Mutual Enhancement between Science and Religion

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TRANSFORMATION AND THE WAKING BODY: A RETURN TO TRUTH VIA OUR BODIES

by William H. Beharrell

Abstract. This article considers the kind of knowledge that is constituted through embodied sensory perception and makes the case for a form of knowledge that is embodied, relational, and potentially transformational. Such knowledge is encountered through our physiological senses and cultivated by reestablishing connections to our bodies. The discussion starts by exploring the literature on sensory perception and interoception and moves on to the role of human agency, which is implicit in the idea of top-down causation. It is argued that this process can be explained by a top-down predictive model within which a sense of greater interoceptive accuracy may be cultivated while reducing interoceptive perturbation. The roles of active and perceptual inference are discussed with regard to the regulatory opportunities that these types of attention yield. By being more interoceptively aware, through a practice of contemplation, it is argued, we open ourselves to an encounter with divine presence that is immanent in the world around us.

Keywords: contemplation; interoception; perception; sense

The idea that cognition and sensation are essentially separate domains continues to dominate professional medical and scientific discourse. The idea that our rationality is influenced by our bodies—central to the field of embodied cognition for three decades now and integral to other traditions for very much longer—is, however, prompting fresh consideration of the role of embodied experience and self-representation. This article

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considers the kind of knowledge that is constituted through embodied sensory perception and makes the case for a form of knowledge that is embodied, relational, and potentially transformational. It is based on the following four premises: that such knowledge is encountered through our physiological senses; that it enables a process of transformation, that is, the process of healing, integration, self-realization, and ultimately self-transcendence; that spiritual contentment can be cultivated by reestablishing connections to our bodies; and that it is indeed possible to change one's habits of self-perception.

The discussion starts by surveying the literature on sensory perception and interoception to examine the claim that perception is best understood as a process—embodied, active, and dynamic—in which sensory inputs and motor outputs are integral to the cognitive appraisal and mental representation of self. It considers how our olfactory, visual, and auditory senses rely on extensive nonlinear bodily connections between multiple sensory modalities and moves on to the role of human action and agency, which is implicit in the idea of top-down causation and illustrated by Ursula Fleming's encounters with patients suffering from chronic pain. Realist and enactivist conceptions of perception are reviewed and compared to the classic Platonic idea of form as cause and the Scholastic concept of innate ideas. This leads to the point that objective reality is neither discovered, nor subjective reality invented, but that we perceive the world by participating in a process of "responsive evocation" (McGilchrist 2009, 133). It is argued that this process can be explained by the concept of predictive coding, which offers a top-down predictive model within which we can learn to cultivate a sense of greater interoceptive accuracy while reducing interoceptive perturbation. The roles of active inference and perceptual inference are discussed with regard to the kind of attention we direct toward bodily experience and the regulatory opportunities that these types of attention yield.

The article moves on to suggest that this sense of agency is contingent on a certain kind of attention to bodily experience, and that by being more interoceptively aware, we encounter a divine presence that is immanent in the world around us. This is particularly relevant to the idea of personal transformation, of the kind illustrated in the series of miracles recorded in the various New Testament Gospel accounts. Instances of this kind challenge the conventional understanding of our bodies. What, for example, do we suppose was happening in the body of the lame man who took up his bed and followed Jesus; or the blind man whose vision was restored; or of the menorrhagic woman who reached out to touch Jesus' cloak to stem years of bleeding? Other traditions also challenge our understanding of the body. One thinks of the "subtle body" concept in Tibetan, Chinese, and Indian medicine and the manner in which those traditions explore somatic sensations and energy centers/channels. Common to such traditions is the

central role of attention to embodied experience and its significance for the process of self-representation.

This point was illustrated, memorably, by a seventeenth-century thought experiment. Suppose a man, who is born blind, is able to see again. Having already learned to distinguish between a globe and a cube on the basis of touch, could he now distinguish between them by mere sight alone? Such is the question posed to the Enlightenment philosopher John Locke by his friend William Molyneux. "Molyneux's problem," as it became known, led Locke, Diderot, Voltaire, Berkeley, and others to question the prevailing assumptions about perception, one of which was that perception was based on sight. John Locke addressed Molyneux's question in 1690 in "An Essay concerning Human Understanding" in which he argued against the Aristotelian and Scholastic model of science and knowledge. He sought to establish a limit to human understanding—what one can know and what one cannot—and challenged the Scholastic idea of "innate ideas," claiming that the mind, prior to experience, is akin to a blank slate. He hoped to show "how men, barely by the use of their natural faculties, may attain to all the knowledge they have, without the help of any innate impressions; and may arrive at certainty without any such original notions or principles" (Morgan 1977, 5). According to Locke, no idea could enter the mind if it did not begin as a sensory impression. This tension, between what was then referred to as "nativism" and "empiricism," is as relevant to contemporary accounts of perception as it was in the seventeenth century. Even though the contemporary position has advanced and we now know that our experience depends not only on sight but also on complex interactions between our different senses, still Molyneux's question remains unresolved. Moreover, it is a good question with which to start this essay, because it challenges our assumptions about the nature of sensory perception, and also because it leads us to reconsider our understanding of what kind of knowledge is constituted by our senses. Such assumptions can be characterized by one of two positions: naive realism with its insistence on the ability of the senses to give us direct access to objects as they really are; and idealism, that school of thought in which the object of conscious experience refers to our internal representation of the world rather than the world itself.

The Senses

The philosopher Barry Smith asks whether blending is an art or a science. In what he describes as a "distinctly human act" (Smith 2019), he seeks to explain our proclivity for creating new and unique experiences by re-assembling familiar parts into otherwise unfamiliar wholes. Whether this is distinctly human or not (how could we tell?), it appears that what distinguishes a successful blend from an unsuccessful one are its qualities of harmony and unity—disparate elements taken up into a seamless whole.

It seems that collections of molecules reach us, via our olfactory receptors, either as "a single note" or as "a collection of odors." For example, Smith describes how Benzaldehyde can smell like "a mixture of cherry and almond whereas collections of up to 800 molecules can smell like one thing—coffee." Elsewhere, Smith suggests that we do, in fact, have two senses of smell: orthonasal and retronasal olfaction; the former a form of exteroception generated by inhalation, helping us to identify environmental threats or rewards; the latter a form of interoception, generated by exhalation, helping us to assess the quality of what we have just eaten or inhaled. The former gives rise to a sense of anticipation; the latter to a sense of reward.

The same may be said of our sense of hearing when reflecting on the thrill one feels when listening to a pipe organ rather than an electronic organ. In this case, the musical sounds which we hear are collections of many different vibrations described as "partials." Each note of a particular instrument or rank of pipes can be divided into separate partials that relate to each other in specific ways, the dynamics of which consist in varying speeds of vibration, and hence our concepts of third and fifth harmonics (which are, respectively, three and five times as fast as the slowest vibration, known as the fundamental). Though these might be duplicated by an electronic organ, there is an inevitable "flattening" of the sound. This is caused when the complex and textured partials emanating from a piped organ, which are variously absorbed and reflected by their interaction with elements in the room—and therefore reach the ears at different speeds—are substituted for a single sound wave, which is an electrical summation of all the partials of the notes played through a particular speaker (Peterson 1998).

There are some interesting parallels between blending flavors and making music, that is, between olfaction and audition. Smith quotes a perfumer, who is also a musician, who says that for her, fragrances resonate as musical notes: "You only need one piccolo in an orchestra, but an awful lot of cellos" (Smith 2019). She draws attention to the similarities in language as well. One speaks of an accord being a collection of notes that makes a single scent just as one might refer to a musical chord. Alternatively, one might speak of top notes, bass notes, and heart notes to remind us that flavors can retain their character even when blended, just as a musical note might do. Understood in this way, both olfaction and audition, blending and music, help to illustrate the multisensory quality of sensory perception, that is, each single sensory percept comprises multiple sensory modalities. For example, gustatory, olfactory, and oral somatosensory information is melded into a single experience we call flavor, which can even be influenced by our senses of sight and sound. Our appreciation of the piped organ comes to us not only through our ears but also through cutaneous and visceral feedback.

When one studies the senses from a physiological perspective, it is clear that each of the traditional "five senses" can be further subdivided into what are arguably distinct senses in their own right. Moreover, there are dozens of senses on which we rely, moment by moment, which are just as important as the "Big Five," such as proprioception, mechanoreception, chemoreception, or vestibular feedback. The somatosensory system alone has five distinct modalities and multiple neural pathways. The dominant point here is not simply that we rely on more than five senses in the ways we come to know the world, nor that our understanding of perception is limited by studying them in isolation, but that all our senses are embodied as part of a unified whole. Vision, for example, appears to require extensive bodily connection according to psychologist James Jones in his book *Living Religion* (Jones 2019). He describes a series of experiments by Mortimer Mishkin and colleagues in which the visual cortex was surgically disconnected from the rest of the nervous system. In other words, even though the optic tract connecting the eyes to the visual cortex was intact, when disconnected from the motor cortex, it left the monkeys blind. He infers from this that the ability to bodily enact visual experience together with nonvisual inputs are necessary conditions for vision (Jones 2019, 25). The same principle has been applied experimentally to other modalities. Jones goes on to explain that "if people cannot speak the words, they cannot hear them, even if their auditory processing faculties are fine." He refers to the use of magnetic waves by Mottonen and Watkins to temporarily interrupt the signals between the lips and the part of the brain that receives those signals so that the brain was not aware of lip movements (Jones 2019, 25). Sounds that required lip movements were unable to be differentiated but recognition of sounds for which the lips or tongue were not necessary was unaffected.

This means that perception is not simply a passive function of our "seeing," "tasting," "touching," "hearing," or "smelling" an object, but that it has to do with nonlinear connections between multiple sensory modalities. Or, as Jones puts it, "Neural anatomical, magnetic resonance, and lesion studies concur in finding that sensing, experiencing, and comprehending are closely linked to our capacities for implicit and explicit bodily activity" (Jones 2019, 26). Motor and sensory stimuli are coordinated, not only in terms of cognitive appraisal, but also of our affective response to sensory percepts. Emotional words, memories, or images stimulate emotion and motor action, just as bodily movement influences our emotional response in a reciprocal fashion. Using smiling muscles or nodding increases positive affect; shaking the head or slumping in your seat produces negative affect (Wells and Petty 1980; Strack et al. 1988; Cacioppo et al. 1993; Stepper and Strack 1993, quoted in Jones 2019). So, in this glorious "symphony of the senses," in which bodily action is an essential component of both our cognitive and affective appraisal of the world around us, our motor

and sensory networks are coupled in reciprocal action. We sense the world, not through any single modality but rather via a distributed and embodied neural network; and not passively, but by a process of active enquiry.

Agency, Form, and Reality

Moreover, if active, what is the principle on which we seek to direct our gaze toward the world? How exactly do we mediate between our subjective sense of being an active agent in the world and the world itself? For example, we rather glibly talk in terms of receiving "information" about the world through our senses. It is difficult to describe the cells and synapses of the visual pathway without referring to the "information" that is transmitted from the world around us to our visual cortex. The noun "information" is derived from the verb "to inform" or "to give form to the mind." Its usage employs a host of different meanings including knowledge, form, perception, and representation, but the most direct technical meaning arguably relates to the idea of "an ordered sequence of symbols" (Wikipedia). But one might also understand the term as referring to the exchange of light energy into a neuronal signal at the level of the photoreceptors.

There are two problems inherent in this kind of definition. The first is what Maxwell Bennett and Peter Hacker have described as the "mereological fallacy" (Bennett and Hacker 2003), that is, "ascribing to parts properties which belong to wholes." And we have seen already that the visual system, for example, cannot function if isolated from the motor cortex, and the rest of the body. The second is in placing too heavy a demand on the word "energy" and attributing to it a kind of descriptive form or agency. This is illustrated by Raymond Tallis in his essay "What Neuroscience Cannot Tell Us about Ourselves" when he describes the outward gaze. Rather like our previous example of inward and outward olfactory senses, he writes that "the inward causal path explains how the light gets into your brain but not how it results in a gaze that looks *out*" (Tallis 2010, 6). He asks us to consider our awareness of a glass sitting on a table. The standard neuroscientific account asks us to believe that light reflects from the glass, enters our eyes, and triggers activity in our visual pathways. Our seeing the glass is "a result of—or perhaps just is—this neural activity." But as Jones reminds us, "our perception doesn't start with a stimulus hitting the eye, it starts with our turning our heads and focusing our eyes; it starts with bodily activity" (Jones 2019, 51). If the physical laws governing the relationship between different kinds of matter apply equally to us as well as to the glass, how is it that we can place the glass in space and time, and distinguish between ourselves as the beholder and the glass as the beholden? There is nothing in the standard account of the visual pathway that accounts for our consciousness always being "about" something other than ourselves. This is the concept of intentionality, about which I do not

intend to expand, but suffice to quote Tallis, "that it points in the opposite direction to that of causality" (Tallis 2010, 7).

This is a crucial point for this article in that it underlines the importance of human action and agency. If we take intentionality seriously and acknowledge that it disrupts the standard view of linear causation between sensory inputs and motor outputs, then it opens up a new perspective in which sensory perception is as much about creating the world as receiving it, and far more to do with the possibilities created by human interaction than to do with the probabilities of material exchange. Surely, this is the basis for the development of civilization and the basis upon which we become actors in the world. But if perception is not merely passive, describing information merely as energy does not help us much when we consider the outward gaze of our visual pathway, nor does it help to explain the form objects take in our mind—that is, we can see the glass in our "mind's eye" even though it may no longer be there.

It is worth considering the twentieth-century psychologist James Gibson's ideas here on visual perception. It has been said that his ecological psychology is information-based rather than sensation-based (Piekarski 2017). If we continue the analogy of the glass on the table, Gibbons would argue that our perception of it is direct rather than representational. In what he describes as "affordances," an object such as the glass is an opportunity to engage with what's around us in such a way that it serves to fulfill our needs and plans, rather than interpret what is perceived as *a priori* neutral information. The brain has to explain the sensory input but it also has to choose which sensory input to sample. We perceive things only in the service of how we can act upon them. We do not see a glass; we see the opportunities afforded by the glass for grasping, drinking, and so on. Our agency comes from the fact that we, the perceivers, can modulate our attention and adjust our senses to maximize the effect of whatever object we happen to be focused on. And whatever it is that we are focused on in our environment, such as a glass, guides our future action and, in turn, our action serves to construct and reinforce it (Ward et al. 2017).

Gibson's point of view is opposed by the enactivist idea that living organisms are endowed with sense-making agency that serves to guide them in bringing forth a unique world. This view rejects the idea of any objective pregiven world and instead makes possible a plurality of worlds generated by autopoetic self-organizing systems. Representation is rejected in favor of enaction where the world we inhabit is dependent on us, the active perceivers, for its relevance and structure. There is a certain appeal to the idea that our sensorimotor interaction with our environment shapes the way we think, but the concept does not seem fully to account for the communal nature of human existence and cognition, still less the preponderance of human behavior and action, which tend to coalesce around the same universal themes. The world seems intelligible to us and

transparent to reason. Yet, at the same time, it seems difficult to conceive of reason as a product of enactivist plurality, where each individual meaning system generates its own telos.

If we consider the light energy that is received by our photoreceptors and which makes vision possible, one might ask whether or not it is dependent for its own existence on the objects which it illuminates. Do such objects only come into existence through our seeing them? For Plotinus, as for Plato, light has no dependence on any object but manifests itself in such objects. Form is indeed cause. "Similarly, reflection requires no reflective surface for its existence but only for its appearance. So it is in the case of soul, considered as the activity of a prior soul, that as long as the prior soul abides, so does the subsequent activity" (Schroeder 1992). Plotinus shows that for him, the world of form, the realm of the spirit, is the primary object of experience with reference to which we may understand the sensible world. Rather than employing anagogical metaphor, based on our sense of the world, to illuminate the transcendent—as a thing within things capable of being understood by reference to other things—Plotinus is arguing that our sense of the world cannot be understood other than as already given to us by the transcendent. For Plato, form was both cause and explanation but also the object of ecstatic experience. For Plotinus, before form is explanation, it is the object of vision and thus leads to explanation. Form will exist regardless of explanation. Light will exist regardless of the object it illuminates. There is therefore no separation between the truth-seeking pursuits of rational enquiry or ecstatic experience. There is a dissolving of the boundary between subject and object.

In this context, the claim that there can be no reason without revelation seems unavoidable. How else are we to account for the intelligibility that seems to underpin all sense-making endeavor? In "Epiphany Philosophers: Afterword" given by Rowan Williams at the end of this group of papers, he describes the human mind as "fundamentally attuned to those agencies we call love and intelligence." This calls us back to the earlier discussion regarding nativism and empiricism and to the Scholastic concept of innate ideas. It seems that we are born with a predisposition for sense-making, and that our lives unfold in reciprocal participation with what we might call transcendent absolutes, among which love and intelligence predominate. There are questions here about the reach of human experience and whether or not it is possible to divide the sensible and material world. Anti-realists might claim that although we might be unified in terms of our own lived experience, still we are beholden to our own fantasies and will refuse to see those elements of reality that do not confirm with our chosen sense of self. The claim that there is a single transcendent source of love and intelligence with universal agency, and the idea that truth will always be greater than our conception of it, is a reality that we may choose to resist. Ultimately, as Stephen Clark reminds us, "The conviction that there is a real unified

world rests on the idea that it exists in Someone, who both understands and feels it" (Clark 1998, 77).

Perhaps it is the case that "we neither discover an objective reality nor invent a subjective reality, but that there is a process of responsive evocation" (McGilchrist 2009). If one considers the ratio of photoreceptors in the retina to the number of axons in the optic tract, then we are already filtering our vision of the world by a factor of a million to one. Thus, if we take perception to be always an incomplete subjective reconstruction of reality, there is an inevitable amount of "active sampling" that goes on and an awful lot of life that passes us by. That which directs our gaze—let us call it agency—gives us the ability to adapt our environment and the awareness to respond to percepts in which we sense love and intelligence. That we do not respond or perhaps fail even to sense such percepts may be a reflection of how we conceive of our bodies.

This sense of agency and ability to adapt is affirmed, perhaps surprisingly, when one considers the experience of pain. The International Association for the Study of Pain (IASP) regards pain as a psychological state. It is defined as a phenomenological experience rather than as a sensation with a particular physical origin because although it might have an immediate cause, such as a noxious agent acting on nociceptors, this need not always be the case. Whether there is pain or not, is not therefore determined by the presence or absence of a noxious stimulus alone, or the activation of nociceptor pathways. For the purposes of this discussion, pain can be understood as an inner subjective experience, perhaps even as a form of knowledge. Ursula Fleming, the lay Dominican and medical practitioner, worked with those suffering chronic pain and describes it thus: "We have an innate power of adaptation to the world around us . . . our reaction to pain is different from the automatic, immediate reactions like sweating or blinking because it is directed partly by thought and is affected by a variety of preconceptions—what we think that pain is, how important in relation to other things THIS particular pain might be, what the expected outcome is" (Fleming 1990, 9).

Fleming soon learned that to tell a patient not to be afraid achieves nothing and that the way to control fear was therefore to control the symptoms of the body. She emphasized posture, concentration and breathing techniques, and for many of her patients she observed that when their body relaxed completely, their mind automatically became tranquil and their body at ease (Fleming 1990, 44). Given our previous discussion concerning vision, it is interesting to note that she thought that it was easier to focus attention and to sense your body when you are not distracted by vision. "Go down through your body, not visualizing it, only sensing it by the touch, the contact, with the floor, and by it warmth. How when you can't see, do you know that you have arms or a neck or shoulders but by feeling them from inside, subjectively" (Fleming 1990, 75). Fleming

teaches us a great deal about pain, not least the way in which we can learn to modulate it, through a top-down sense of agency and adaptation, but also through a bottom-up control of bodily symptoms leading us to relax and confront our fear. The constant exchange between us, with our internal states, and the environment with its external states, across some kind of boundary that separates the two, has been an implicit theme in much of the discussion so far. The inner surface of the boundary that separates us from the world—our visceral surface—is where we receive our sense of ourselves from within through a moment-by-moment process of interoception.

Interoception

Interoception refers to the integration of sensory percepts into a central higher order representation of ourselves in space and time and is essential for maintaining desired physiological states. It is foundational too for our sense of embodiment and spiritual experience. But rather than explaining the passive processing of the perception of bodily states, it highlights the cognitive appraisal of these states and the bearing this has on our response selection. For example, an early experiment in 1974 showed that participants, who did not know that they had consumed caffeine pills, recorded elevated anxiety appraisals compared to participants who had taken a placebo (Zanna and Cooper 1974). We may not know the causes of interoceptive visceral signals but this does not prevent them from coloring our interpretation of the self, others, and the world.

This relationship between bodily sensations and emotional experience is illustrated by the fact that emotion influences our subjective experience of pain, a phenomenon borne out time and time again in the work of Ursula Fleming. "Negative emotions impact the affective component of pain negatively and decrease pain tolerance" (Carter et al. 2001), whereas "positive emotion increases pain tolerance" (Zweyer et al. 2004). What is more, how we feel appears to be affected by what we choose to look at. Vision is understood as a sense that facilitates the perception of the surrounding environment but it can also enable the perception of body status. Feedback from the visual system affects the experience of acute and phantom pain, our feeling of satiety, and homeostasis disruption in the case of an aura prior to a seizure or "graying-out" before a faint. There is evidence that looking at the color blue (i.e., the sea) leads to greater feelings of contentment when compared to the color green (i.e., trees) and this forms the basis for a current population-wide study looking at "green-blue space exposure changes and their impact on individual-level well-being and mental health."[1] It has been found that "simply adding houseplants to sparse offices increased staff productivity by 15 percent" (Nieuwenhuis et al. 2014). To understand exactly what interoception adds to this body of literature, it is necessary to have a basic grasp of the neuroanatomy.

Hugo Critchley and Dr. Sarah Garfinkel describe how the body-to-brain axis of sensation concerning the state of the internal body has two parts: (1) exteroception: external environmental sensory inputs (such as mechanoreceptors, proprioceptors, and photoreceptors) are sensed by the primary cerebral sensory areas via modalities such as vision, audition, touch, taste, smell; and (2) interoception: internal bodily sensory inputs (such as baroreceptors, chemoreceptors, thermoreceptors, and so on) transmit "information" such as pain, temperature, itch, blood oxygenation, intestinal tension, heart rate, and so on. Both external and internal sensory inputs are ultimately processed in the posterior insula cortex (PIC), where together they enable a person to perceive his/her body in relation to its environment. This kind of continuous afferent feedback "informs action selection with regard to both internally directed (autonomic) and externally directed (motor) actions" (Petzschner et al. 2017, 425). It appears that the interoceptive pathway yields a topographical representation of the body within the PIC that is arranged according to an anterior-posterior axis. In turn, exteroceptive stimuli appear to be mediated by the middle insular cortex (MIC) and closely associated with the amygdala and hypothalamus. The integration of these separate sources of sensory stimuli takes place, it seems, in the anterior insular cortex (AIC) representing a common neural substrate for embodied and experiential processes and an important component of emotional experience.

The literature on interoception offers a general consensus that the more accurately one is attuned to one's bodily feedback, the more effective our strategies for affective regulation. For example, positive shifts in interoceptive accuracy induced by contemplative training are associated with decreased alexithymia, or an improved capacity to verbalize emotional states (Critchley and Garfinkel 2017). A negative emotional state has also been frequently associated with abnormal visceral sensation. It can be inferred from such findings that one's ability to regulate, or indeed to downregulate, emotions is limited by disruptions to interoceptive signaling. In fact, it has been observed in clinical disorders, such as autism, that "the degree of 'mismatch' between perceived sensitivity to interoceptive states and observed accuracy in performing an interoceptive task such as heartbeat detection, predicts anxiety symptoms and deficits in interpersonal emotional interaction" (Critchley and Garfinkel 2017, 12). One way of understanding autism therefore is as a failure to understand one's internal body. So, what happens when the body is out of tune with itself?

Deficits in interoception can also be seen most commonly in anxiety, panic, and depression; but also in eating disorders and obesity; addiction and other psychiatric disorders. What they have in common is a dysfunctional appraisal of somatic sensations. In the case of anxiety, this may lead to negative self-evaluation; in depression, a decreased capacity for decision-making; and in panic disorders, an increased ability

to perceive fear and a decreased ability to perceive other parameters. Research has shown that interoceptive training and contemplative practices have potential to empower patients to take control of the way they experience symptoms (Farb et al. 2015). Interoceptive reconditioning is being tested as a therapeutic approach to certain kinds of phobia, post-traumatic stress disorder (PTSD), autism, and eating disorders. Such approaches draw on the body's ability to adapt, and the brain's capacity to change itself, what we call neuroplasticity. This has not only implications for patients but it also highlights the importance of spiritual practice.

Subjective interoceptive experience "interoceptive sensibility" is "an expression of a high-level model or 'belief' for generating predictions about information coming from inside the body" (Critchley and Garfinkel 2017, 12). A "mismatch" between this and objective interoceptive accuracy generates a prediction error signal. Predictive coding, which I will explain below, elucidates this tension between expected and felt body sensation. So, rather than the view that emotional feelings stem from cortical representations of viscerosensory afferent information, a top-down predictive model suggests a kind of "reverberating causality" in which predictions concerning internal bodily states are expressed in the drive to the autonomic nervous system (and in endocrine and immune responses) (Critchley and Garfinkel 2015). Such efferent autonomic responses have been described as "descending interoceptive predictions" and are paired with bottom-up interoceptive signals that "cancel predictions and inform (through prediction errors) a revision of the predicted state." Critchley and Garfinkel state that such autonomic efferents "represent a means to probe and actively infer the internal state of the body, and both emotions and feelings arise through the interplay between ascending prediction errors and descending bodily predictions" (Critchley and Garfinkel 2017, 12). The integrating function of the AIC referred to above serves to transpose otherwise diffuse sensory signals into a holistic representation of the body. This so-called "simulation map" has parallels with "the subtle body" in its conception of a neural representation of the body. Such representation offers a schema from which the executive brain areas can interpret experience and coordinate responses.

The comparison with aspects of the Asian model can be extended to the process of achieving homeostasis through physiological or behavioral change. The term given to this process is *allostasis*, much of which is autonomic. In the Asian model, according to psychologist Norman Farb, energy flows in the body are not available to consciousness but are associated with it. He suggests that they are capable of being brought to consciousness through training and that they can become formative of a person's sense of embodiment, emotional orientation, agency, purpose, and self-worth. "Just as attention to the body increases activity at the corresponding level of the spinal cord, so allostatic cues can inform cognition and behavior

at higher levels of representation" (Farb et al. 2015). So, for example, our trust in others is exaggerated by warm sensations and attenuated by cold ones (Kang et al. 2011). Afferent sensory stimuli are in constant dialogue "with higher order cognitive representations of goals, history, and environment," which Farb describes as informing emotional experience, and motivating regulatory behavior. As stated above, this kind of dialogue not only influences our ability for self-regulation and broader mood states, but it also appears that accuracy and awareness of such interoceptive signals can guide decision making. By directing our attention to such interoceptive processes, it is possible to create opportunities for adaptive behavior, that is, "disrupting over-learned perceptual and interpretive habits formed during cognitive development" and can facilitate greater presence "connection to the moment" and agency "ability to effect change" (Farb et al. 2015).

Regulatory responses such as these are contingent on sensory feedback and according to Farb "are driven by the magnitude of the predictive error (PE) and deviation from priors at a given layer of simulation." When the afferent sensory inputs do not match the top-down predicted states, a process of "active inference" facilitates a return to the expected state through physiological, automatic, and sometimes unconscious responses (Farb et al. 2015). When this facility for autonomic regulatory capacity is stressed, "cascading PEs may reach levels of the simulation map that are accessible to conscious awareness." This appears to be the point at which a person adopts a strategy of active inference in order to achieve a return to an expected state through engagement with the external environment. Whether automatic or conscious, the intention of active inference is the same: to so modulate sensation as to return to prior expectations rather than updating the priors themselves.

Farb advances an alternative method by which to "reduce the disparity between current and desired states," which is "to adjust one's expected state to match the internal milieu." He describes this process as "perceptual inference" (Farb et al. 2015). Revisions made to the expected simulation map so as to extend the range of sensory expectation yield more accurate reflections of immediate sensation and reduce the stress caused by unexpected sensations. The effect of perceptual inference is to reduce the inferential weight of such sensations on the simulation layer. This is similar to modern psychological (suppression, distraction, reappraisal) and contemplative (acceptance, equanimity, noninterfering observation) accounts of emotion regulation—changing one's attitude to sensation rather than changing the sensation itself.

Farb suggests that "perceptual inference may facilitate emotion regulation by reducing over-learned and seemingly obligatory perception-appraisal associations." This can highlight a kind of misattribution. While, for example, it is inferred that a sense of restlessness stems from hunger, active inference pairs the unexpected interoceptive signal with an externally

directed behavioral response. This shifts attention from interoception. But if restlessness stems from another source, the shift from interoception to regulation reduces the opportunity to explore unfolding interoceptive signals. Perceptual inference would take the restlessness as the new expected state. This might enable the "dynamic time course of arousal" (Farb et al. 2015) to be explored. This may allow the individual time to realize that his/her arousal was greatest when thinking about the workplace and not from hunger. When repeated, this may afford new regulatory opportunities and an adaptive set of priors for anticipating and explaining physiological arousal.

The view that interoceptive inference is not just a passive, bottom-up processing of sensory information, but rather something which involves active top-down activation to make predictions of the causes of sensory input, is informed by the theory, introduced above, of predictive coding. The potential explanatory power of this model may be illustrated with reference to medically unexplained symptoms (MUS). For example, it may be argued that such symptoms stem not just from peripheral sensory feedback but from prior beliefs, where attention, attributed agency, expectation, and prior experience and cultural beliefs all influence the perception of symptoms. Interestingly, a biological cause can be found for only 26 percent of the ten most common symptoms in primary care (chest pain, fatigue, dizziness, headache, swelling, back pain, shortness of breath, insomnia, abdominal pain, and numbness) and up to 50 percent of primary care patients present with symptoms that are "medically unexplained" (Edwards et al. 2010).

Increased noisy or ambiguous afferent sensory input and decreased accuracy of perception serves to reinforce the top-down modulation of efferent response, with the rather unhelpful corollary of creating a self-referential percept of the body state. It appears that for those with major depression, and perhaps with other mood disorders, they have an overactive or underactive anterior insula, suggesting accurate and inaccurate perceivers. So, regardless of the accuracy of their perception of sensory afferent homeostatic feedback, actual bottom-up homeostatic pathways are neglected in favor of maladaptive "cognitive-emotional schemes of interpretation."

Active inference may serve an allostatic role in restoring the body to its homeostatic baseline, but perceptual inference effects change in habitual regulatory behavior and therefore challenges interpretive bias. Recalling Fleming's approach to patients in chronic pain, it is instructive to consider Farb's suggestion that through attention to unelaborated emotional or physical sensation, a person may discover levels of tension or psychological distress associated with the body that were not previously in awareness. So, it seems that to resolve interoceptive perturbation, and thus to minimize predictive error, we have a choice between two responses. Active inference aligns with the predominant modern conception of the body as something

within our possession, a natural and objective thing that is ours to manipulate, and something that is entirely independent of other bodies. Perceptual inference, on the other hand, sits more comfortably alongside the idea that our bodies are an expression of our souls. Our bodies are culturally attuned, historically situated, and they become a place of encounter between the eternal and the temporal. This is a relationship that can be nurtured or denied according to how we choose to inhabit our bodies and in which the process of transformation has its origins.

Contemplating the Transcendent

So far, this article has tried to demonstrate that we are sense-making creatures and that our embodiment influences the kind of meaning we perceive in the world around us. It has shown that a top-down concept of predictive coding can be modulated by perceptual inference so that bottom-up sensory stimuli are reconciled to the body state of mental representation. Such a process infers a sense of both agency and unity that, it can be argued, are contingent on an infinite and unified self-giving agency, experienced both as love and as intelligence, and referred to traditionally as the divine. Paradoxically, it is by becoming more aware of the physicality of our bodies that we open ourselves to a kind of an encounter with the divine. Clearly, there are those who maintain that it is a fiction to be sentient: our feelings are no more than physical events; and others who argue that consciousness is an epiphenomenon: we, like the rest of the animal kingdom, are physically and biologically determined. But such theorizing seems distant from our own experience, and scientists can have no serious business if there is no such thing as "thought" that is not determined. Others may claim that a governing unity can emerge from a complex assemblage of parts, the quality of which cannot be translated directly from its parts. How that "quality" emerges and where it comes from remains a mystery. The problem with this position is pointed out by Stephen Clark who writes, "there are not souls nor any conscious being; there are selves but these 'emerge' for no clear reason on the back of merely physical events and without any reason to believe they replicate the 'real' world." He continues, "there are indeed real selves, themselves the source of unity in the material beings we identify as bodies. . . . So far from explaining 'soul' by physics, we should attempt to explain physics by reference to soul" (Clark 1998, 77). That there are real selves, existing as unified beings, integrating body and mind, seems to me to be the most plausible way of accounting for the totality of human experience.

So, if we accept that such encounters with the divine are neither illusory, nor epiphenomenal, but are instead a recurring and fundamental aspect of human experience, is it possible to describe them as a form of perception? And if so, are we talking here about a spiritual sense? One way of drawing

matter and spirit together is through the concept of dual-aspect monism, which posits one reality comprising the two aspects of consciousness and physicality. Such a position allows us to say that there is indeed truth beyond our immediate sensations but that our senses have a role to play in encountering it. One thinks here again of Plotinus, "the soul cannot be put together from unsouled parts" (Clark 1998, 77). We can understand truth in this context as a divine reality that is immanent within nature. Whether or not we ever become aware of such a divine reality must, to a large extent, depend upon how we choose to direct our attention toward the world. There are many different ways in which our perception of the world is processed neurologically. In his book *Living Religion*, Jones refers to various "experiential and noetic frameworks" that may help to interpret spiritual experience, including the models of dual, interacting cognitive systems (Watts 2013) and bihemispheric difference in the brain (McGilchrist 2009). What these models seem to have in common is a recognition that we depend on at least two ways of knowing: one is unconscious, intuitive, and "implicational"; the other is conscious, deliberate, and more "propositional." Common to both theories is the finding that the intuitive system provides the assumptions that guide the propositional system's activity.

It can be suggested that spiritual practice gives us a means of "tuning" and "heightening" our intuitive senses, so that we become more aware of the life around and in us. Religious communities offer not only a rhythm to sustain this kind of practice but also a culture in which spiritual experience can be lived and shared without necessarily having to translate it into propositional terms. Ursula Fleming describes what she sees as the role of the monastic rule and discipline in the process of personal change, which she says is "contained as it is in every religious tradition in the practice of the liturgy. . . . Self-change is implicit in liturgical worship. Singing plain chant or receiving rhythmic mantras alters the rhythm of the breath and the rhythm of energy going to the brain. The long controlled gentle out breath transforms angry anxious hyperactivity into a state of receptive tranquility. Gentle movements and periods of silence retrieve the mind from its constant preoccupation with the future, and with futile attempts to control the exterior world by the force of the will" (Fleming 1990, 154). Rupert Sheldrake, in his book *Science and Spiritual Practices*, also considers the role of mantras and forms of chanting, which, when combined with rhythmic movement and breathing, induce a state of ecstasy, synchrony, and bliss (Sheldrake 2017).

It is possible to challenge the conventional understanding of our bodies still further. The work of Kenneth Ring, professor emeritus of psychology at the University of Connecticut, and a researcher within the field of near-death studies, offers an alternative perspective, which comes from seeking to find empirical proof for visual perception in near-death and out-of-body experiences in thirty-one blind respondents. He asks whether

blind individuals have near-death experiences; whether they are the same as sighted individuals; and whether they can be corroborated with reference to independent evidence. The results record that most of the blind respondents had near-death experiences that were common to sighted individuals. They claimed that they could see and in some cases record details of visually based knowledge that could not have been produced in any normative sense. He postulates that consciousness is primary and the ground of all being; that it is nonlocal; that it is unitive; and that it functions independently of the brain. Moreover, on this basis, he concludes that the notable finding is not that the blind claim to have seen but, like sighted persons, they have transcended brain-based consciousness. Their experiences go beyond any kind of normative language or conceptual explanation. Ring's explanation is of a process that begins with mind fully independent of brain but which becomes self-referential and identified with consciousness itself. He suggests that this "noumenal consciousness is concerted into a dualistic modality that generates the familiar phenomenal world" (Ring 1997, 145). The near-death experiences that he analyzes are therefore best explained by seeing them as the "reversal of that process by which, even though the traces of an everyday dualism remain, the individual is enabled, however temporarily, to experience the world from a perspective independent of brain functioning and the operation of the senses" (Ring 1997, 145).

Conclusion

The central claim of this essay is that embodied sensory experience informs mental representations of selfhood through particular kinds of attention to bodily experience. Greater accuracy of interoceptive self-representation promotes greater moment-by-moment adaptation and opens up possibilities for a transformational encounter with the divine. As one resolves unexpected sensation through autonomic or behavioral responses, it is possible to draw closer to a feeling of engagement and connection with our bodies and environment. Contemplation is said to give a sense of presence and to minimize predictive errors (Seth et al. 2011). A variety of visceral experiences may broaden the distribution of interoceptive expectations (priors) minimizing the potential for such predictive error. In a simulation map that allows for greater variation of sensory inputs, relatively few visceral sensations are extreme enough to create predictive errors demanding a regulatory response. The influence of prior expectations is therefore successively weakened.

Overt active inference to resolve unexpected events is associated with the idea of agency. It is "a feeling of control over one's actions in the world" (Farb et al. 2015), and comes from direct regulation of bodily sensation and through changes in behavioral patterns, which confer a sense of responsibility for self-regulation. But faced with threats to agency,

maladaptive behaviors can be reinforced, such as leaving the room in an anxious state. The predictive coding framework links higher order appraisals of self-worth to momentary regulatory acts. This encourages a sense of presence—a closer connection to our bodies and the world, rather than isolation from it. This kind of presence or attention to the body might delay cognitive appraisal, thereby creating space to restructure the integration process. This might also be relevant when priors (traumatic) are too powerful to be actively controlled and too aversive to be accepted, a combination that can lead to somatic dissociation. This has been described as "biography driving biology."

In Western philosophy for two thousand years, the nature of reality has been treated in terms of real versus ideal and subject versus object. There is, in reading the literature concerning interoception, a risk that a sustained focus on the self reinforces a certain set of idealist or mechanistic assumptions. The former takes us toward a position of solipsism; the latter toward a series of senseless machine metaphors. This essay has sought to show that the self does indeed live and that its being is contingent on divine reality as expressed through such universal agencies as love and intelligence. We encounter this reality when we learn to live with our bodies, and not merely inside them. "We are to stop our ears and convert our vision and our other sense inward upon the Self" (Clark 1998, 37). In this sense, it can be argued that if we take perception to be always an incomplete subjective reconstruction of reality, it is impossible to think that our bearing on reality could ever be more than partial. This is not to deny the reality of truth but to argue that truth is not the kind of reality we can ever represent, but is a presence in which we can participate. We do so primarily with our bodies and by choosing where to direct our attention. "Our only model of being is presence. It is only within presence that anything exists at all" (Clark 1998, 79).

This brings us back to the central role of attention. The brain not only has to explain the sensory input, but it also has to choose which sensory input to sample. A greater understanding of contemplative practice and perceptual inference opens us to new possibilities for perceiving our place in the world and for acting in the world with a greater sense of presence and agency. Seen this way, the homeostatic mechanisms on which we depend are calibrated to allow the mind to serve the body's needs rather than making the body subservient to the mind's desires. Christopher Cook, in his book *The Philokalia and the Inner Life*, has a passage on health and well-being in which he refers to the Philokalia's focus on the purification and illumination of the intellect (Cook 2011, 167). Purity of the intellect is achieved through discipline and penance but yields spiritual perception and contemplative knowledge (Cook 2011, 167). In a rather lovely exhortation from Maximus the Confessor, he refers to "continual participation in the divine radiance," which leads to the intellect being "totally filled with

light" (Cook 2011, 167). The wisdom embodied in these practices can perhaps be summed up by acknowledging that a life of dispassion and contemplation deepens and broadens the reach of human perception to a point where we see the divine immanent and flowing between all things, and, as Fleming puts it, "we learn to live with our bodies, not just inside them." By appearing to withdraw from the world into our bodies, we may be paradoxically, engaging more fully with the world through our bodies. If Clark is right to tell us that "our awareness of the Truth is rightly mediated through awareness of our selves" (Clark 1998, 137), this at least warrants a reassessment of the bodily experience of the many interacting forms of physical and mental illness.

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Note

1. "Green-blue space exposure changes and impact on individual-level well-being and mental health: a population-wide record-linked natural experiment conducted by Swansea University in collaboration with the National Institute for Health Research (NIHR)." https://www.ecehh.org/research/green-blue-space-natural-experiment/

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