nervous systems, or the lifestyles of ancestral animals, play in providing constraints and evidence for alternative views about consciousness. In this respect, the evolutionary bottom-up approach has at least as much leverage in disentangling conscious from unconscious processing. But it also holds that evidence from humans becomes increasingly unreliable for distinguishing conscious from unconscious processing in non-humans as we move further away from ourselves on the tree of life. De Weerd concedes this in a footnote, but maintains that it can nevertheless lead to a gradual iterative process by which we move "our way backwards to understand more primitive functions of consciousness" (De Weerd, 2025, p. 8). If this concession is made, however, there is no unique benefit to the top-down approach. It just shows how it limits itself by eschewing the tools of evolutionary biology that have helped us to understand the origins of so many other complex biological phenomena. The bottom-up approach does not only not lack "the tools to adjudicate between hypotheses about conscious and non-conscious processing" (De Weerd, 2025, p. 5), but it has more available to it. Perhaps, de Weerd may be stuck in the gravity of the Cartesian paradigm that denies any access to consciousness beyond our own experience. Unfortunately, as I shall argue later, this is a paradigm that has been incredibly influential in the top-down approach.

Finally, de Weerd also offers a criticism on the connection between the PCT and the distinction between conscious and non-conscious valence, and whether the

Cambrian may have seen the origins of nonconscious evaluative mode of being. Since similar comments have been made by Pober (2025) and Fischer and Barrett (2025) in a different special issue on my book in the journal *Philosophia* (Veit, 2025c), I shall address this problem there, rather than just repeat myself here.

Naturphilosophie, Philosophy of Nature, and the Autopoietic Tradition

Let me now turn to a commentary by the philosopher Carl B. Sachs, who kindly offered the following description for my book: "the Gordian knot of consciousness met the sword of Darwinism as capably wielded by Walter Veit" (Sachs, 2024, p. 1). While I am not the first to offer a Darwinian approach to consciousness, Sachs praises my engagement with the sciences, and unashamed biological approach that seeks for the strongest candidate of a naturalist explanation of consciousness. He characterizes my book as a contribution to as distinct kind of philosophy dubbed by Godfrey-Smith as a *philosophy of nature*. For clarity, let me cite a longer version of what can be found in Sachs's quotation from Godfrey-Smith:

> When doing philosophy of nature in my sense, a writer comments on the overall picture of the natural world that science, and perhaps other types of inquiry, seem to be giving us. But this commentary does not have to use language in the same way that scientists find convenient for their own work. It can use its own categories and concepts, concepts developed for the task of describing the world as accurately as possible when a range of scientific descriptions are to be taken into account, and when a philosophical concern with the underlying structure of theories is appropriate. The claims made by a good philosophy of nature do have to be consistent with the claims made by science. But the concepts employed by a good philosophy of nature do not have to be the same as those used in the relevant science, and the organization and presentation of information in the two projects can be quite different. (Godfrey-Smith, 2001, p. 284)

In my book, I make explicit reference to Godfrey-Smith's conception of philosophy of nature as one I am influenced by, and Sachs is right to note that other philosophers, such as Dennett and Sterelny, have followed a similar approach. Yet, I do not go into much detail of what this entails, contrasting it merely with older more romantic conceptions of German *Naturphilosophie*. Thus, I shall engage here in a bit of metaphilosophical reflection to address Sachs's comments regarding my treatment of autopoiesis theory focused on the self-organization of autonomous biological systems and its "related tradition of enactive cognitive science or enactivism" (Sachs, 2024, p. 2).

While I describe autopoiesis as a direct non-Darwinian competitor to the pathological complexity thesis, Sachs maintains that we need to be careful to distinguish between what he describes as two phases of autopoietic theory. Firstly, *autopoiesis* 1.0, developed by Humberto Maturana and the early Francisco Varela (Maturana & Varela, 1980), which largely bracketed external environmental influences and positioned itself in opposition to Darwinian explanations of life as well as teleology; and secondly, *autopoiesis* 2.0, shaped by Varela's later engagement with the German phenomenologist Hans Jonas, which sought to revise the original model by naturalizing biological teleology, and has inspired other names like Thompson (2007). If we look at the history of autopoiesis, we find a complex picture of many names and different ideas, and Sachs insists that I miss out on "important differences between" these two iterations (Sachs, 2024, p. 2).

As Sachs points out, while its current form familiar from enactivism "has become associated with the rejection of a mechanistic worldview, the original formulation of autopoiesis was an attempt to establish a mechanistic biology by specifying the specific kind of mechanism that all constitutes all and only organisms" (Sachs, 2024, p. 4). But while autopoiesis 1.0 rejects teleonomic explanations and treats all life as cognitive, Sachs maintains that it isn't a "genuine rival" to the pathological complexity thesis (Sachs, 2024, p. 3). He notes that while the work of scholars like Lyon (2006, 2015) appears influenced by their work, cognition may well exist in all organisms without contradicting anything I say about consciousness. While I agree with Sachs that there is no in-principle conflict here with my thesis, many seem to expand these cognitive arguments to infer sentience even in bacteria (Reber, 2019), failing to make just this distinction, which is also illustrated by Yilmaz's commentary (Veit, forthcoming). Then again, I am happy to grant this is simply a tempting mistake, not one that is inherent to autopoiesis 1.0.

Furthermore, Sachs argues that Maturana and Varela insist that (i) Darwinian explanations cannot reveal the nature of organisms since they presuppose the autonomy of the organism, and therefore cannot explain it, as well as that (ii) the environment plays no constitute part in the organism, which need to be understood as purposeless autopoietic machines. However, both claims are wrong and are in conflict with the pathological complexity thesis. Firstly, Darwinian evolution has successfully provided several models for how biological autonomy may emerge via Darwinian means (Veit, 2022c). Secondly, as the success of the Darwinian revolution revealed, it is only once we began to see organisms embedded in their external environments that we really began to understand them (Veit, 2022b). It was only in light of Darwinism that we were able to develop a true philosophy of nature in the older German sense of Naturphilosophie to make sense of nature, without the need to engage in suspect metaphysics. In some ways, I therefore see my project closer to this stronger sense of philosophy of nature, than Godfrey-Smith's minimal sense which only

requires one to comment on the natural world through the lens of science.

Autopoiesis 2.0, Sachs argues, reshapes its opposition to teleology as now treating autopoiesis as a naturalization of teleology, and expands its cognitive view of the living world to a broader biopsychist view assigning sentience to all life (Thompson, 2022). Here, the conflict with the pathological complexity thesis lies in its natural opposition for a gradualist explanation of how hedonic evaluations emerged in the history of animals. However, Sachs maintains that I am not engaged in the same project as Thompson and other contemporary biopsychists, who are much more firmly rooted in phenomenology than the naturalist philosophy of nature found in the writings of Dennett and Godfrey-Smith, despite claiming the label for themselves (Gallagher, 2017; Meyer & Brancazio, 2022). Here, they are closer to what ultimately doomed German Naturphilosophie: a prioritization of phenomenology and romanticist philosophical armchair theorizing. But since this sounds very harsh, I would also like to praise it for its insistence that a philosophy of nature needs to include subjective experience, which has often been neglected by attempts to offer a naturalistic view of the world. Like a pendulum that has swung too far in both directions, I see the philosophy of nature I develop as carefully situated between the excesses of behaviourism and biopsychism. I aim to retain the insights each tradition offers while discarding what I take to be the misguided elements in their attempts to make sense of the world and consciousness's place within it. Thus, like Sachs, I believe that the pathological complexity thesis "deserves the full attention of biophenomenologists, neurophenomenologists, and enactivists—not only for the similarities but also for the productive conversations to be had exploring those differences" (Sachs, 2024, p. 4). It is in such dialogue that we'll be able to build a better philosophy of nature. So, I ultimately disagree with Sachs that I am (despite the title of my earlier book) just providing a philosophy for the *scientific* investigation of consciousness. I do not characterize science as a unique form of investigation, rather I treat it as whatever we uncover to be the best practices to unveil the nature of reality. Thus, my book aims to provide a philosophy of nature in the ultimate sense of understanding the world.

Cartesian Gravity, the Hard Problem, and the Metaphysics of Consciousness

I shall now turn to the metaphysics of consciousness, which I have only briefly discussed in my first monograph. My commentators are entirely right to point out that I did not get bogged down by the philosophical literature on the hard problem. Sachs is right when he notes that those taking it seriously may change their views after reading my book by "nudg[ing] their intuitions into seeing the hard problem as more of a pseudo-problem" (Sachs, 2024, p. 1). But Frankish maintains that despite my best efforts to escape what he describes as the *Cartesian paradigm* reflected in the influential writing of David Chalmers, Thomas Nagel, and Ned Block, who insist on the idea that subjective experience cannot be captured in functionalist descriptions, I sometimes display a residual influence to the mistaken idea of *qualia*, perhaps remaining caught at the edge of Cartesian gravity (Frankish, 2025). He argues that while I am "operating firmly within the post-Cartesian paradigm" he feels that I am weakening my "case by making rhetorical concessions to the Cartesians" and hopes to use his commentary to press me on these issues (Frankish, 2025, p. 4). While we have discussed our disagreement in personal communication, this article will offer me the chance to reply in much more depth. To respond to Frankish's charge let me first examine the commitments of the Cartesian paradigm.

Cartesian Gravity

To those caught in *Cartesian gravity*, to borrow a term by Dan Dennett, subjective experience is seen as closed off to the third-person tools of modern science (Dennett, 2017). Consciousness is seen as "*irreducibly subjective*, in the sense that they are accessible only to the subject of the experience" whose experiences shape a "private mental world, where qualia are directly revealed to a self or subject, whose own nature typically remains unspecified" (Frankish, 2025, pp. 1–2). As Frankish is right to point out, this idea can be traced back to René Descartes, who was the most influential in defending the primacy of consciousness, that subjective experience is the only thing we can have certain knowledge of.

While intuitively plausible, I agree with Frankish that this paradigm has been damaging to the development of a scientific study of consciousness. Dennett himself called the residual dualist idea of a place in the mind where all comes together for an observer mockingly the *Cartesian theatre* (Dennett, 1991). But the most significant residual from the dualism of Descartes is the continued emphasis on a supposedly unbridgeable *explanatory gap* between subjective experience and the facts uncovered by science (Levine, 1983) or as Chalmers called it: *the hard problem of consciousness* (Chalmers, 1995). No matter how much progress the sciences of the mind make, qualia are seen as "private observables" that are "neither public observables nor theoretical posits introduced to explain observations" and thus cannot be captured through science (Frankish, 2025, p. 2). According to the Cartesian paradigm, Frankish argues, neuroscience "will need to be supplemented by a metaphysical theory of how the public world of brain processes is related to the private world of qualia" (Frankish, 2025, p. 2). This, as Frankish points out, would not just be an obstacle to my evolutionary approach to consciousness, it would make it impossible. As Frankish notes, an evolutionary account would require us to identify adaptive benefits of qualia:

> But anything that makes a causal difference is experimentally detectable and can be treated as a theoretical posit defined by its causal role. And any theory couched in such terms would omit properties that are irreducibly subjective. Anything irreducibly subjective will slip the net of evolutionary explanation. (Frankish, 2025, p. 2)

Frankish argues that the Cartesian paradigm is incompatible with the evolutionary bottom-up and animal-centric approach to consciousness that I favour. Since our only access to consciousness is supposed to be through our own subjective experience, we are forced to extrapolate from the human case. While science can compare brain structures and functions across species, it cannot tell us whether the relevant similarities are the ones that give rise to subjective experience. As Frankish points out, this judgement depends on the metaphysical theory one adopts about the relationship of matter and mind. And since there does not appear to be any consensus emerging on this question Frankish is right to lament that the Cartesian paradigm appears to force us to accept that "consciousness exists in a parallel realm whose connection with the biological one is obscure, and the prospect of finding any theoretical consensus about animal consciousness is slim, to say the least" (Frankish, 2025, p. 2). This is arguably why consciousness science has been so resistant to an evolutionary bottom-up approach as illustrated in de Weerd's (2025) strong resistance to it.

Am I an Illusionist?

Alongside Dennett, Frankish has been one of the most forceful critics of the Cartesian paradigm, asking us to think of phenomenal properties and qualia as theoretically misguided concepts of a bygone era similar to magical properties humans once endorsed to explain events in the natural world. Not surprisingly, Dennett's book *Consciousness Explained*, was often dubbed *Consciousness Explained Away* by critics (Bishop, 2003), seemingly asking us to strip the magic out of consciousness by reducing conscious states entirely to the causal functional roles within the brain. This move appeared too radical to many. Yet, the problematic assumptions of the Cartesian paradigm led to even worse "internal problems, which have led its advocates to adopt increasingly extreme positions, such as the *panpsychist* view that all matter is conscious" (Frankish, 2025, p. 2). While vastly implausible and absurd to many, indeed significantly more so than the *illusionist* view of Dennett (1988) and Frankish (2016, 2017) that eliminates qualia altogether, panpsychism has been promoted by the most influential names in the Cartesian paradigm, such as Nagel and Chalmers.

Frankish considers illusionism to constitute a post-Cartesian paradigm and hopes to make me sign up for it wholesale. As I emphasize in my book, I am much more interested in the hard question by Dennett (2018) than the hard problem. What does consciousness do for the organism? Who benefits? All throughout my book, I follow a Dennettian post-Cartesian approach to consciousness, trying to figure out what the variations of subjective experience may allow organisms to do, as well as, and perhaps more importantly when it is harmful to the organism as a Darwinian agent. Yet, Frankish is right to point out that I continue to use the lingua franca of the Cartesian paradigm, such as 'qualia' and 'phenomenological properties'. He notes that I employ Churchland's (2002) call to engage in empirical study of paradigmatic cases, rather than get bogged down in philosophical analysis of the concepts of consciousness itself, and acknowledges that I am trying to naturalize the aforementioned terms central to the Cartesian paradigm in scientifically unproblematic ways. However, Frankish believes that there is a fundamental difference between pre-theoretical terms like 'water' and 'qualia':

> These are not empirical concepts in the ordinary sense. We can't get together and point to uncontroversial examples of qualia, as we can with koalas; each of us would have to point inwards to something unobservable to the others. Rather, they are philosophers' notions. Qualia are supposed to be intrinsic properties, which resist functional analysis and are not entailed by facts about structure and dynamics. And the term 'phenomenal consciousness' was coined specifically to mark a contrast with a functional form of consciousness (Block, 1995). To use these terms for functional properties invites misunderstanding and accusations of failing to address the real problem. (Frankish, 2025, p. 3)

Here, I think Frankish gets things backwards. Is it not illusionists like him and Dennett that receive the accusation of avoiding the real problem more than anyone else? Does avoiding terms used by Chalmers and Nagel really help us to address the mysteries of consciousness? While I consider myself a post-Cartesian, have defended illusionism, and even described myself as an illusionist elsewhere, fully agreeing with the view that our understanding of the nature of consciousness is distorted through introspection, I also noted that I usually do not use the label because it so often invites misunderstanding (Veit & Browning, 2023a). But it also reflects a disagreement between me and Frankish about when to revise or replace concepts.

Unlike discarded scientific concepts like 'phlogiston', the terms illusionists are eager to replace are too tied up with subjective experience to cede the territory and be accused of not really addressing the hard problem. I do not have that much reverence for the history of terms to think that their meaning is forever fixed. Frankish is right of course that these terms are often deliberately defined though often somewhat hidden in a way that makes them immune to "revision in the light of scientific theorizing, as empirical concepts and theoretical constructs are" (Frankish, 2025, p. 3). Later, Frankish notes that a neutral term not associated

with the specific conceptions of Cartesians would be useful, such as his proposed term of "quasi-phenomenal properties" (Frankish, 2016), but insists that we would be better off using a new one altogether "rather than trying to repurpose theoretical terms deeply embedded in a fundamentally different paradigm" (Frankish, 2025, p. 4). Here, I simply have a deep disagreement about the nature of concepts altogether.

What to Do With Concepts?

In my naturalist meta-philosophical view all concepts are open to revision. When Cartesians insist that we already know the "essence of a pain quale" and that "empirical investigation won't enlighten us further" (Frankish, 2025, p. 3), they are simply mistaken, even if they have built these ideas into their definition of 'quale.' Definitions are a mere tool to understand phenomena: they are always open for revision, lest we condemn ourselves to engage in mere analysis of the higher-order truths of chmess as an arbitrary variation of the rules of chess (Dennett, 2006). Yes, it is a game that can be entertaining, intricate, and used to demonstrate the ingenuity of philosophers, but it is not one that helps us to understand the world. In a sense then such an activity is not philosophy.

Strange theories like panpsychism (Goff, 2017) or the Integrated Information Theory of Consciousness (Tononi, 2012) may be intriguing and even constitute useful avenues of research *under the right conditions*, but if they are based on unquestionable (rather than revisable) axioms, they are not just unscientific, but they are no longer part of intellectual inquiry into reality altogether. If qualia had their essences revealed to us in introspection, as Tononi and Goff claim, then why are there such major disagreements about them, even when applying their preferred methodology of introspection. Frankish notes that Cartesians, such as Block, frequently "quote Louis Armstrong's remark about jazz: 'If you have to ask, you ain't never going to get to know'" (Block, 1978; Frankish, 2025, p. 3), but this is no more of an argument than religious folks who simply appeal to the unquestionable intuition of divine purpose. It is just faith. Indeed, I find it hardly surprising and somewhat ironic that Goff has recently turned to defend cosmic purpose and a limited God against a naturalist conception of the world (Goff, 2023). Frankish objects to my usage of terms like 'qualia', since it will give rise to confusion to treat them like any other theoretical term in science, but I couldn't disagree more. Cartesians, such as Goff, Tononi, and Block may profess puzzlement, of course, but they are perfectly able to understand the idea that consciousness is not all that it may appear from their own introspection, not least because there is plenty of disagreement even among Cartesians.

Our conception of 'energy' radically changed over the years, without requiring a new term. We once thought that life had a magical spark of vital life forces, indeed, treated this as an essence of the concept of life, but we have long overcome this view thanks to Darwin and molecular biologists. In the years between one may speak of quasi-life, sorta-design, the appearance of purpose, and other related terms, but once the sciences revolutionized our understanding of these phenomena, terms like 'design' are no longer tied to their original consensus definition of requiring a designer. Must we now speak of 'quasi-lions' simply because our concept of species has shifted from an immutable biological essence to an evolving population-level understanding? Of course not. Instead of eliminating the usage of old terms we can adjust their meaning. While I frequently refer to terms like "hemi-semi-demi-pseudo-proto-quasi-minds" (Dennett, 1995b, p. 108) and "semi-proto-quasi sentient creatures" (Veit, 2023a, p. 120), the goal is to capture instances between consciousness and its absence that an essentialist view based on human introspection misses out on. Indeed, I am even reluctant to admit something like a 'real occupation' in the multidimensional space of consciousness across nature, as if we could ever draw such sharp lines about any complex biological phenomenon in the tree of life. There is no sharp boundary between flight and gliding, but that doesn't mean that these are categories capturing important biological phenomena. Likewise, there are real phenomena in nature that give rise to our philosophical musings about 'qualia' and 'phenomenological properties', and whatever future science will reveal them to be is what these terms will henceforth reflect.

The Metaphysics of Hedonic Valence

However, Frankish also objects to my choice of terminology on more fundamental grounds:

> How do states of hedonic valence perform their work of motivating adaptive choices? Veit doesn't say explicitly, but he sometimes writes as if they do so in virtue of their experienced feel. He speaks, for example, of 'a commanding sensation' (Veit, 2023a: 74), 'an imperative plus or minus "feel"' (78–79), 'a psychologically real felt common currency' (84; italics in original), and 'some kind of "quasi-intrinsically" motivating states of hedonic valence' (85). This suggests a Cartesian view: valenced states have an intrinsic feel, a hedonic quale, which directly moves the organism to act. And that assumes a Cartesian theatre – or a Cartesian bureau de change – where the intrinsic value is presented to the organism, felt, and reacted to. Veit often talks of reducing the explanatory gap and minimizing the challenge of the hard problem (e.g. Veit, 2023b: 87, 114), as if acknowledging that an explanatory gap and hard problem still remain at the basic level of hedonic value. But if hedonic valence is irreducibly subjective, then the hard problem remains as hard as ever and the explanatory gap as wide. A tiny one-dimensional Cartesian bureau de change is just as much a challenge to a physicalist worldview and an obstacle to

> evolutionary explanation as a florid multidimensional Cartesian theatre. (Frankish, 2025, p. 4)

While he agrees with my focus on evaluation in trying to understand consciousness, Frankish worries that my account of hedonic valence risks smuggling in a miniature *Cartesian bureau de change*, instead of *Cartesian theatre*, but no less problematic. This challenge is an interesting one and merits scrutiny. Are these imperative feelings something presented to an inner subject who then *consumes* them? In my book, I deliberately avoided an explicit discussion of the metaphysics of consciousness, only dedicating a single paragraph to it:

> The pathological complexity thesis was ultimately intended as a teleonomic theory of consciousness, but it may also offer us some clues regarding the metaphysics of consciousness. In particular, we should plausibly think of consciousness in terms of something like a hybrid materialist-functionalist identity thesis that identifies the origin of consciousness with the origin of valence systems in multicellular animals, somewhere around the beginning of the Cambrian. To be such an animal simply means to be a subject with experience. Tracing the gradual evolution of Benthamite creatures from objects into subjects/agents makes the mystery of consciousness substantially smaller than it would otherwise seem. (Veit, 2023a, p. 120)

I will shortly turn to detailing this hybrid view in more detail. But before I do so, I will note that part of the reason I tried to avoid committing myself too strongly to any particular metaphysical view, was that the pathological complexity thesis is in principle compatible with a large variety of views on the relationship between matter and mind: be that a material identity view, a functionalist one, dualism, panpsychism, and so forth. Thus, even if a physicalist view of consciousness turns out to be mistaken, that would not invalidate the usefulness of the pathological complexity thesis for understanding the evolution of different variations of experiences across the animal kingdom.

A second reason I avoided discussing my metaphysical view in detail, is that the metaphysical literature on consciousness is often not making any real contribution to and, at worst, misguiding us in actually getting closer to understanding consciousness. Far too much weight is placed on dubious inconceivability arguments and thought experiments crafted to favour one position over another. The more important contribution philosophers can make is to help steer the scientific study of consciousness itself. Indeed, I think an anecdote Frankish gave in a podcast interview following Dennett's death will illustrate this point quite well, where he described a conversation between Dennett and the panpsychist Goff that took place during the Greenland consciousness cruise:

> Philip Goff: "Look, panpsychism doesn't contradict anything that you believe or that you want to say about how the physical world works, or about evolution, or about the kinds of evolutionary explanations you give. All of that's perfectly compatible with panpsychism. Panpsychism doesn't say it doesn't work like that. It just says there's an extra dimension, the intrinsic nature of all these processes that you talk about. So there are these evolved brain mechanisms which achieve all the effects, but there's also this intrinsic nature to them as well. So really, all I'm doing is seeking to expand on the kind of work that you do. And you could join us and still do everything you're doing, but you'd have this extra bit as well."
>
> Dan Dennett looked a bit mischievous and said: "Well, tell me is there any money for doing this extra work you're talking about? Is there any grant money available for panpsychism?"
>
> Philip Goff: "Well yeah, it's becoming quite popular. There's quite a lot of funding available for this."
>
> And Dan Dennett said, "Well then, it sounds quite attractive… because there's no work to do!"
>
> ([cleaned up version from an audio recording of Keith Frankish's recollection] The Human Podcast & Frankish, 2024)

Even if a view like panpsychism is compatible with the pathological complexity thesis, and I would of course welcome Cartesians of all stripes adopting my methodology and evolutionary explanations, I ultimately think that efforts to develop dualism, panpsychism, idealism, and related positions amount to little more than games of chmess. The purported difficulties for naturalist materialism or physicalism are, in fact, being steadily resolved, and they pale in comparison to the persistent problems confronting these alternative views, which remain much as they were in Descartes's day.

Thus, Frankish is right to demand a "positive naturalistic account of how states of hedonic valence motivate action – an account of their nature and causal powers, the systems that consume them, and so on" since readers "may plug the gap with the idea of intrinsically motivating qualia" (Frankish, 2025, p. 4). While adding intrinsically motivating qualia in the traditional meaning of the term to the origins of consciousness wouldn't be incompatible with the pathological complexity thesis, my own motivation is to offer a physicalist view account of consciousness. But to my suggestion that "we should plausibly think of consciousness in terms of something like a hybrid materialist-functionalist identity thesis" (Veit, 2023a, p. 120), Frankish notes that he has two potential objections:

> First, what is it that Veit wants to identify with material-functional states? It can't be qualia. How could something that is irreducibly subjective be identical with something that isn't? But what else could it be? If Veit means that qualia talk tracks material-functional states, then it would be better to put it

> that way. Second, why suppose that the identity is with something partly characterized in material terms, rather than with something wholly functional? Is there an aspect of consciousness that can't be cashed out in functional terms? If so, which aspect? Of course, the functions involved may be so fine-grained that only specific neural mechanisms can implement them, but that is still functionalism in a broad sense. (Dennett, 2005; Frankish, 2025, p. 5)

The first objection is answered by the longer quote from my book above, where I state that the origins of qualia are identical with the origins of (complex) valence systems. I do not cede definitional rights to Cartesians. If the term 'qualia' is meant to capture the subjective feel of experience, then we can identify hedonic experiences with the valence system of the brain.

Frankish's second objection urges me to endorse functionalism wholesale. As I note above, I do not think that the pathological complexity thesis inherently forces one to adopt one metaphysical position over another. While functionalism naturally fits perhaps most naturally with my approach, and its emphasis on the adaptive benefits of different kinds of experiences, a materialist identity view could also vindicate a physicalist worldview. But is Frankish ready to discard the possibility of a materialist identity theory already? That seems to go against his statement that "in the end, consciousness is what our best empirical theory of consciousness says it is" (Frankish, 2025, p. 2). That may well turn out to be an identity theory. Trying to answer these metaphysical questions strikes me as premature. Should we have engaged in a lot of metaphysical debates about the nature of life to settle the question before scientists began to uncover several plausible scenarios for how it may have happened? Like Patricia Churchland, I am convinced that the metaphysical question will end up resolving itself by simply doing the scientific work to progress our understanding of consciousness.

However, I am more optimistic about a hybrid approach taking the advantages from both an identity theory and functionalism to present the strongest case for a naturalist theory of consciousness. Functionalism in a broad sense narrowing in on the detailed neuroarchitecture may well be able to capture this, but I am not yet willing to bet, that identity views have nothing to contribute here. A hybrid view could allow us to integrate the best elements of both physicalist frameworks, using the resources of each to address objections more effectively than either could manage on its own.

Furthermore, I do not mean that their phenomenality exerts causal power *in addition to* their function. They are identical. Hedonic valence is a common currency of sharing evaluative information across multiple control systems to coordinate action control and selection. To 'feel bad' is not to host an entirely private sensation of badness but to occupy a coordinated regulatory state that ties a multicellular organism with high degrees of freedom together for goal-directed behaviour. What philosophers call 'hedonic feelings' is simply how such control architectures are *implemented* in the brain. In this sense, the *currency* metaphor is not Cartesian but cybernetic. The evaluative signals that structure consciousness act as a common currency through which diverse bodily and environmental feedback can be integrated, compared, and acted upon. Their motivational force arises from their role in the neural dynamics that lead to action selection and control. Feeling is thus not a mysterious inner addition but just a description of what it is like to be such a system 'from the inside'. Hedonic valence no longer needs to be treated as an irreducibly subjective property. It is a naturalized, functional mode of evaluation, to be understood through mechanistic and functional neureconomic research into how the brain deals with action selection and control though hedonic valence. In short, talking of imperative and hedonic feels or qualia does not posit a private Cartesian bureau de change. This language reminiscent of the Cartesian paradigm merely designates the neurocognitive mechanistic control mechanisms in order to deal with the pathological complexity caused by high degrees of freedom.

Too conclude, I believe it is in fact Frankish that is caught in Cartesian gravity, trying to avoid even terms like 'feeling', while nevertheless playing the game by Cartesian rules. I refuse to do so. Indeed, I think the time of naturalist philosophers of mind is much better spent aiding scientists in studying consciousness, than engage in discussions with Cartesians. Vitalism wasn't defeated by metaphysical arguments, but ultimately hard philosophical and scientific theorizing and experiments that unveiled the mechanistic nature and the possible origins of life. To allow Cartesians to define the terms that are ultimately used by scientists is of course going to lead us astray. Like good scientists we should simply allow for conceptual engineering of our terms, as science has so often done in the past. I am thankful for Frankish's endorsement that the pathological complexity thesis "should be read by all consciousness researchers" and his hope that it will influence many (Frankish, 2025, p. 1), since it is these researchers that I ultimately hope to convince that they do not have to be worried about hard problems and explanatory gaps. It is not about showing that there is no hard problem or no explanatory gap as Frankish suggests. Explanatory gaps remain across all kinds of scientific questions, like the origin of life, the causes of the last financial crisis, or the world of bacteria. But they are not mysteries. They do not require any leaps of faith. As we develop a better understanding of the different forms of experience, its causal advantages and disadvantages for organisms depending on their life histories, rather than just experience vs no experience, we will no longer treat consciousness as a mystery immune to scientific investigation.

Evaluation and Its Relation to Perception and Prediction

Suzuki (2024) offers several criticisms to the ideas defended in *A Philosophy for the Science of Animal Consciousness*.

The first worry he raises is my proposal that evaluative experience first arose independently of sensory consciousness. While Suzuki agrees that consciousness research has been too focuses on the sensorimotor side of experience without paying much attention to affective experience, he is sceptical that an evaluation-first as opposed to a sensory-first explanation of consciousness will be successful:

> it is not clear whether it is really possible for any conscious organism to have the e-dimension alone; what is being evaluated? Although an animal with a sensorimotor aspect alone will be a reflex robot, an animal living in a hedonic dream cannot be a functional agent in the real world. (Suzuki, 2024, p. 2)

Suzuki admits that I would reject an unecological view in which hedonic evaluation is detached from action. But he makes a mistake of thinking that hedonic values require the states to which they are assigned to be consciously experienced. The history of the nervous system and animal life involved sensory information processing long before conscious experience entered the scene. If a Cambrian animal is engaged in a particular action, hedonic valence could provide a signal to stop or to continue to engage in that action without the actions or the surrounding sensations to be consciously experienced. While such an expansion of conscious experiences would undoubtably have adaptive benefits in improving animal decision-making and I argue that these aspects of experience would have (in evolutionary terms) quickly evolved once evaluative experience emerged, that is not to say that they are necessary for evaluative experience.

Suzuki is right to question my analysis of gastropods as a potential group of animals restricted to evaluative experience alone. He argues that just because we could place *Aplysia* on the dimension of evaluation in the multi-dimensional consciousness profiles favoured by me and Birch et al. (2020), that does not mean that they actually have evaluative experiences, since these "dimensions tell nothing about the thresholds or boundaries between conscious and nonconscious states" (Suzuki, 2024, p. 2). While Suzuki is right that I do not consider *Paramecium* or *Chlamydomonas* conscious, he notes that they should still be plotted on the perceptual richness dimension. Admittedly, even bacteria show perception, evaluation, and the capacity for self-other distinctions. While Birch et al. (2020) are ambiguous on this point, I use the multi-dimensional consciousness profiles exclusively to map out conscious variations. If an animal has no consciousness but does possess complex evaluative capacities, it would thus still not be placed alongside the evaluative richness dimension. I thus agree with Suzuki that despite their evaluative capacities, gastropods may nevertheless be non-conscious. I only discuss them as a potential case for evaluative experience, since they do show a level of richness in their evaluative capacities (Bédécarrats & Nargeot, 2020; Crook & Walters, 2011) that is at least suggestive of the possibility of hedonically felt evaluations. More research will be necessary to settle this question. If my framework is correct, we would require gastropods to have a high level of pathological complexity as well as the capacity for motivational trade-offs indicating a common currency of evaluation before we should confidently assign them conscious experiences. For animals, such as corvids and cephalopods, however, that we judge to be conscious, we should expect the complexity of their evaluative or for that matter sensory capacities to closely correlate with their evaluative and sensory experiences. While most information processing is done unconsciously, the meta-cognitive usage of these capacities for action selection is our best window into what it is other animals experience.

As an alternative to seeking the origins of consciousness on either the evaluative or sensory side, Suzuki has proposed to focus on prediction as a capacity that ties perception and evaluation together: a "hypothesis that consciousness makes immediate future predictions by combining neural representation systems and affective/motivational systems" (Suzuki, 2022, p. 25). If an organism lacks such predictive evaluative processing, or if its neural architecture is too simple to support it in a temporally extended way, then it should be considered non-conscious, which is why Suzuki is sceptical that gastropods have consciousness since their evaluative and sensory capacities are too simple. Naturally, I am happy to concur that much of what goes in our brains and those of animals relates to predictions. However, why should one think that all of subjective experience is reducible to predictions: that "the subjective world is a predicted world" (Suzuki, 2024, p. 3)? Is it really the case that evaluative processing "inevitably relies on recent-past information to predict current or near-future situations" and this is the reason "conscious agents experience the subjective world" (Suzuki, 2024, p. 3)? This idea, I believe, is both too narrow and too broad.

Firstly, it is too narrow since there are many forms of subjective experience that do not directly relate to predictions, even if predictive mechanisms are operating somewhere in the background. The warmth of sunlight on one's skin, the heaviness of tiredness, or the dull ache of an old injury are all states with clear evaluative significance, yet their phenomenology is not exhausted by forecasting near-future outcomes. They matter because they feed into the organism's action priorities in the here and now. To treat their conscious character as nothing more than the by-product of predictive modelling stretches the notion of prediction beyond its natural explanatory role and to the brink of being uninformative.

Thus, the idea is also too broad since making prediction the defining feature of consciousness risks collapsing an important distinction. Predictive control architectures are

found throughout the tree of life, whether in immune systems that predict infections, in bacterial chemotaxis that adjusts to gradient changes, and in the responses of plants based on past 'experiences'. If the mere presence of prediction were sufficient, we would quickly face an implausibly liberal ascription of consciousness. Suzuki tries to avoid this result by adding the requirement that prediction must be both temporally extended and evaluatively integrated. But in that case it would appear that it is either temporal unity or evaluative integration are what makes a subset of predictions conscious. However, as I argue in my book, out of all the dimensions of consciousness this temporal aspect of consciousness is the least likely to have been present at the very origins of consciousness. Thus, it appears that the raison d'être of consciousness lies in the evaluative integration of diverse stimuli that makes such an evaluative action selection architecture worth having. While consciousness in us brings together a lot of features, that is no reason to think that they must have existed already for consciousness to appear, which is also my main criticism of Ginsburg and Jablonka (2019) who effectively provide a bottom-up explanation of the particular features of human consciousness, not subjective experience as such. Just as Ginsburg & Jablonka's *Unlimited Associative Learning* (UAL) may mark an important transition in the evolution of consciousness, Suzuki's emphasis on prediction may illuminate a key feature of how consciousness operates now. But this is not the same as explaining its initial evolution. It is a mistake to assume that the earliest forms of consciousness had to encompass all the subjective capacities required for a predictive subjective-self-world model in order for experience to confer an adaptive advantage. Suzuki is also sceptical of the very idea that consciousness is an adaptation, and this may underlie his reluctance to locate its origins in the fitness benefits it provides. Instead, he treats consciousness more as a byproduct of the brain's predictive architecture. Thus, let us examine this objection next.

Is Consciousness an Adaptation?

While most researchers examining the evolution of consciousness assume consciousness to be an adaptation, Suzuki is right to point out that there are exceptions, like Ginsburg and Jablonka (2019), who treat consciousness as akin to life. While life is meant to have no function in and of itself, it opens up a new realm of functions. Similarly, Ginsburg and Jablonka argue that consciousness is a new mode of being with a new realm of goals. I have criticized this idea elsewhere in a review of their book (see Veit & Browning, 2021a), but the most significant objection is that even if consciousness opens up new functions, which I myself defend, that doesn't mean that consciousness isn't itself an adaptation. If consciousness has no adaptive benefit for living systems, then it would have been selected against. If the new functions are disconnected from the evolutionary fitness of the organisms, then likewise they would be selected against. Consciousness is so far only found in living systems, and so of course, it is not meaningless to ask what its function is. Just because there is a single species out of the millions of conscious animal species that have lived on this planet, that is humans, where our conscious goals have deviated strongly from our biological goal to maximize reproductive fitness, is in no way evidence that consciousness is not an evolved adaptation.

Furthermore, it is only in our fairly recent evolutionary history due to radical technological and cultural changes that this divide has become significant, for example, through contraception and addictive substances or activities. There is no special magic to conscious agency. It is just as tied to the biological imperatives as any other trait. At times it reads as if Suzuki endorses the idea that the later evolution of consciousness decoupled it from fitness. But even if we were to restrict ourselves to only our own species that view appears to me mistaken. Even in our radically changing environments of today, some humans will leave more offspring if their differences in conscious goals are more closely tied to their reproductive success. Rather than seeking a strict division between conscious and non-conscious agency, I treat agency like Godfrey-Smith (2020) as the bridging concept between conscious and non-conscious minds, rather than as Suzuki suggests between simple animal consciousness and human-like higher order consciousness.

Suzuki's focus on consciousness as a developmental rather than purely adaptive explanation is more convincing here. He notes that the tetrapod forelimb with its "basic structure composed of the humerus, radius, ulna, carpals, metacarpals, and phalanges" is found in all tetrapods, while nevertheless "fine-tuned to specific habitats" (Suzuki, 2024, p. 5). Drawing on the work of DiFrisco et al. (2020) and Wagner (2014), Suzuki argues that we can think of "ground plan of the forelimb may be characterized as character identity established by means of a specific developmental mechanism […] whereas character states of this body part are variable as a result of species-specific adaptation" (Suzuki, 2024, p. 5). He is right to emphasize that this ground plan opened up opportunities in the Darwinian design space for a lot of alternative forelimb designs fitted to different ecologies such as different forms of wings.

Nevertheless, I do not think that these arguments are ultimately challenges for the pathological complexity thesis. Developmental and historical contingencies of the brain architecture in different classes and orders of animals may well influence particular features about the particularities of subjective experience in different species. This is especially relevant when we consider closely related species or even individuals within the same species with very different life history strategies. If these differences in life history strategies do not bear out in difference in subjective experience that could provide us with a way of assessing how much

importance to assign to developmental constraints. But constraints are not an invalidation of Darwinism. They are simply constraints on adaptationism. They help us to explain what natural selection is able to act upon. Alternative life history strategies within the same species also align with Suzuki's call to encompass more ideas from the extended evolutionary synthesis such as phenotypic plasticity (Pigliucci et al., 2010). Indeed, adaptationists have very early on argued that phenotypic plasticity could be explained within a thoroughly adaptationist programme (Houston & McNamara, 1992). This is one of the reasons I explicitly focus on *state-based* life-history theory. Darwinism continues to absorb or extend itself to encompass domains of biology thought to be largely independent from Darwin's universal acid (Dennett, 1995a).

I also find Suzuki's work on the homologies and ground plan of the vertebrate brain incredibly valuable (Suzuki, 2022). But his proposal that distinct ground plans enabling consciousness independently evolved in vertebrates, cephalopods, as well as arthropods, appears to be evidence in favour of an adaptationist view, rather than a developmental one. If the most minimal forms of consciousness did not come along with distinct adaptive benefits, it is much less plausible that it would have independently evolved. Furthermore, even here we find exceptions. Snakes, caecilians, and legless lizard have all lost the tetrapod forelimb. It was no longer adaptive for their ancestors. And so consciousness may similarly disappear in lineages where it no longer plays a functional adaptive role.

Here, we need to distinguish between consciousness as a highly diverse multidimensional phenomenon and its most minimal original form. Of course, it is hard to look at a multidimensional phenomenon and try to identify a single function or capacity that is meant to explain it. That is why many theories of consciousness fail and why Ginsburg, Jablonka, and Suzuki want to resist treating consciousness as an adaptation. But consider this parallel: both the skeleton and an immune system are adaptations. Even if we can't reduce them to a single function. That would only invalidate a very simplistic straw-man version of adaptationism. Part of the motivation for the pathological complexity thesis was precisely my rejection of much the literature to seek to explain consciousness by a single function or capacity, be that UAL or a global workspace. Instead, I sought to explain the functional origins of the first kind of subjective experiences that could give rise to many new functions and capacities to be built on top.

The pathological complexity thesis tries to avoid the problem of treating consciousness as an all-or-nothing treat with a single function by offering a framework to think about all the various functions enabled by consciousness. If hedonic evaluation is the ultimate way that consciousness impacts an organism's survival and reproduction through action selection and control, this allows us to understand why other types of consciousness exist, and how they discharge their functions. Sensory consciousness, self-awareness, an experience of time, dreams, and any other such enrichments must ultimately impact actions to be functional, and they do so through action-evaluation. Nevertheless, it is of course true that even if we restrict ourselves to say dreams, we may find a multiplicity of functions for them. That does not mean that dreaming isn't an adaptation.

Does the adaptivity of animal consciousness then really seem all that puzzling? It is indeed what contributed to the success of the animal kingdom, not only by enhancing their evolvability and exploration of a vast design space, but also by directly helping conscious individuals to deal with more complex bodies leading to an evolutionary ratchet, not because it was developmentally locked in, but because it was so incredibly successful and central to the survival success that its costly neuroarchitecture wasn't selected against.

Finally, I will note that even if developmental factors play a significant role that does not mean that adaptive explanations have become meaningless: they are just another factor to be considered. Thus, even if we embrace eco-evo-devo perspectives that would not remove the demand to understand the adaptivity of consciousness. This is especially true since consciousness appears to be significantly more flexible than the ground plan of animals, the tetrapod forelimb, and so forth. If consciousness originally evolved to deal with the pathological complexity of the complex trade-offs of action selection than we are unlikely to see any adaptive deviation of this. New functions may be added to this original function, but it is ultimately in improving the link between the actions of an animal and their fitness consequences that the consciousness of different species will be shaped.

Disunified Consciousness and Its Neural Basis

A third criticism offered by Suzuki (2024) concerns my discussion of the disunity of consciousness. In my earlier book, I argued that the proposal by Birch et al. (2020) that we may think of birds (who do not possess a corpus callosum connecting the two brain hemispheres) as natural split-brain patients with potentially disunified experiences between the hemispheres, makes much more sense in non-avian reptiles as well as fishes (Veit et al., 2025b):

> Non-avian reptiles – or for that matter, fish – constitute the best neuroanatomical examples of a healthy split-brain because they have (compared to birds) greatly diminished ipsilateral projections in the tectofugal and thalamofugal pathways, which make it easier to infer that only one brain "half" is involved in a task (Deckel, 1995, 1997; Sovrano et al., 2001; Vallortigara, 2000). Indeed, the evolution both of birds and mammals is a

> striking case of an increase in lateral brain connectivity, which is precisely why we should be careful not to overemphasize birds. Their evolution from theropods (the clade of dinosaurs including all predators) is one of consciousness becoming more unified. In thinking about healthy and adaptive forms of disunity, we should therefore focus on fish and non-avian reptiles, which I put here together not because they have very similar life-history strategies, but rather because they remain comparatively understudied in comparison to octopuses and birds. (Veit, 2023a, p. 105)

Suzuki appears resistant to the very idea that consciousness could be disunified questioning what that would even mean. He acknowledges that one may understand birds as having two conscious selves and that octopuses may have nine subjects (with one for each arm), but fails to see that this does not exhaust the range of views about the unity of experience. Indeed, these views still treat unity as an essential aspect of consciousness. This is capsulated in Suzuki's urge for me to focus more on the distinction between creature and state consciousness, that is, an agent being conscious versus a mental state being conscious (Bayne, 2007; Manson, 2000). I never found this distinction particularly helpful, perhaps even obscuring the more important question of what consciousness is for. A creature is conscious, after all, if it has any conscious states. And an entity that has conscious states is a conscious creature. I largely considered it as a distinction arising from experimental research to distinguish the neuroscientific research examining what goes on in the brain under such states like coma, anesthesia, and dreamless sleep, from studies disentangling which brain areas are activated for different conscious states, such as in the binocular rivalry paradigm mentioned by Suzuki. It is, of course, worth avoiding the mistake of thinking that whatever brain parts are the most active in a particular experience must be the brain region responsible for all of conscious experience, but this is not a mistake people would have been likely to make prior to the availability of neuroimaging tools. Overemphasizing the distinction gives the mistaken impression, however, that we are somehow carving nature at its joints to distinguish between two types of consciousness altogether.

Nevertheless, Suzuki has shifted my view somewhat since using this distinction can help me to illustrate how there are two important senses of disunity. The first sense of disunity concerns the possibility of several conscious selves. While Suzuki recognizes this possibility he argues against it. But a more important sense of disunity is to question the very assumption that unity is an essential property of consciousness at all! Indeed, I largely discuss the possibility of multiple conscious selves in the same body as an intuition pump to make readers question their own intuition that just because consciousness is highly unified in us that this must not track how it is found in the rest of nature.

How integrated experience is can be a matter of degree. The division of labour we find between brain hemispheres is suggestive of partial unity that can in- or decrease depending on the situation. Species, like dolphins, capable of unihemispheric sleep question the assumption that consciousness involves integration across the entire brain. Similarly, I discussed the octopus as the most extreme form of potential disunified experience since the majority of the octopuses' neurons can be found in its arms, with a degree of independence in the decision-making of each individual arm. As Suzuki acknowledges citing the work of Sumbre et al. (2001) and Hague et al. (2013) even isolated octopus arms have been shown to engage in goal-directed behaviour and avoidance of noxius stimuli. However, Suzuki thinks that multiple selves would be evolutionarily implausible since such animals "would evaluate things differently and come into conflict with each other, diminishing the survivability of the animal" (Suzuki, 2024, p. 4). Yet, this is precisely why the octopus example is a useful one.

Of course, in the kind of bodies we have, it is hard to imagine how multiple selves wouldn't just lead to failures of coordination. But this is precisely why philosophers and scientists have been mistakenly attracted to the idea of a homunculus that deals with all information at once. Cybernetics, robotics, and artificial intelligence research have conclusively shown that it is simply not feasible to build such a system without slowing it down to ecological impracticality. Since the arms of an octopus are engaged in independent decision-making, it would simply be inefficient to allocate all decision-making to a centralized brain. Disunity of the brain is adaptive here and suggestive that subjective experience itself might also come in a disunified shape.

Revealingly, Suzuki uses cites evidence by Pinto et al. (2017) for the behavioural unity of split-brain patients outside of laboratory conditions that led researchers like Bayne to question the hypothesis that they could have independent streams of experience, as well the fact that octopuses have "a central brain that learns and makes decisions" to argue for a single conscious self (Suzuki, 2024, p. 4). But he mistakenly treats unity as binary, as if we needed two wholly separate brains that cannot coordinate in a body to grant the possibility of two streams of experience. He writes that the information from octopus arms is integrated and that they have a central brain for decisions, as if I denied this, as if any evidence for integration is enough to debunk the idea of disunified forms of consciousness. If we were to turn this into an axiom, we might almost be led to believe that a group of coordinating humans in a company have a unified stream of consciousness rather than independent ones. Contrary to the collective consciousness in the TV show *Pluribus* by Vince Gilligan, this would be terrible inefficient. We shouldn't think of the octopus as having either one or nine selves, but as an instance of partial unities. An octopus may switch back and forth between

unified and disunified streams of experience depending on the computational problems it is facing for optimal efficiency in information processing and quick responsiveness. A split-brain patient similarly exhibits puzzling partial unity that is not easily captured by the simplistic idea that there must either be one or two streams of consciousness. If we assume that these are the only available options, I'd be happy to concur that split-brain patients are more likely to have a unified self, that can as Suzuki suggests switch "within a single phenomenal field between conflicting perceptions as in binocular rivalry" (Suzuki, 2024, p. 1). But without the preconceived notion that there can only be one phenomenal field within an organism, we may instead think of conscious selves as temporarily created 'user illusions' to effectively deal with action-selection problems. After all, is it likely that there is only a single phenomenal field that suddenly brings into view different windows of the arms, when the arms are simultaneously engaging in independent actions? I don't believe we have good evidence for this view, unless we assume that consciousness in creatures of incredible diversity in bodies, behaviour, life-histories, and brains, must be identical in their consciousness. The very experience of a unified bodily self may simply be an artefact of our own constrained bodily organization, whereas the opportunities afforded by an octopus body might even render such an experience maladaptive.

Suzuki's argument, however, that the split-brain research has put too much focus on the cerebral cortex is a welcome one. As he rightly points out, the "core neural basis for the affective or evaluative system is located not in the cerebral cortex but in subcortical structures in the vertebrate brain" which are not completely lateralized (Suzuki, 2024, p. 3). But split-brain patients do not have a split brainstem, which "if it were, the lesion would likely be lethal. In this sense, the bilaterally integrated affective or evaluative system and single creature consciousness may be linked" (Suzuki, 2024, p. 4). This is all evidence that the pathological complexity thesis is correct and evaluation is an ancient evolutionarily precursor for and enabling more complex forms of consciousness. In my book, I deliberately avoided focusing on the neuroarchitecture of consciousness, instead focusing purely on the functional side, since consciousness could be multiply realized in very different types of species with very different types of brains. But I am in agreement with Solms (2021), who as Suzuki notes, also defends an evaluation-first view of consciousness, where the periaqueductal gray is central to conscious experience due to its role in evaluation: "consciousness as we know it requires the existence of something which looks like the PAG, or its immediate evolutionary precursor, together with its adjacent equipment in the midbrain decision triangle and reticular activating system" (p. 272). Indeed, I fully agree with Suzuki here:

> The "selection triangle" of behavioral decision-making, composed of the substantia nigra (SN) for action selection, the superior colliculus (SC) for target selection, and the periaqueductal gray (PAG) for motivational rating. This triangle appears to be the neural structure in the vertebrate brain required to deal with Veit's (2023a) pathological complexity. (Suzuki, 2024, p. 4)

To respond to Frankish's earlier comments, I am less certain about which functional analogues in different species are sufficient for consciousness, which is why I avoid delving too deeply into neurological details. However, Suzuki is certainly right to suggest that because these brain regions involve projections between the left and right sides, the idea of two entirely separate streams of consciousness may be overstated. As he emphasizes citing several papers, this is the case in macaques, rats, and even lampreys (see May et al., 2021; Mengual et al., 2016; Pérez-Fernández et al., 2017), which suggests that this may be common to all vertebrates. Again, however, disunity doesn't require two entirely separate brains. This evidence does not undermine the idea that unity can come in degrees once different forms of experience evolve, nor that octopuses couldn't have genuinely different evaluative selves that are sometimes unified into a single stream and sometimes not. But we do find strong evidence here that the evaluative side of experience came first due to its link with older brain areas, with other capacities plausibly build on top, just as new brain regions were built 'on top' of the brainstem.

Animal Welfare and the Pathological Complexity Thesis

Next I will turn to Matteo Chincarini's commentary, who, as one might expect from an animal welfare scientist, highlighted the significance of my framework for a better understanding of what feels good and bad from the perspective of different animal species, that is, their affective experiences (Chincarini, 2025). As he points out, if we understand consciousness in light of the pathological complexity thesis, this has implications "for how we study and promote **animal welfare**, since welfare depends on understanding species-specific affective experiences that are shaped by evolutionary trade-offs" (Chincarini, 2025, p. 1). In his commentary, Sinha (2025) wonders whether the states of contentment we associate with well-being might themselves qualify as states of consciousness, which I can firmly agree with since it is becoming standard in animal welfare science (Browning & Veit, 2021a, 2022). Like Chincarini, I hope that "future research will pursue the implications of [my] work within the science of animal welfare" (Chincarini, 2025, p. 2). Some of this work is already happening. My work on animal consciousness has been cited by animal welfare scientists, and I have started to collaborate with animal welfare scientists on several projects (e.g. Browning et al., 2024). It is as I have once argued elsewhere in an

integration of animal consciousness and welfare research that we will make the most progress in the future (Browning & Veit, 2023a). While he is right to point out that I have not made the link between these fields very explicit in my first monograph, this was largely owed to a desire to avoid the charge that my work is biased by a concern for animals, which similarly made scientists like Donald Griffin reluctant to engage in animal welfare discussions. Luckily the times are changing, and we can study the affective experiences of animals without fear of being accused of being less objective than behaviourists who simply ignore this question altogether. Indeed, much of my research has shifted towards animal welfare issues (Browning & Veit, 2020, 2021b, 2023b, 2025; Veit & Browning, 2021a, 2021b). If evaluative experience, as I have argued, is at the core of conscious experience, then Chincarini is exactly right to point out that "the study of animal welfare becomes not just ethically important but methodologically relevant to consciousness science" (Chincarini, 2025, p. 2). Sinha (2025) connects this line of thought to his earlier speculations about forms of memetic fitness in humans (Sinha, 2002) where the new goals of conscious creatures may underpin memetic fitness. I am indeed optimistic that further research into the links between cultural complexity and its influence on the pathological complexity of different species may help us to understand the origins of cultural values and memes, which is an area of research I have also contributed to (Schlaile et al., 2023).

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Notes

1. See also: Veit, (2022a, 2022a, 2022b, 2022c, 2023, 2025a, 2025b), Veit & Browning, (2022, 2023b), and Veit et al., (2025b).
2. De Weerd intends his criticism to extend to other defenders of bottom-up approaches like Peter Godfrey-Smith's "neural dynamics of subjectivity" approach (Godfrey-Smith, 2024).

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