How the Brain Makes Up the Mind:
A Heuristic Approach to the Hard Problem of Consciousness

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ABSTRACT

A solution to the "hard problem" requires taking the point of view of the organism and its sub-agents. The organism constructs phenomenality through acts of fiat, much as we create meaning in language, through the use of symbols that are assigned meaning in the context of an embodied evolutionary history. Phenomenality is a virtual representation, made to itself by an executive agent (the conscious self), which is tasked with monitoring the state of the organism and its environment, planning future action, and coordinating various sub-agencies. Consciousness is not epiphenomenal and serves a function for higher organisms that is distinct from unconscious processing. While a strictly scientific solution to the hard problem is not possible for a science that excludes the subjectivity it seeks to explain, there is hope to at least informally bridge the explanatory gulf between mind and matter.

1. Introduction

The "hard problem of consciousness" [Chalmers 1995] is the challenge to explain phenomenal experience scientifically—that is, in physical terms of neural processes. Beginning with Leibniz, it has seemed to many that there is an unbridgeable categorical gulf between one's conscious subjective experience and objective events in the brain that are presumed to cause it. Even though many "neural correlates of consciousness" have been identified, it remains unclear how physical processes of any sort could cause or bring about vivid conscious subjective states such as feelings, sensory experience of color, smell, sound, and touch, as well as more subtle experiences such as memories, mental images, volition, thoughts, and dreams. Many factors conspire to make the hard problem hard, including cultural and psychological conditioning, philosophical biases, and a narrow view of causality.[1] I shall argue that one in particular renders a solution virtually impossible—at least as things stand. This is the fact that science has long banished the subjective and the mental from its ontology of efficient causes, transmitted passively through material systems, while insisting that mind must ultimately be explained in the terms of such an ontology. However, in recent decades the mental has re-entered scientific discussion by the back door, namely through the computational metaphor, which enables insight into the active role of mind in constructing phenomenal experience. At the same time that computers changed our view of the mental, advances in brain imaging made it plausible to identify neural "mechanisms" thought to be responsible for subjective states. However, the significance of computation as an approach to mind is less that it assimilates mind or brain to a machine than that an engineering strategy enables the designer or programmer to understand the system from

[1] For a further exploration of such factors, see [Bruiger 2017].

an insider's point of view. To inquire how a physical organism can be conscious is to ask how Mother Nature, as designer, does the trick.[2] The best attempt at an answer may be to put oneself in the organism's place, which is more of an engineering approach than a strictly scientific one.

Ever since Descartes, however, there has been a general objection to this sort of strategy, which substitutes a conscious human point of view for that of a natural system. In particular, to suppose an already-conscious agent within the head does nothing to explain consciousness.[3] (For, then, the consciousness of *that* being must be explained, in an indefinite regression.) The problem is rather to explain how any agent can be conscious at all, and under what circumstances. Yet, clearly it will make a difference whether "agency" is considered from the extrinsic point of view of an observer, who sees only a physical system, or from the point of view of the agent itself, operating on its own terms. In other words: whether the task facing the brain (to produce phenomenal experience) is considered from a third-person or a first-person point of view. I will argue that there is no regression problem, that the agent is only incidentally a physical system, and that the present approach can bring us as close as possible to understand how the brain produces experience. The challenge I address is not to explicate neurological structures or physical processes that underwrite consciousness, but to understand how an *agent* can be conscious. This, we will see, is through the active nature of mental agency as original cause—the very opposite of the traditional passivity of the physical.

2. The Cartesian theater

The idea of representation is central to some modern theories of cognition. The undesirable implication of an inner audience for inner representations is incidental to such theories. It comes from thinking of the representation as something given outright, encountered as though it were an already existing thing, a re-presentation of something external: a ready-made image with a ready-made witness for it. But the view presented here is that the agent *makes* the image, for its own purposes, rather than finding it. The strategy here substitutes a conscious human point of view for that of the agent in question, to understand why it does this. There is no regression of observers within observers because the "homunculus" is the investigator, not some part of the system investigated.

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[2] While Daniel Dennett's [1987/1998] strategy is to assimilate intentional states to natural design—to "what Mother Nature had in mind"—the strategy I advocate here is to assimilate "natural design" to (human) intentional states. Rather than second-guess the "intentions" of natural selection, I propose to put oneself in the place of an agent tasked with designing itself.

[3] There have also been many legitimate objections to considering the brain in isolation from the body, and to the computational metaphor because it likens the brain literally to a disembodied computer. These are not the issues I address here. Rather, I assume from the outset that the brain is an organ of the body, embedded in an environment with which the organism's present and historical interactions are crucial for its behavior and perception, and therefore for its conscious experience. I use "brain" as an abbreviation for the cognitive system of an embodied environmentally embedded organism with an evolutionary history.

3. Phenomenality[4] and scientific reduction

Reduction seems unproblematic so long as phenomenality is tacitly ignored and only facts derived from it are considered reducible to other propositions. But when phenomenality itself is what is to be scientifically reduced, the vicious circle bites back. For, phenomenality is then to be reduced to concepts derived from it in the first place.

Phenomenality is foremost sensory experience of the external world, mixed with various body sensations, emotions, memory, imagination, and self-talk formalized as reasoning and thought. Each of these experiences is the activity of an agent, for which there is "something it is like" to be doing them [Nagel 1974].

Reasoning and thought led to science, as a formal conceptualized version of cognition. The hard problem *presumes* this conceptualized version that we call 'physical reality', and then asks how phenomenality arises *from* it. This is now widely considered a scientific question, which implies it should have an experimentally testable answer. Yet, the question could with equal validity be put the other way around: how and why does everyday phenomenality give rise to the scientific worldview? Formulated in the present tense, the *how* is an epistemic question. In the past tense, it becomes a question for the historian of science. With emphasis on the *why*, it becomes a problem in psychology, sociology, or perhaps evolutionary psychology.

The hard problem is rendered hard by various motivations and presumptions underlying the scientific worldview. Since science originated in expurgating the subjective to produce an account of the world deemed objective, it is at least odd to ask how the subjective "emerges" from the objective or is caused by it. The question could mean: how can one *recover* or reconstitute the original subjective version from the objectified one? The appropriate answer would be: through an inverse of the process through which it was objectified in the first place. But the hard problem asks instead how the *brain* (not society or the whole person) *produces* (not recovers) the phenomenal experience that now appears mysterious in a world *defined* to lack it. As such, the quest is set up for failure.

Let us admit from the start that the scientific worldview (with the physicist's ontology) is fundamental by convention only. Science is an alternative form of cognition, motivated by need of the human organism to improve upon sensory perception and to enable control of nature. To serve that purpose, it agrees to bracket the subject and focus upon the object. This does violence to the fundamental truth that all cognition is co-determined by subject and object conjointly. Physics, especially, confines the relevance of consciousness to the role of the idealized observer, a mere fly on the wall.

However, scientific explanation is a narrative; it is *communication* (at the least, from one scientist to another) whether in a natural or in a formal (mathematical) language. The structure of both is based on common perceptual experience: language usually contains nouns to represent objects, adjectives to describe qualities, verbs to represent interactions, etc. Formal systems contain parallel elements more abstractly.

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[4] I use 'phenomenality' to refer to the entire domain of what can enter consciousness, which includes sensory experience, emotion, imagination and memory, dreams, thought, etc. In short, everything for which there is "something it is like" to be in that state.

Scientific theories consist of propositions, which someone proposes. The communicator speaks in the first person, to someone addressed who constitutes the second person, about the phenomenon investigated, which constitutes the (depersonalized) third person.[5] By taking them for granted, scientific protocol tacitly brackets the first- and second-person aspects of scientific communication in order to focus on the third-person object of the communication. This works well enough unless the object is phenomenality itself, which necessarily entails the first and second persons.[6] The refusal to admit subjective experience and teleology into the scientific protocol obviates a scientific explanation of consciousness. A corollary of this refusal is the exclusive focus on efficient cause, with the metaphysical implication that matter is inherently passive. At the very least, a science that incorporates the role of the subject would be a more complete science [Bruiger 2014, 2016].

The reductive program reflects a bias: that physics is held to describe what is "real" while phenomenality is a sort of illusion produced by the brain. Of course, the science of physics is also produced by the brain, but we don't for that consider it an illusion. Rather, we hold it to be our best account of the world—one made by disciplined conscious effort instead of the less reliable account made naturally and unconsciously by the brain's processing of sensory information. It thus remains our bias that phenomenal experience is to be explained ultimately by physics and not the other way around. We seek to know how the brain produces phenomenality while implicitly thinking of the brain as a physical system that can produce only a behavioral output. To understand how the brain (or the organism as a whole) can be *subject* and *agent* as well as material *object* will involve putting ourselves as subjects (and agents) in its place, to inquire how *we* would go about creating phenomenal experience. Effectively, this is the strategy of artificial intelligence, which attempts to understand natural intelligence by reproducing it. It means identifying what a human engineer would do to create an output judged to be the "same" behavior. Applied to human consciousness, the task becomes to find what the scientist must do to re-produce her own phenomenality.

4. An executive role for consciousness

The hard problem is that a *causal* explanation is sought for processes that are essentially not causal but intentional. One could say that they occur in a *virtual* rather than a material system. Explanation then cannot consist of identifying efficient causes passively transmitted throughout a physical system. Rather, the system itself, and its subsystems, must be considered *agents*, which are original first causes. Since these have a point of

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[5] One speaks in the *third person* to refer to *de*personalized elements of reality. However, in natural language, developed by a highly social species, the "third" person is historically a literal person talked *about* rather than *to*. The notion of cause had once been correspondingly personal: some*one* was considered responsible for extraordinary occurrences (whether beneficial or malevolent), while ordinary occurrences needed no explanation—as reflected in Aristotle's ideas on causality. The scientific revolution adopted a different understanding of causality and rejected personification of the natural world.

[6] Phenomenality is by definition first-personal. When it becomes an object of thought to be reported, it is also an object of communication and therefore second-personal.

view of their own, the appropriate strategy is to identify with that point of view in order to embrace the challenges facing the active system.

Such a strategy need not involve an indefinite regression of agents within agents. On the contrary, it points to a special executive function within the brain, where the buck stops. This function might be likened to the CEO of a corporation, who is responsible for decisions on the highest level, based on "reports" provided by conditionally reliable subalterns. The job of this executive is to monitor and trouble-shoot the overall operation of the system, to plan ahead on various time scales, and to take charge in situations where established protocols are inadequate. To consider the point of view of this executive function (by substituting for it the observer's conscious point of view) entrains no logical regression, because it would be pointless for a subsystem to display to itself the same information it provides to the executive. However, it is still possible to ask why this executive function could not be performed *unconsciously*, as we assume is the case for subsystems. What is there about the executive function that requires phenomenality and conscious volition? What is it about phenomenality that makes the difference between conscious and unconscious processing? Or, to put it bluntly, what are qualia good for? Whether or not to answer such questions would solve the hard problem (how the brain *produces* qualia), it would surely shed light on it.

The hard problem involves the psychological obstacle that thinking of the brain as a physical system seems incompatible with thinking of it as a conscious agent. Yet, of course, we know that the human organism is in fact a conscious agent. If we are to propose the executive function as responsible for this fact, we must think of it not only as a physical organ, subsystem, or "third person", but rather as we think of our own consciousness, in terms of agency and from a first-person point of view. The heuristic purpose of the present strategy is to put oneself in its shoes, so to speak, in order to discover how its reasons and reasoning imply phenomenality. In other words: to understand why there *must* be "something it is like" to be this executive, and why its job could not be performed unconsciously. We want to identify what sets it apart from non-conscious processes.

One thing that could set it apart is that its algorithms might *not* be pre-programmed, but formed in real time. Immediate attention demanded by some alarum is often accompanied by a pre-programmed quick first response. Beyond that, however, the demand itself also puts the executive on notice for future short-term and long-term planning. The monitoring capacity of the executive also entails *directing* attention where it is not externally demanded, and on a time scale permitting deliberate re-programming (reason and reflection). The executive makes use of both symbolic and iconic forms of representation in preparing the next action or next step in planning, just as a CEO uses charts, graphs, and reports. Phenomenality summarizes the "data" and the decision process up to the present moment.

A great deal of human behavior is performed without conscious attention. We experience the results of neural processing but not the processing itself. Since some of this processing leads to conscious experience and some not, what makes the difference? Conscious attention seems to be required in novel, complex, or otherwise mobilizing situations. If the action cannot be done by rote, confronts a novel or demanding situation, or requires planning and forethought, conscious attention is brought into play. This suggests that phenomenality makes real-time sensory input available to higher centers for planning or dealing with novelty or emergency. One role of consciousness is to muster additional resources to deal with situations that are not already handled by existing strategies—to gain new mastery, to learn improved algorithms.[7] Formal reasoning can be more precise (as in mathematical calculation) than non-conscious processing, which is faster but probabilistic.[8] Conscious problem solving is slow because its processing involves many steps and coordinates more areas of the brain, which are farther apart. A visual process, for example, seems to be conscious if it involves information shared over a key distance of 10 cm in the human brain [Lamme 2015, sec9].

Consciousness plays a different role than behavioral responses that can occur without it, and presumably involves different or additional neural processes. Many motor tasks are executed "automatically," and one is sometimes conscious of performing an action that seems to "do itself." Though awareness of initiating voluntary action comes after the neural processes that have actually caused it, this awareness serves as the basis for choosing *future* action, or action in a larger context [Frith and Metzinger 2013]. Thus, consciousness is not epiphenomenal.

Planning, forethought, and reasoning obviously involve conscious attention, as do mobilizing alarums, suggesting that consciousness serves to coordinate and integrate sub-systems.[9] The agent that does this is known to itself and others as the "self" of that individual [Metzinger 2010, p29]. Though it cannot take full responsibility for the actions of the organism as a whole, it appropriates an identity with the body and is often held accountable by others. It is more than a figurehead but less than an absolute monarch. It is a sort of virtual avatar of the organism, tasked with monitoring a real-time virtual representation of external reality and the organism's relationship to it. Consciousness is also closely bound up with memory [Lockwood 1998, p84]; it serves as a registration system for information coming into the system, which can then be tagged for future retrieval.

Yet, one may still ask: Why could there not be a *non-conscious* executive function, and *non-conscious* monitoring, just as there can be perception outside of consciousness? A possible clue lies in the responsibility of the executive function as decision maker. Sensory information available to the organism is essentially probabilistic and ambiguous. Yet, it is crucial for the organism, as for a corporation or government, that such information must nevertheless lead to decisive action. This means *deciding* unequivocally what is perceived, as opposed to probabilistic estimating of non-conscious processes. What the conscious self perceives is ideally *un*ambiguous, even at the cost of being wrong.[10] And what renders something certain is ultimately no more than the

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[7] In effect, homeostatically, to restore a state no longer requiring consciousness! [Solms, p179; Lamme 2015, sec11]

[8] Non-conscious visual perception in blindsight, for example, involves experimental results that are better than random but far less than certain.

[9] It seems to involve a synchronous broadcasting of information globally, especially to parts of the parietal and prefrontal cortices [Kandel 2012, p464-5] and also seems to be closely associated with particular features of the brain, including the claustrum, a sheet of neural tissue in contact with most of the cortical areas, which may even serve as an "on-off" switch for consciousness [Koubeissi et al 2014].

[10] Consider the Necker cube and other unstable figures, which *at any given moment* appear definitely one way or another.

assertion that it is so.[11] Moreover, there should be only one boss who decides; it would not be functional to have multiple seats of consciousness competing in the organism.

5. The virtual reality metaphor

Computation has served as a fruitful, if limiting, metaphor to explore the nature of mind. A computer can produce a virtual reality (VR), which may serve to explain, at least metaphorically, how the brain generates phenomenality [Lehar 2003a; Metzinger 2009]. If the mind is a virtual machine running on the wet-ware of the brain, then perhaps what we know as phenomenality is a virtual reality (VR) generated by the brain.

An obvious difficulty with this metaphor is that actual VR is a simulation made externally via an interface with the user's senses. In the metaphor, however, the *brain* is both the creator and the user of the experience. To apply the VR metaphor properly, we must switch from thinking of it as an artifact for a human observer's use to thinking of it as a simulation the brain creates for its own use. Moreover, the brain's VR is not an *imitation* of external reality, although it is experienced *as* external reality happening in real external space. We quite normally have, so to speak, an "out-of-brain experience" [Revonsuo 2006].

Another problem for the VR metaphor lies in the temptation to imagine a sort of hologram dancing inside the skull (which then requires an inner witness). While the VR is by definition first-personal as an *experience*, it is also third-personal as a *program*. An observer would not see the VR through the subject's eyes but would see only the subject wearing VR goggles, the computer, etc. Confusing these viewpoints can lead to absurdity, which has not prevented one commentator from claiming that "out beyond the walls and floor and ceiling of the room I saw around me was the inner surface of my true physical skull, and beyond that skull was an immensely remote external world, of which this world that was in my experience was merely a miniature virtual reality replica." [Lehar, 2003b].

A third problem, then, lies in thinking of the VR as a *replica* of the external world. The notion implies comparing two things: the copy and the original. But the brain cannot get outside the skull to verify the copy by comparing it directly to the original. Indeed, the brain's natural VR is not a "copy" at all, but an original creation that serves to guide the organism in navigating a putative external world. It functions like a map, based on data collected through interaction with whatever lies "out there." It is a *theory* of the external world, whose accuracy can only be measured by its success in permitting the survival of the organism. In sum, the brain creates its VR (phenomenality) as an efficient way to monitor the world, the body, and their relationship. How, then, does it do this?

Since the brain is literally sealed within the skull, to navigate the world it must "fly blind," possibly making use of a *model* it has devised of what lies outside a cockpit

[11] Cf. [Frith & Metzinger 2013]: "Only conscious experience… can represent something as *real* and as taking place *now*... There could be unconscious models… and they could certainly be characterized by a high degree of Bayes optimality. But only misrepresenting the probability of a hypothesis as 1.0 and simultaneously flagging it as a fact holding *now* via a window of presence turns a possibility (or a likelihood) into a reality."

that offers no direct view.[12] To literally put ourselves in the place of the brain, let us entertain a thought experiment. Imagine a subject sealed within a windowless compartment, with no exit, connected to the outside world via diverse "sensors" that supply only streams of digital information. The chamber is also equipped with various "effectors" of unknown function. The subject may find that activating an effector changes the sensory input. (In real life, "mistakes" in this trial-and-error process may end in the termination of the experiment; here we treat this as a repeatable game in which the player can "die" and reset to begin again.) The subject's task is to continue in the game, by correlating incoming data streams with outgoing commands in such a way as to avoid "game over." How might one proceed?

A first approach would obviously be simple trial and error until effective correlations are established that can be hard-wired. Greater flexibility could be achieved by constructing a theoretical model to account for observed patterns, so that predictions from this model can be tested by trying specific outputs. The model compresses a vast amount of data acquired through trial and error; its predictions can be compared with current input to update it, like a dynamic map. While that would be a laborious procedure, a user-friendly additional step would be a VR version of the theoretical model, which summarizes all the previous procedures and becomes an efficient interface with the putative external world. A first key point is that this VR is "true," or "resembles" the outside environment, just to the extent it permits continuance in the game. A second key point is that the subject in this interactive exercise will inevitably come to experience the VR *as* a real external world.

A virtual reality is a simulation, which involves limited detail, since it runs on a finite program; whereas natural reality may be indefinitely detailed. Perhaps one reason why VR entertainment is engaging—and its coarse-graining serves well enough—is that sensory experience itself is normally impressionistic. When attending to a visual scene, for example, it is the overall impression and the feeling it evokes that constitute the experience, not an exhaustive registration of all detail. It is an illusion that we fully and uniformly *see* all that is before the eyes. We see *that* there is detail, often without putting a finer point on it.[13] To the extent that a VR can present sufficient detail to give that sort of impression, it can pass as a substitute for sensory experience. By the same token, sensory experience itself is actually highly selective and digitized, but gives the impression of continuity and indefinite detail. One may think of the brain's natural simulation as an illusion, but there is nothing outside it to set a standard of comparison except the truths of science, which ultimately also can only be measured by evolutionary success.

We understand how a literal machine can produce an illusory experience for the human user of the device, because we have constructed systems that do this. The challenge here is rather to grasp how the brain can produce such an illusion for its own

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[12] Before the development of computerized flight simulators, the situation of the brain sealed in the skull was metaphorized by Keith Oatley [1978] as a pilot flying by instrument. Maturana & Varela [1980] also proposed that the organism simply tries to maintain a certain configuration of sensory input by means of its motor output. Metzinger [2009, p108] likens the situation of the brain to that of a "total flight simulator, a self-modelling aeroplane that, rather than being flown by a pilot, generates a complex internal image of itself within its own internal flight simulator."

[13] We return to this question in section 10.

use. The question is how there comes to be an actual view from the brain's point of view, how there comes to be "something it is like" from that viewpoint.

6. Intentional connection

To answer that question, I propose that the brain *makes* internal connections on its own initiative: it is an *agent* rather than a *patient* (in the archaic sense of the term). Its processes are intentional as well as causal. This distinction itself is a matter of point of view: *cause* is observed by a third person; *intention* is the act of a first person. Since these are ways of looking, they do not logically exclude each other. However, science has in practice excluded the first-person perspective, in favor of third-person description. It is primarily this exclusion that hinders the scientific understanding of consciousness.

A second hindrance is the traditional understanding of intentionality, derived from Brentano, which is based on language usage. While statements are about something, it is not words that refer, but speakers. Reference ("aboutness") is not a property inhering in symbols but an action performed by an agent. An observer may identify internal connections as representing elements of the external world, which are significant to the organism as an environment full of consequence for it. But such reference resides in the making of the connection, not in the representing symbols themselves, which have no "pre-existing intentionality" [Kuipers 2007, p86].

The internal "language" of the organism is not merely syntactic, because the organism is motivated to survive. All meaning—including the meaning implicit in phenomenality—reflects the active relationship of the creature to a world upon which it critically depends. The meaning to itself of its internal communications is analogous to the meaning that emerges for a human language user in the act of reading or writing, of speaking or listening to speech, in which the communicator translates linguistic symbols (written or aural) into mental images, thoughts, and feelings—or vice versa. The brain assigns meaning to its internal connections, thereby evoking phenomenality in much the way that words evoke mental images. Symbolic ciphers are translated as conscious experience. But how?

In natural language, sounds and symbols carry meaning as words by deliberate convention. Similarly, algebraic symbols gain numerical significance by the mathematician's fiat: '*let x stand for such and such…'* Phenomenal qualities are comparable to intelligible meanings carried by means of a constructive fiat, similar to the emergence of meaning from the babble of spoken syllables or the squiggles on a written page. Pain, for example, represents something (e.g., tissue damage) as well as compelling a response. We do not normally question the reasons for our own neural connections, to which we do not have conscious access. Yet, it is only from a third-person perspective that they appear arbitrary, merely conventional or uncompelling, because the observer is then not in the position of being the agent that makes the connection. As in the case of a foreign language, it may then appear mysterious that such apparently meaningless connections carry meaning.

The creation of sensory experience is *like* the creation of mental imagery in response to language or giving rise to it. There is a *resemblance* between full-blown sensory images and their subtler cousins, mental images. Of course, simply pointing to the similarity does not explain what they do and do not have in common. Yet, their very differences may provide a clue to what is required for sensory phenomenality.

One difference stands out: mental images convey only the detail they already embody from prior input. Unlike a sensory image, a memory or visual imagining cannot be searched for more propositional information than it already graphically presents and stores. A retinal image, in contrast, is constantly updated in real time (or nearly), and so is an ongoing source of new data. The visual field itself changes as the world changes, but is also continually refreshed through eye saccades. Somehow this constant renewal of an external source of sensory input provides a vivid experience of reality, as distinguished from paler imagination and memory. But another factor also characterizes sensory experience: the very significance of reality to the organism.

6. Embodiment

Embodiment is more than physical instantiation. It is a relationship of an agent with the world, whether established through the present interaction of the individual or the interaction of the kind over generations of natural selection. The meaning to the organism of its internal communications derives ultimately from its evolutionary history. It involves potential consequences of events for the organism. That these consequences mean something to the organism implies valuation, particularly with respect to potential action. To the fly, the descending swatter *means* "get out of the way." The fly does not need to have phenomenal experience, think, or make a conscious decision to perform this evasive action, since the reaction can be automatic (and indeed must be, for the sake of speed); yet the action expresses an intention to survive, and the descending fly swatter has a significance in relation to that intention. The human intends to kill the fly, or chase it away, but the fly does not need to know the human's intention in order to take the evasive action. A social creature, on the other hand, often *does* need to be able to read (or imagine) the intentions of its conspecifics, who may even issue deliberate warnings as a substitute or prelude for more serious action. Either way, meaning refers to possible consequence and response.

This presupposes a system of values (survival is good) and the possibility of effective action (quick take off). The creature seeks out external conditions that permit internal conditions to remain within tolerable limits, and tries to avoid conditions that do not. Yet, evaluating significance doesn't have to be conscious. It is enough that those creatures alone survive that are programmed in such a way that they take appropriate action with regard to various stimuli. When it *is* conscious, valuation is experienced as feeling and emotion. Cognitive science has tended to ignore the affective states that permeate all of human experience. Such a prejudice derives from the exclusion of the subject, the body, and "secondary" qualities from relevance in physics in favor of abstractions.

It would be incredible that mere physical stimulation should be imbued with meaning if the organism could do no more than receive physical energy and react as inert matter does through efficient causation [Dreyfus 2007]. However, the organism does far more than is suggested by stimulus and response. It *acts* in an environment full of consequence for it and *assigns* significance and meaning to stimuli according to its own values and criteria, which have been conditioned by natural selection. Its values reflect its evolutionary success, not necessarily reality as conceived by a scientific observer.[14] Its nervous system evolved to guide adaptive behavior in a specific niche and for specific purposes, which is not the same as producing veridical perceptions [Hoffman 2011]. Color perception, for example, provides certain kinds of useful information, such as which fruits are ripe. It is less directly related to properties of light such as wavelength, or of surfaces, such as reflectance. The question of whether the world *has* color is not well-formed, for color is not simply a property of objects, but involves the interaction of the world with the perceiving organism, according to the latter's nature and needs. Yet, according to the principle of co-determination, the same may be said even of so-called primary qualities such a shape and size, position and time, and the very existence of "objects."

It would not be surprising if we share cognitive biases with other creatures with which we also share most of our genetic makeup. Experiments with monkeys, showing their responses to various colors, shed light on some human preferences [Humphrey 1976]. They also hint at the evolutionary meanings of color qualia themselves as "a species of affect-laden intentional activity" [Rovane 2000]. Following Darwin, we should expect that all phenomenal qualities reflect processes conducive to survival [Jackson 1982]. Far from being epiphenomenal, qualia are often intimately linked to appropriate behavior.

7. Phenomenality and behavior

I experience a tickle in the throat, and compulsively begin to cough. What is the relation between the tickle sensation and the behavior of coughing? Does the experience cause the behavior? Not in the usual sense of efficient causation, for modern science neither allows nor requires anything outside physical processes or entities as causally effective. Is the sensation epiphenomenal, playing no functional role? No, for the tickle sensation *represents* to the organism its state of readiness to cough. But, toward what end? We are not dealing with a merely causal system, but also with the reasons for an action.

The tickle represents a state of affairs to an agent that might act upon it independently of the coughing reflex. The *sensation* serves as an emblem of that reflex, as well as of the irritation, to inform the agent about the occurrence of both. The job of this agent is to monitor the state of the organism and the activities of various sub-agencies, because it has executive powers to override the cough or to plan some other action to deal with the irritation that registers as a tickle. The executive function itself cannot be automated like the coughing reflex because automatisms are fixed algorithms that can deal only with well-defined situations to which they are adapted. The registering of the sensation bears information about the stimulus and the appropriate response, and constitutes a separate function independent of automated behavior.

Similarly, there is valuation and more or less programmed behavior associated with other sensations, such as itching, pain, hunger and thirst, sweetness, bitterness, or

[14] As one commentator wryly puts it: "Perception is not about truth, it's about having kids" [Hoffman and Prakash 2014]. On the other hand, if *all* cognition is merely adaptive behavior, is science merely a strategy to have kids?

attractive and repulsive odors. Certainly, these contain information about the proximal stimulus. The associated behavior contains the *meaning* to the organism of the sensation—that is, what it should do about the stimulus as a first response. Other sensations—such as provided by the distance senses—may lack obvious behavioral concomitants. What is the "meaning," in the above sense, of specific color sensations, for example? While the answer may not be readily apparent, the question is not without sense. Rather, it then becomes more general: how does the organism establish the meaning to itself of its sensory input?

The single-celled organism can deal with physical contact with a reflex of withdrawal or engulfing. For complex creatures, more complex behavior is usually required, but it remains grounded in the biologically fundamental responses of approach and withdrawal. While behaviors of aversion and attraction need not involve consciousness, consciousness necessarily is grounded in the values behind such behaviors. Affect, with the judgments behind it, is therefore central to consciousness.

The event with most immediate consequence for the organism is physical contact, of which the sense of touch yields a perception whose experienced quality is undifferentiated from the force of the contact itself [Jonas 1966/2001, p148]. At the primordial level, the affect and the behavior form an undifferentiated whole.[15] Even the apparently disinterested information gathering by the distance senses has its evolutionary roots in the affective values of immediate feeling-response [Dennett 1991, p181].

The paradigm example is pain, which is at once feeling and response. To the organism, pain *means* the associated behaviors of withdrawal, avoidance, and protection of an injured part. But the pain response has two phases, corresponding to two neural pathways (c-fibers and a-fibers).[16] One is a quick reflex reaction—for example, removal of the hand in response to contact with a hot surface. The slower response of lingering painful feeling reflects an ongoing, *internally generated* stimulus, which over time continues to acknowledge the tissue damage during the process of healing. The associated response is protective behavior. We might think of the ongoing nerve signal responsible for it as consisting of re-iterations of an initial undifferentiated impulse-response: a persisting reverberation or reactivation loop [Humphrey 1992, p204-5]. The time integration of these reiterations constitutes the *quality* that signifies persisting damage and the process of repair—namely, the hurtfulness of the pain, which requires the organism to be mindful of the injury. This conscious experience of pain carries several implications: first, that the initial reflex was not sufficient to avoid injury; second, that the injured part must be favored during healing; third, the lesson to avoid such stimulus in future; and fourth, that the experience is not a passive reception but an active management of the situation.

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[15] Herbert Spencer [1890] had a basic intuition that the key to affect as a phenomenal experience lay in the behavioral response associated with it. He postulated a primitive "shock," an impulse in which feeling and response are united, and from which the brain may proceed to differentiate various sensations according to modality.

[16] As Dennett [1978, p200-202] points out, the physiology of pain is more complicated than this, involving separate channels through the "old brain" and the "new brain," and also the possibility of other pathways influencing the experience of pain. This should not affect the argument here, which concerns the grounding of the felt quality of pain in the associated response.

On the basis of this kind of simplistic analysis, can we hope to understand in a similar way qualities such qualities as color, auditory tone, and smell, which do not seem to involve a reflex response or other associated behavior? The challenge is to understand the grounding of phenomenal qualities in affect. A reflex response to a proximal stimulus has direct benefit for a creature. However, on the example of pain, it is not this immediate reaction, but mediated *valuation* after the fact, which is salient for phenomenal qualities and upon which subsequent *considered* action can be based. This mediated valuation continues to carry with it the implied (but not actualized) immediate reaction. There is neurological evidence that phenomenal experience involves efferent as well as afferent nerves [Ellis 2000, p44].[17]

There is no immediate behavior associated, for example, with visible light of a given wavelength, which is generally too weak a stimulus to directly impact the organism by the sheer force of contact [Jonas, p29].[18] (For visible wavelengths, the energy transfer involved in the encounter of a cell with a photon would be miniscule.) Especially for larger organisms, in order to lead to response such non-invasive stimulus must be *interpreted* as having a significance requiring considered action, which is not a reflex but complex behavior.

All nervous activity consists in the same sort of electrochemical signals, and all exteroceptors derive from the cell membrane of the organism. Visual receptors differentiate tissue and signal alike in such a way that light is no longer essentially a proximal stimulus with immediate import, but conveys information from a distance. It no longer bears the same implications, and engages a different level of response: monitoring and evaluating from afar. The distance senses are thus freed from the need for the immediate response implied in contact. Visual and aural *qualities* are accordingly dissociated from such response. Yet, plainly, auditory tone results from repeated iterations of a wave front impinging on the eardrum, while the single wave front is but a negligible or meaningless disturbance. The qualitative experience of tone emerges as many such events rapidly encountered are synthesized into an experience representing an overall texture. Similarly, a stable visual world emerges from repeated saccadic "takes" on the retinal surface, without which the visual field dissolves [Solms 2014, p183]. And, as we have noted, pain emerges from an ongoing reiterated stimulus that initially (as a single event) entailed but a reflex response. The brain integrates such repetitive micro-events into a gestalt, with a texture that is a phenomenal quality. To what end?

While non-conscious mental processing occurs *before* the conscious experience it underlies, this does not render the conscious experience superfluous. Rather, the

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[17] "Consciousness always involves efferent activity, defined as neural activity generated by the organism itself, for purposes of its own survival and well-being, rather than from passive stimulation by incoming sensory signals." Cf. also [Humphrey 2000, p17-18]: "In order to be able to represent 'what's happening to me', the animal must in fact continue to issue commands such as *would* produce an appropriate response at the right place on the body *if* they were to carry through into bodily behavior."

[18] "The smallness (in dimension, time rate, and energy) of the unit-actions and reactions involved in affection of the senses… permits their mass-integration into one continuous and homogenous effect… Where qualities are perceived, the raw material is action: impacts, hustlings, clashes on a molecular scale. Organisms not far exceeding that scale can therefore have no perceptions, but the collision experience [sic] only."

conscious experience indicates recognition of that non-conscious processing, after the fact, by an executive function (the self). The persisting experience of pain serves not to avoid the original stimulus, but to avoid further damage and facilitate healing. It forces the organism to favor that part.[19] The conscious experience serves a distinct purpose, with a different associated behavior than the pre-programmed response. Consciousness serves to monitor various activities of the nervous system, just as the computer user monitors the state of the central processor, interacting with it via desktop icons [Hoffman 2008]. It also serves a different purpose than its own underlying non-conscious processing, just as a computer desktop serves a different purpose than the computational processes that produce its pixels.

A partitioning of quick and slow pathways, similar to that of the pain response, seems to exist in the visual system too, where an initial fast wave of visual processing happens outside consciousness, and is made available to subsystems for immediate responses. This is followed by a slower phase of "recurrent processing" that involves integration of various brain areas leading to conscious experience [Revonsuo 2010]. Here too phenomenal qualities emerge from the reiteration of an original signal and serve a different purpose from it.

8. The language of the senses

Whatever the color red signifies to the organism may not be the same as what it did a million years ago, just as many words in Shakespeare's plays do not have the same connotations to a modern as to an Elizabethan ear. Shakespearian scholars attempt to make up this deficit, and evolutionary scholars attempt to unravel the changing meanings of the language of the senses. The intentionality involved in color perception, for example, is deeply buried in the evolution of the primate visual sense. The very existence of color categories (hue) indicates an evolutionary significance, since they clearly reflect needs of the organism more than properties of light or reflective surfaces. While we have little need to be engaged by outdated behavioral correlates of color qualia, the very nature of the visual system is to divorce itself from immediate behavioral implications. We gain the detachment vision provides at the cost of access to the underlying subjectivity. Nevertheless, the challenge presented by the apparent objectivity of the visual sense is to understand how its qualities derive indirectly from affect: that is, to speculate on the behavioral meanings of phenomenal colors. Evolutionary advantage explains color *discrimination*—why things appear to be differently colored—but not why a particular wavelength of light appears just so and not otherwise.

Since the diets of Old World primates consisted significantly of fruits that were yellow, orange or red [Tsou 2013], it would make sense for these food items to stand out for our ancestors from a background of foliage. Subjectively, we tend to think of red as contrasting maximally with green. (Yellow is closer to green in wavelength—hence contrasts with it less than red—but also may indicate a less ripe fruit.) In the forest context, at least, the color red signifies something singular—whether a ripe fruit or a

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[19] One might infer that insects, which do not seem to favor damaged parts, do not experience pain as a result of those injuries [Eisemann et al 1984]. Patients who pathologically cannot experience pain are at severe risk.

poisonous creature [Dennett 1991, p385].[20] But this still does not tell us why the chlorophyll of foliage does not appear red and the ripe fruit green, which would maintain the same relative contrast for discrimination. What is it about the qualitative feel of greenness that commends it to represent foliage in the vocabulary of the senses? And what about redness commends it to represent things that must stand out against that background?

The question may be likened to asking why a particular meaning is denoted in a particular language by a particular word, written and pronounced its particular way, rather than by some other symbol. For the native language user, the association seems natural and self-evident, though of course it is actually a social convention and a product of historical accident. The internal communication of the organism may be no less arbitrary in its choice of symbols. *Some* symbol must be chosen, and will inevitably come to seem imbued with the meaning it has been made to convey by convention. Thus, it is backwards to ask why grass "feels" green; rather greenness is what it is by virtue of the association with grass. Greenness is the way we visually experience the totality of associations related primarily to chlorophyll.

Moreover, like language, perception is motivated. Originally language may have served to alert or warn others. The first human vocal expressions were probably not so different from the excited alarm calls of primates and other animals. What makes fully grammatical language powerful is precisely its dissociation from fixed meanings and context, so that it may be used in a detached and flexible way. For the human being, capable of abstraction and bent on transcending the natural condition, the informing significance of many phenomenal qualities is no longer strictly compelled by the original urgencies from which they were derived. Yet, some colors continue to have affective values for human beings, as for their primate relatives. They can serve to capture attention, to convey information, and to bear an emotional charge. Monkeys tested for color preferences showed a preference for blue and green and an aversion to red, which agitated them. Red can signify a variety of quite different things. It may be precisely this ambiguity as a signal that imbues red with its characteristic charge, and creates anxiety in a situation that does not lend a natural interpretation.[21]

In any case, the *sensation* of redness (unlike the word) is not merely a linguistic convention subject to social change, but a convention of neuro-logical organization, with the force of long genetic precedent. Indeed, the human cognitive system adapts to distorting colored lenses or filters in such a way that subjective experience of verdant foliage, for example, is eventually restored to its normal greenness [Neitz, et al 2002]. While the words of a natural language have relatively transient definitions, the meanings of qualia are backed rather by evolutionary history. The sensation of redness is just what it is, and different than the sensation of greenness, precisely because of the real-world

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[20] Other associations are possible, such as blood, or colorings related to sexuality, or the red of dusk when some predators hunt. No doubt all qualia involve a matrix of such associations, for which the quality itself stands summarily [Loorits 2014].

[21] However, as Humphrey [1976] explains, the laboratory context must be taken into account, where the natural context for response cannot be re-created.

things it refers to in our evolutionary history, from which it cannot be arbitrarily dissociated. This is why there can be no "inverted spectrum."[22]

9. Filling in

A solution to the hard problem must include a theory of qualia.[23] The qualities immanent in phenomenality (qualia) are far from "epiphenomenal" with regard to associated cognitive behavior, neural processing, or the physical facts that seem to be their objective counterparts. When we look at a source of green light, for instance, one should not imagine that one's brain dispassionately assesses a frequency and then "colors in" that information with the superfluous quality of greenness. Rather, the experience itself of greenness is a qualitative estimation of frequency (among other things). Similarly, the perceived quality of a particular musical tone is itself an estimate of sound frequency, the experience of warmth or coldness an estimate of temperature, etc. Sensory qualities are thus not something gratuitously added to the information they represent, nor are they caused by it. Rather, they are a *version* of that information, synoptically presenting it to the executive function. Qualia, in other words, are a way the embodied subject first-personally presents to herself physical information that an observer might also detect by means of laboratory equipment and describe in terms that are third-personal, physical, propositional, and quantitative. If the specific quality of greenness seems to convey privileged information beyond that involved in the public analysis of light, this is because (along with information about the world) it also bears information about the organism—its priorities and evolutionary history, its habitat, its *relationship* to the world, and the internal communication that mediates that relationship. *That* information cannot be recovered merely from facts about the external world.

Propositional knowledge in general, and as conveyed in science, concerns perceived *differences*—that is, *differences among qualia*—which are construed to be differences in the world. Facts are thus *based* on phenomenal experience, but are not the experience itself. Qualia contain implicit information about structure in the world, which propositional knowledge renders explicit as "facts." Qualia seem ineffable because, while they *already* recognize and refer to structure, they are themselves by nature structureless. Their function is to *integrate* differences or structure in such a way that the resulting quality stands for that information. Thus, they "fill in," so to speak, between discrete events.

The brain smoothens over the jerkiness of eye saccades, for example, like it does the separate frames of a motion picture. Otherwise put, it fills in the continuity and stability of the visual field like it fills in the blind spot, and fills in the quality of a tone, integrated over successive wave fronts.[24] The key point is that this "filling in" process does not *perceive* local continuity but *asserts* it. As Dennett [1992] has noted, the brain

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[22] The 'inverted spectrum' is the "apparent possibility of two people sharing their color vocabulary and discriminations, although the colors one sees… are systematically different from the colors the other person sees." [Wikipedia: inverted spectrum]

[23] Wikipedia defines qualia as "individual instances of subjective, conscious experience."

[24] To be perceived as a *tone*, there must be a regular repetition of wave fronts hitting the eardrum. A single wave front impinging on it will not be experienced as a tone, if it registers at all.

recognizes continuity in the world by disregarding the actual sensory discontinuity.[25] If the brain can create such an appearance by simply asserting that it is so, then why not all appearances?

Only in anomalous circumstances do we even notice this sleight of mind. These circumstances include laboratory studies of perceptual completion effects, habituation, perceptual adaptations of various sorts, and phenomena of spatial projection—all of which are examples involving what I call acts of fiat. A feature of such effects is that the subject's phenomenal experience typically seems to go beyond the facts or events that would be noted by an observer. That is, the subject's brain invents what is "not really there" according to a bystander. I contend that qualities in general may be understood as such completion, adaptation, or projection effects, while offering the caveat that what is deemed "really there" involves a fundamental bias deriving from the scientific commitment to the third-person point of view.

"Filling in" is simply an unfelicitous way to describe a fundamental aspect of all perception, which may alternatively be described as an act of invention, positing, or fiat. It demonstrates the constructive capability of the brain, a basic process of interpolation [Crick and Koch 1992/2002, p15]. Numerous laboratory experiments demonstrate visual completion effects of various sorts.[26] Other experiments demonstrate various forms of spatial and temporal projection. Still others (among which the famous experiments of Stratton, repeated in many variations) show the adaptability of the nervous system to restore perception that corresponds to functional behavior within an environment. Some lead to quite bizarre experiences, such as the disorientation first experienced by subjects wearing lenses that invert or reverse the optical input to the eyes; or the strange feeling of phantom limb that can be induced in the "rubber hand" experiment [Metzinger 2010; Botvnick & Cohen 1998]. Apparent motion effects are familiar in modern culture through motion pictures and illuminated signs. Such effects, which are usually artificially induced, are considered illusory when they involve perceptually jumping to a *false* conclusion. But the general lesson should be that *all* perception is naturally a matter of jumping to conclusions, whether warranted or not. Phenomenality might then be characterized as a useful illusion, a virtual reality realistically guided by sensory input.

The terms 'filling-in' and 'completion effect' are somewhat ambiguous, since they sometimes refer to what is *experienced* and sometimes to something the brain *does*. In the latter sense, there is evidence [Pessoa et al 1998] of a neurological basis for completion or filling-in, despite Dennett's [1978] well-known objection that the brain simply *ignores* an absence. In the case of the blind spot, the experience of continuity of the visual field overrides a defect of physiological design. It is the brain's way of representing to itself its (true) belief that, despite the blind spot, the external visual world is actually continuous. I hold that qualia *in general* are a result of the same sort of creative process as involved in the blind spot and other completion effects, all of which reflect a positive act of assertion. One might then wonder, *in the general case*, what the brain fills in *between*—just as in the case of the blind spot it fills in between the enervated retinal areas on either side of an un-enervated area. The answer must be that these functional adjacent areas *too* are filled

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[25] His valid point is to distinguish, for example, between representing a continuous phenomenal field and representing *that* it is continuous. It is precisely the latter I claim as the normal basis of phenomenality.

[26] For a taxonomy of perceptual completion phenomena see [Pessoa et al 1998].

in, but on a finer scale (between receptors), and temporally as well as spatially. That is, the brain *generally* asserts continuity across discrete structures or events when their discreteness is irrelevant, just as it asserts continuity between frames of a motion picture. Phenomenal qualities are “filled in” just as the quality of being fifty years old is filled in between one’s fiftieth and fifty-first birthdays, virtually by edict.

10. Perception *of* is perception *that*

However complex the neural processes giving rise to them, qualia are essentially simple and integral gestalts [Crane 2000, p188]. This is so first of all because there is no conscious access to the underlying complex processes; but equally, because qualia are by nature syntheses that summate information without revealing its path history. Information is implicitly conveyed about wavelength of light, reflectance, sound frequency, etc.— which an observer can measure as *quantities.* But the succession of wave fronts of light or sound is integrated into a seamless emerging *quality*, which may then serve to represent more than these physical properties. One may speculate that qualia are built up essentially from primitive *responses* at a lower level, in the way that a digital image is built from pixels [MacLennan 2005]. Each “pixel” represents a simple judgment or assertion (1 or 0), but the image that emerges is an integration of that digital information,[27] facilitating judgment and response on a higher level. The miniscule energy and individual import of discrete impulses (pixels) is absorbed into a larger synthesis with which the agent has a different relationship [Jonas 1966/2001, p29].

Mental images are sparsely detailed, compared to perceptual images. But even the latter are only relatively detailed. The perception of dense or complete detail in sensory experience is illusory, since it is little more than the assertion *that* there is unlimited detail. The good faith of this assertion is backed up by the fact that the senses can access additional information about the external world upon demand, whereas mental images cannot.

Suppose I close my eyes and conjure a mental image of a printed page. Unless I have keen eidetic memory, I may note little more than the presence of typed letters in lines, without being able to read actual sentences. Perhaps words are only partially made out, and not even in a distinct typeface. In effect, what I “see” is *that* the imagined or recalled page contains printing, words, and sentences. Now I open my eyes and look at a real printed page in a language I know. I can access the actual words and sentences and read them by directing my foveal vision at a line of print, one phrase at a time. In my peripheral vision, however, the words may not be clear, though I may anticipate them because of context. Either way, r*eading* a word is a matter of *deciding* that a particular configuration of marks on the page represents a word in the language I know, which in turn represents a particular meaning. Even when the individual word is clearly in focus, seeing is recognizing *that* something is the case.

Let’s say that now I notice a painting on a distant wall or in my peripheral vision. Though I may have seen it every day, peripherally or from a distance I recognize *that* it is a particular painting, with a variety of colors and of a certain size, but perceive little more until attention can search out more details with foveal vision. Noticing a “detail,”

[27] One ‘bit’ of information is literally a decision between ‘1’ or ‘0’.

however, is much the same as noticing that it is a painting, but on a smaller scale: it is a matter of asserting a fact. The possibility to identify indefinitely many such details (by getting nearer, by directing the fovea, or by paying closer attention) distinguishes sensory perception from remembered imagery, imagination, or dreams. But the impression that perception reveals reality in full detail at a given moment is illusory [Crick and Koch 1998, p99]. A glance takes in with clarity only a small portion of a repetitive pattern—on wallpaper, for example. Yet it seems subjectively (and falsely) as though one uniformly "sees" all the individual forms that are repeated [Dennett 1991, p354-5].[28] I take this a step further to claim that it only seems (falsely) that we clearly see even the single isolated form!

In other words, perception in general is perception *that* rather than perception *of*. The latter, in fact, is scarcely a coherent notion. For it presupposes a read-made presentation of what exists, as though one passively surveys a panorama given in its entirety, while the challenge is to understand how the mind constructs that panorama. While this presupposition is the fundamental tenet of naïve realism, it is also is a belief of which we have been convinced, perhaps, by the objectifications of physics. But perception entails cognizing sensory input as we go along, following attention. It is an act of the organism, the momentary assertion of a proposition, a decision or judgment made about what is sensed. It may not be a *final* decision (as illustrated by the Necker cube and other ambivalent figures about which the brain cannot make up its mind); but in the moment, it is made with the tautological finality of all declarations by fiat, as in the mathematician's "Let *x* stand for such and such…" and the divine "Let there be light!" This unequivocal action of assertion, which I call fiat, is the essence of mind and the basis of phenomenality, which cannot be understood so long as the organism, the brain, and matter at large are considered essentially passive.

10. A note on qualia[29]

The problems posed by qualia have aroused many passionate discussions in philosophy of mind [Armstrong 1999, p121]. This is scarcely surprising, since explaining qualia effectively *is* the hard problem [Crane 2000, p171]. Since perception *of* is perception *that*, it is sometimes argued (e.g., by Dennett [1991]) that qualia in themselves don't exist.

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[28] Dennett's example is wallpaper by Andy Warhol, with a repeated image of Marilyn Monroe. Such an image is literally an icon, with limited detail, and easily identifiable. This is not the case with perception of a natural scene, which may be ambiguous and contains indefinite detail.

[29] According to Wikipedia, "qualia are individual instances of subjective, conscious experience." In other words, they are the individualized contents of phenomenal experience. The term 'qualia' (singular 'quale') was first used in its modern sense by C. S. Peirce in 1866. But explicit focus on the role of qualia in the mind-body problem began in 1958 with Herbert Feigl's *The Mental and the Physical*. [Crane 2000, p177-81] I sometimes avoid the term in favor of the more informal 'quality'—to emphasize the qualitative aspect of experience—a term that dates to usage by the early natural philosophers, who distinguished secondary qualities from the primary ones that were supposed to be quantitatively expressed. 'Qualia' has since been associated with the secondary qualities, in contrast to supposedly objective properties of the external world.

That is, only propositional information exists. The *notion* of qualia is problematic—like the disgraced notion of 'sense-data'. For, qualia are not normally *objects* of perception, but are the acts of perception itself. One does not ordinarily see such things as "color patches" or have "raw feels." In other words, pure sensation is not normally factored out from perception. Yet it is possible, with special effort, to "deconstruct" features of visual experience, for example, to attend to color patches instead of colored objects. Painters routinely do this, and we are culturally accustomed to the idea of pure color through the use of paint. Some meditation techniques train the subject to relax the interpretive aspect of perception and focus on bodily sensations. However, color patches and raw feels are not the *input* to cognition but the *result* of special cognitive acts. In experimental situations, qualia are artifacts of the experimental set-up. (For example, one does not usually encounter monochromatic colors in nature, in isolation from objects and surfaces.) So, the notion of qualia hinges on self-conscious introspection and artificial conditions; but that hardly negates their phenomenal existence.

As pointed out already, phenomenality is a function of the organism interacting with physical reality. It is as much a property of the organism as of the world. This is why Jackson's [1982] artificially sequestered scientist "Mary" can know everything there is to know about physical processes while not about qualia. Phenomenal experience is not deducible from physical facts alone, nor can it be reconstituted from such facts. This is because physical facts are denatured in the first place—distilled *from* phenomenal experience—and because consciousness is not a product of the object alone, but of the subject and object together.

11. Summary conclusion

I have assembled threads of an admittedly loose argument, that to solve the hard problem it is necessary to take the point of view of the organism and its subagents. However, what is necessary may not be sufficient.

In any case, it is useful to try to understand—from the inside, as it were—how the organism constructs its own first-person point of view and phenomenality. The organism does this through acts of fiat that an observer can translate as propositional assertions. The brain creates phenomenality in a parallel way to how it creates meaning in language, through the use of symbols to which it *assigns* meaning in the context of an embodied evolutionary history. Phenomenality is an internal representation, to itself, by an executive agent (the conscious self), which is tasked with monitoring the state of the organism and its environment, planning future action, and coordinating various sub-agencies. I have tried to show in principle how such an agent can and must be conscious. Does this sketch succeed in providing the basis for a *scientific* solution to the hard problem? Short of that, does it suffice at least to appease the intuitive sense of an explanatory gulf?

The first question must be answered negatively *for science as it stands*, which excludes a first-person perspective by definition. The limiting exclusion of notions of causality other than efficient cause, the view of matter as fundamentally inert, and the paradoxes of objectivity, may eventually lead to changes in the scientific program. But until then, consciousness is bound to elude its constrictive net. Yet, even if these conditions could be remedied, there might still seem to remain an explanatory gap. To liken the creation of phenomenality to the creation of meaning in language may simply be restating the problem in other terms. For there then remains the question of how words can evoke mental images. My answer is: by fiat! But to some that may seem circular—no answer at all, let alone a scientific one.

Because the second question has a subjective and individual dimension, some readers more than others may find satisfaction in the approach presented here. As the author [Chalmers 1995] who coined the term 'hard problem' has put it, one may still feel that there remains a sense in which *no* approach can tell us why there is phenomenal experience at all. Yet, he is quick to add: "But this is the same for any fundamental theory. Nothing in physics tells us why there is matter in the first place, but we do not count this against theories of matter." Despite scientific advancements, we may never have an answer to the mystery of why anything exists at all. Similarly, we may never have an answer to the mystery of how there can be consciousness of it. Indeed, it is only the reflexivity of the conscious mind that gives rise to such questions, and it may be this very reflexivity that renders an answer to them perpetually elusive. Yet, even if the very nature of consciousness poses limits to an understanding of itself and the world, there is much to do within those limits.

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