Article

Whither the Self?
The Foundation of Consciousness and its Implications for Poetics

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ABSTRACT

A model of human consciousness and perceived agency is described, in which the distributed elements underlying unified phenomenological consciousness and its emotional valence, as well as triggered recollections, are recruited, bound, and reinforced by reciprocal connections with the heavily networked claustrum. Preliminary evidence for this theory, which builds on the work of Crick and Koch, Ramachandran, Smythies, and others, is briefly reviewed, followed by a discussion of the implications this model may have for our understanding of the basis for the potency of poetic devices wielded in the practice of that art.

Key Words: selfhood, consciousness, neuroscience, poetics.

Introduction

A fundamental objective of this paper is to reconstruct the features and lineaments of a missing person, namely, the conscious self. He or she exists, of course, but, as any cognitive scientist or philosopher will tell you, this creature has been infamously difficult to locate. I will draw chiefly on neuroscience, and, to a lesser extent, philosophical considerations in presenting a model or, to preserve the metaphor, clay visage of the self. We will then see if this paradigm has implications for the neurological underpinnings of the experience of poetry. The underlying model of consciousness is heavily indebted to, and essentially represents a union of, several recent theories, with a relatively modest interpretive twist. Let the buyer, and even the browser, however, beware, as at least one pivotal strut (in fact, the axial and weight-bearing portion of the framework), is speculative.

To contextualize this reconstruction of the modern conscious self, I will briefly chart the possible birth, and our changeable understanding, of that entity over the millennia. After this, I will depict the supportive bones of the self. Next, I will articulate the skeleton and apply modeling clay in an endeavor to reproduce a simulacrum of the self, in which the functional scaffolding is specifically tied to neural correlates of human self-reflexive consciousness. Finally, I'll link the proposed anatomy of consciousness to poetry.

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The Possible Beginnings & an Evolving Interpretation of Modern Consciousness

In *The Origin of Consciousness in the Breakdown of the Bicameral Mind*, Julian Jaynes described the minds of the ancients as, essentially, selfless and divided. He hypothesized that this type of human consciousness, on evidence in Homer's *Iliad*, lacked any concrete notion of the self, and that the temporal lobe of the non-dominant hemisphere served as the wellspring of hallucinated injunctions that guided the bicameral mind through challenging and unusual circumstances. These auditory hallucinations were imputed, thousands of years ago, to Gods. During the course of human cultural evolution, greased by language and the requirements for increasingly complex social interaction, the bicameral mind broke down, and we acquired a more expedient "theory of mind" world view which posited the existence of "minds," like our own, in others, minds that could be "read" as it were by observing behavior to inductively ascertain, for example, the motivations of other humans – and what they might be counted upon to do in the future. This transition to theory of mind, which was largely complete by ~500 B.C.E, consigned the selfless hearers of the Gods' voices to the periphery of a society populated by selves (or souls) with the capacity to more efficiently collaborate, and for which the exhortations of deities were internalized to yield what some might now call the *sotto voce* of the soul. But there was an obverse to the coin of the self. In addition to facilitating life in cosmopolitan settings, humans began to understand that another mind could be deceived. Unctuous advertising traces its genealogy to the breakdown of the bicameral mind.

All of this is an enormously simplified version of Jaynes' theory, which also stressed other essential ingredients of human consciousness, and the self of which we are cognizant, even if it is only a convenient abstraction. These include the centrality of metaphor to consciousness, the "intentionality" of the latter (i.e., it is always "about" something), and the narrative quality of consciousness (anticipating a more recent epithet that has been affixed to the self, and of which the philosopher Daniel Dennett is fond, namely the "center of narrative gravity").[1]

Once we grew souls, religion followed suit. The vast majority of religions, with the stark exception of a few such as Buddhism, which is more of a philosophy, take the existence of a soul, discrete from the body, as axiomatic. The extent to which people have cared for their souls, and the religion of which they form a part, is attested to by The Crusades, modern radical Islamic martyrs, and the exorbitant amount of silver paid by sinners toward the end of the first millennium for plenary indulgences from the Christian church that would wipe clean the slate of their transgressions and literally purchase their salvation in the afterlife. Of course, Cartesian dualism (the conception of the independence of body and mind/soul, the latter of which Rene Descartes localized to the pineal gland) has been philosophically and scientifically lambasted in modern times. Daniel Dennett for example, in *Consciousness Explained* (1991), has insisted on the insoluble problem of how an ethereal soul, made of soul-stuff, could possibly interact with and guide the motions of a material body. Rather than tethering a particular neuroanatomical

structure to human consciousness, modern neuroscience has concerned itself with the more humble elucidation of the "neural correlates of consciousness," although our tools are still relatively crude. The voxel size of the highest resolution functional MRI scanners, is about 1-2 square millimeters. At the microscopic, molecular and neurobiological level, that constitutes space ample enough for an enormous amount of complexity. Still, a sense of the neural substrate of consciousness, and the functional relevance of various parts of the brain, in memory, sensory experience, emotion, the comprehension of written text, and the creation of a sense of "agency" or self may be coming into better focus, even if our vision is far less than 20-20 and no theory of human consciousness is unassailable.

Consciousness, however, is not all about the brain. A sine-qua-non of human consciousness is its *embodiment* and the implied fallacy of those who contend that a "brain in a vat" could be made to experience genuine human consciousness if tickled by the right neuronal excitation. Robin Zebrowski (2010) is correct in claiming that it is only by "real sensing," through mobility and physical interaction with the environment, that one can hope to acquire "felt experience." The British psychiatrist Iain McGilchrist (2009) emphasizes the importance of embodiment to human experience, and the manner in which metaphor, grounded in that physicality, creates bona fide human understanding. Sensation imbued with human *meaning* requires our interaction with a physical world "red in tooth and claw," with draconian (including life or death) consequences that issue from our behavior. Human consciousness and selfhood are contingent upon the interplay of *brain*, *body*, and *environment*, the components of which bleed into each other across porous boundaries. Pleasurable, painful, or mortal consequences, and our attendant, uniquely human, phenomenal experience, create the semantics of human consciousness. Cultural factors, too, are pivotal in defining that semantics.

Any attempt to sketch the possible outlines of human consciousness is a bold and, some would say, foolhardy venture. Many theories have been adduced and it is not my intention to comprehensively review them here, but some of the greatest contemporary thinkers continue to wrestle with the slippery notion of consciousness. At times, they seem to speak to each other at cross-purposes, in part because of the absence of unambiguous and universally recognized case definitions of basic concepts such as 'consciousness' itself. Elements of various theories seem to ring true but, ultimately, efforts to gather compelling empirical evidence in favor of any theory remain stymied by the uniquely subjective and internal experience of consciousness. Some materialists, such as Daniel Dennett, have concluded that we, as conscious entities, are not in or out of the loop, but that, rather, 'we *are* the loop' (Dennett, 2003). With this many would agree, but the devil, of course, is in the details. A virtual leader or chief executive officer appears to be at the helm. But where is he, and how does he govern?

The Bones of Human Consciousness

Perhaps the first step in constructing a model of the self is to identify some of the key elements and attributes, or "bones," of consciousness. One diamond-hard nut that must be cracked is the concept of the "quale." Qualia (plural of quale) constitute our experience: for example, our sense of the redness of red, the coldness of cold, or the tone and timbre of a particular note played on the cello. Die-hard materialists regard qualia as illusionistic window dressing, but the truth of the matter is that qualia – and higher-order qualia-suffused mental constructs such as the discrete image of a dying sibling – possess an emotional valence that contributes to human meaning. How do we explain qualia? In essence, how do we account for the rich, unique, and highly personal 'phenomenal' experience of the world in which we live? A compelling theory has been put forth by Nicholas Humphrey (Seeing Red, 2006), who posits that 'sensation' and 'perception' constitute two discrete, albeit usually co-occurring, processes that interact with each other. 'Perception,' according to Humphrey, neutrally informs us about the objects and events beyond the body. 'Sensation', on the other hand, apprises the subject of the *response* of the body to various kinds of stimuli, generating, in the process, qualia, the building blocks of our phenomenal experience. Normally these two channels respond to stimuli at the same time so that the total experience is a unified whole where non-sensory behavioral competence toward the world is 'clothed', so to speak, in qualitative sensory experiences. As an apt example of this union, one can cite reflexive withdrawal in response to pain that is triggered by the neutral 'perception' of pain, a perception that is cloaked by the 'painfulness' of this noxious stimulus as an experienced human 'sensation.' Humphrey has suggested that sensation is linked to evolutionarily more primitive responses, and he likens it to an internalized covert bodily 'action' or physical expression-manqué that, among conscious humans, is monitored recursively in a feedback loop that also serves as the basis for the 'thick' moment of phenomenal consciousness within which we live.

That the two processes described above (perception and sensation) may take place independently has been documented, at least preliminarily, by experimental observation. For example, patients with 'blindsight' appear to have the residual capacity to 'perceive' and appropriately act upon visual stimuli that remain completely opaque to the conscious mind. Conversely, sensation may take place in the absence of 'perceived' external input (e.g., hypnagogic hallucinations, hallucinogen-induced experiences, psychosis, and phantom limb pain). Humphrey's position that unembellished 'perception' and vibrant conscious 'sensation' follow two distinct avenues within the nervous system is supported by other scientific evidence, including cases of metamorphosia, experimental results of studies that have evaluated sensory substitution, and, perhaps most impressively, the phenomenon of sensory mislocation (Armel and Ramachandran, 2003).

Qualia possess dimensions that are not directly determined by the real-time perceptual input with which they appear to be allied. For example, a particular suite of sensations may be colored by historically similar sensations that are involuntarily elicited. Furthermore, the recursive 'monitoring' that serves as the basis for sensation incorporates emotional centers in the brain. Thus, qualia (and phenomenological experience in general) are affect-laden. The emotional valences of qualia, and the integrated qualia-formed mental constructs that constitute human experience of the world, color the ensuing propositional components of experience (i.e., opinions and beliefs) which subsequently come into being.

All of these considerations invite an obvious question. How is heteromodal sensory experience, consisting of qualia of varying species from the visual, auditory, olfactory, and tactile dominions, "bound" into a unified conscious whole yoked to memory, a sense of agency, and emotion? Before articulating a skeleton and taking a handful of modeling clay, let us name the abstract bones that, when properly articulated, may form the armature of consciousness:

- Integrated or "bound" phenomenological experience, woven of qualia. The constituent sensations may be of external (exteroceptive) and/or internal (interoceptive) origin. Interoceptive sensory experience includes, but is not limited to, sensations borne of primitive drives (e.g., hunger). Exteroceptive experience may include somatosensory, auditory, visual, olfactory, and gustatory sensation.
- Attention to experience, which consists of nuclear (focus of attention) and fringe (peripheral and incompletely apperceived) elements of the attentional field
- Memory (immediate, working and long-term categories)
- Emotion, including the emotional valence tethered to experience (concurrent or recollected)
- Cognitive propositional attitudes, including intentional beliefs and desires; analytic or abstract syntheses of the experienced world; other products of higher mental thought enabled by frontal lobe activity
- Language or "linguistic overlay."
- A sense of personal "agency" and narrative center of gravity

This last piece, the perception of agency, is perhaps one of the most enigmatic. Obviously, the "self" morphs over time in lockstep with accrued experience, so the concept of a static and enduring agent to whom "it all happens" is largely a convenient abstraction that we manufacture, an illusory entity of great utility in human social intercourse and discussions of moral responsibility. Of this "agent" – the seat of higher order thoughts (thoughts about thoughts) and phantom "owner" of phenomenological experience, feelings, and a cache of personal memories – more is said below.

Articulation of the Skeleton of Consciousness and the Application of Clay

Vital to the concept of the self is the distinct sense that the "agent" with which we identify is privy to an integrated or bound admixture of unique experiences and its own relational attitudes toward those experiences. The irresistible sensation that the self perseveres along a temporal axis is central to human consciousness. The self, it seems to us, is the protagonist of an unfolding novel, the next page of which contains unknown text over which we feel we can exert at least some degree of authorial control. Our immediate phenomenological experience is contextualized by memory, emotional valence, instinctual and reflexive responses, and cognitive and linguistic overlay. The bewitching way in which a reflexively conscious self is invented and conscripted into this network of rich phenomenological experience, memory, emotion, and cognition has not, of course, been fully elucidated in its particulars, but neuroscience and philosophy allow the formation of hypotheses.

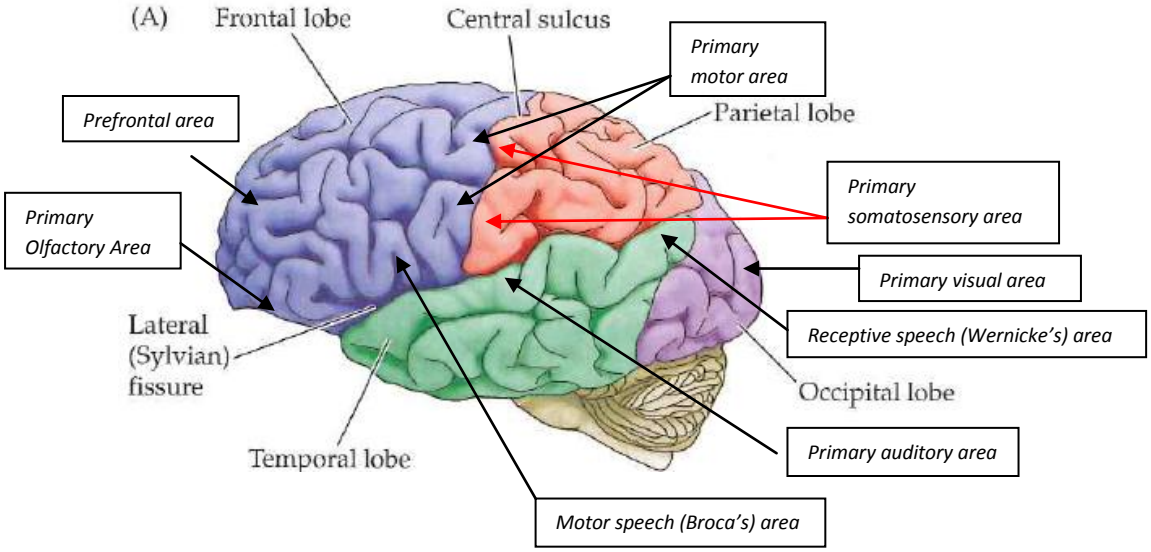
Obviously, evolving knowledge of the neural correlates of the litany of "mind stuff-related" terms listed above is gradually, but as of yet, incompletely, removing the infinitely ornate masks upon masks behind which mind is hidden. Yet there is one explanatory keystone upon which the architecture of this mind-stuff may be based, namely, the existence of an internal integrator that binds "sensation," as defined by Nicholas Humphrey (i.e., the canvas of experience), memory, emotion, cognition, and our sense of agency, with this last deriving from an active process analogous to what Humphrey has referred to "redding." "Redding," Humphrey would contend, is an action-manqué or "sensation" we impose on unembellished "perception" in a dynamic interplay between both processes that is recursively monitored in a reentrant circuit that serves as the substrate for the "thick" moment of experience in which we dwell. I propose that much the same happens in the action of "selfing." *The self is a useful mental construct with a perceived material embodiment and an abstract "center of narrative gravity." That eye of the storm is "selfed" in the much the same way that the color red is "redded"*

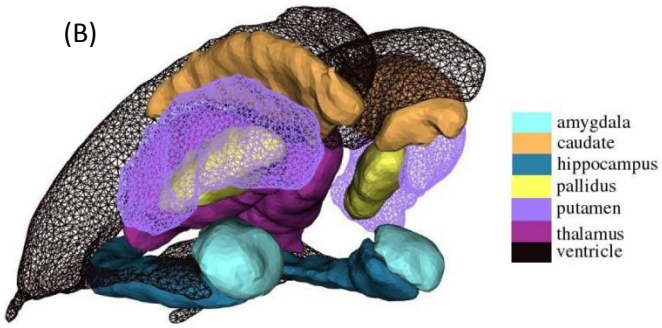
What remains is the need for something to tie the bow, or "bind," the self with our emotional roiling, our recollected and immediate experience, and our cognitive capabilities. An intriguing albeit speculative hypothesis was put forth by Francis Crick and Chirstof Koch in 2005, in their article "What is the function of the claustrum?" Francis Crick, of course, is one of the two scientists who discovered that DNA is composed of a double helix of concatenated nucletotides. In their paper, Crick and Koch posited that the claustrum, a sheet of neural tissue interposed between two other neural structures (the putamen and the insula), might orchestrate integrated human sensory experience. The claustrum shares reciprocal connections with an enormous swath of virtually all regions of the cerebral cortex bilaterally, including somatosensory, visual, auditory, olfactory, frontal (higher mental functions), prefrontal (executive control and attention), ventral temporal (pattern/shape recognition), motor, supplementary motor area (SMA)/pre-SMA and parietal cortex. It also has links to the rubral network and components of the basal ganglia

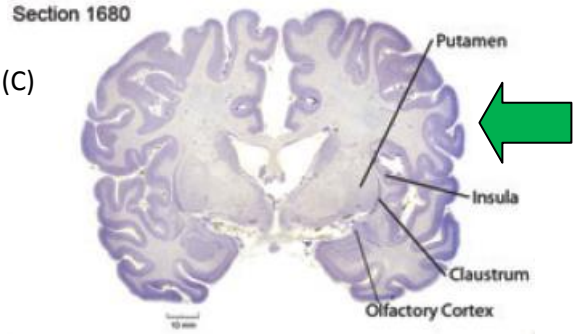
and the limbic system. The limbic structures are integral to emotional responses (the amygdala, for example) and short-term declarative memory (hippocampus). By way of orientation, Figure 1(A) below illustrates some of the above-referenced brain regions, providing a visual sense of the generalized distribution of claustral connections. Cortical regions in which damage is associated with expressive (Broca's area) and receptive (Wernicke's area) language impairment are also depicted in Figure 1(A). Figure 1(B) portrays the deep subcortical structures of the limbic system and basal ganglia.

There is limited, albeit tantalizing, scientific research to suggest that the claustrum, which is identified in Figure 1(C) below, plays a role in the integration and "binding" of heteromodal information (e.g., visual, auditory, tactile, etc.) to support unified phenomenological experience (Baugh et al, 2011; Naghavi, 2007; Hadjikhani, 1998). In addition to binding and amplifying discontiguous activity in various parts of the cortex through reentrant circuits, claustral projections to the cortex may be multimodal and diffuse, lighting up other portions of the brain, beyond those activated by primary sensation, to "flesh out" experience. Since the cortex is a likely seat of long-term memory, and the nexus with the limbic system may infuse "bound sensation" with emotional valence, the neural substrate of phenomenological consciousness, in all of its affect- and memory-saturated vividness, may have something to do with the claustrum and its sweeping connections. Case reports suggest patients with lesions in the claustrum live in a world of aberrant or incomplete sensory experience, or perturbed consciousness (Ishii et al., 2011; Sperner et al., 1996; Albayrak and Gorgulu, 2008; Ishida et al., 2006). Notably, however, removal of the claustrum on *one* side of the brain (it is a bilateral structure) during glioma surgery is not incompatible with an ostensibly normal social and professional life (Duffau et al., 2007). This may be a testament to the redundancy of neural connectivity. Other apparently contravening but difficult to interpret threads of clinical observation have also been described (Yamamoto et al., 2007; Kalaitzakis et al., 2009).

FIGURE 1







(A): Major cortical areas (adapted from Purves D., et al. *Neuroscience*, 4th Edition, Sinauer). Used with permission from Sinauer Associates. Cortical associative regions not depicted.

(B): Deep subcortical structures, reprinted from *NeuroImage*, Vol. 42, Qui A. and Miller M. "Multi-Structure Network Shape Analysis via Normal Surface Momentum Maps," 1430-1438 (2008), with permission from Elsevier.

(C): Coronal section of the human brain showing location of claustrum between the insular cortex and the putamen, a subcortical structure (from Buchanan and Johnson, 2011). Seen *en face* (i.e., from the side of the brain in the direction of the green arrow), the outline of the sheet of tissue composing the claustrum resembles the shape of the continental United States in primates. Copyright 2011 The New York Academy of Sciences; used with permission from Wiley.

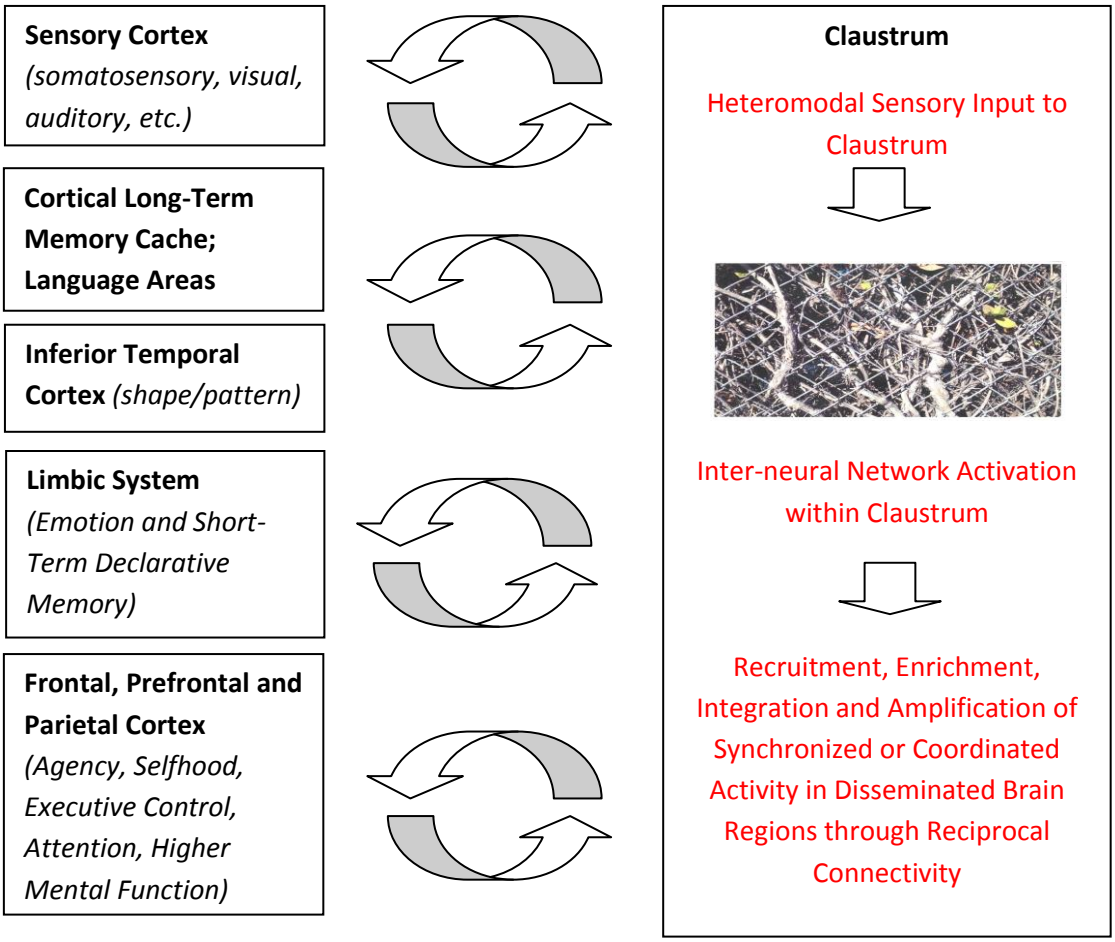
Whatever the claustrum and its dense interneural connectivity conjures in the human brain, it, in itself, is not the seat of the human soul. We should not tread in the errant footsteps of Descartes by imputing consciousness to a latter-day pineal gland. For one thing, in a small study of rhesus monkeys, the overriding majority of tested sites in the claustrum responded to unimodal (e.g., visual) but *not* heteromodal (e.g., visual *and* auditory) input when recordings were obtained using a multielectrode system. This is consistent with the current belief that with rare exceptions, there is no "Jennifer Aniston" or "grandmother" neuron in the human brain. Consciousness is a distributed property of brain function. The claustrum may (or may not be) necessary for consciousness as we know it, but it is not sufficient. If it is a linchpin of sorts, it seems more likely that, as proposed by Crick and Koch, interneural connectivity within the claustrum fosters the binding of the elements of consciousness into an integrated whole through interactions that mediate and reinforce coordinated activity in widely dispersed regions of the brain. Of this, more will be said later. Secondly, that the claustrum can't be the nidus of the soul, the place where it all "comes together" on the screen, is obvious if one considers the infinite regress this invites. There is no homunculus who has sunk himself into a recliner within the wetware of the claustrum, privy to all we experience, for how do we explain his or her experience? Another more deeply ensconced homonuculus? No, the partition between the observer and the observed is not an opaque front-lit scrim on the stage, before which a homunculus passively sits. That can reveal only nothing. It is, rather, a back-lit scrim, upon which images of our own making dance, images, and, more broadly, phenomenological experience, that hails from coordinated, far-flung and distributed activation in the brain. The observed and the observer are one.

But how does all of this happen, exactly? It has been hypothesized that the claustrum may be a "synchrony detector" (Smythies et al., 2012) that, through its frequently reciprocal connections with numerous cortical and subcortical structures, amplifies and expands upon those distributed synchronies as a means of orchestrating conscious awareness. Smythies and colleagues have suggested that the claustrum, through (a) its detection of synchronous activity in various areas of the brain, (b) internal amplification of that synchrony through intraclaustral connections that involve GABAergic interneurons, and (c) projection of augmented signals back to cortex and subcortical structures with a resultant enhancement of synchrony in those geographically distant regions, may have a hand at the loom that converts isolated bits of perceptual input into the tapestry of sensation. While the details of the theory are speculative, there is a definite allure in the prospect of a "*pattern recognition*" center in the brain (e.g., the claustrum) which, when coaxed into a given state by a specific complex of afferent input, amplifies Humphrian "sensations" that are alloyed into unified experience and conjoined with elements of cognitive overlay and emotional valence – all reinforced through the reciprocal and distributed connectivity of the claustrum with cortical and subcortical structures. The numerous reentrant loops of which this network is composed would, through their orchestrated activity, serve as the

foundation of human consciousness. Moreover, the synchrony detector may add additional dimensions to consciousness, *enriching it by recruiting activity in brain areas that were not directly engaged by a primary set of unimodal inputs*:. For example: "sound of tiger's roar" + "sight of tiger" + "detection of rapid forward motion of the animal" → "intense fear, physiological changes, and attendant interoceptive sensations."

The following schematized, incomplete, and simplified diagram may be helpful:

FIGURE 2



It should be highlighted that the "Agent" or self in the lowermost box on the left in the diagram above is not at all insular. This model is not a mosaic composed of autonomous tiles. There can be no sense of agency without a fabricated world in which the agent exists.

Claustral cells are connected with each other in several ways. In addition to axonal and dendritic connections, they may form a functional "syncitium" through what are known as gap junction linkages. Through such connections, entrained or concomitant afferent input from several quarters of the brain in response to a given stimulus might trigger a self-reinforced network of activity within the claustrum that, through its diffuse and reciprocal projections, amplifies and recruits specific foci of widely distributed brain activity in cortical and subcortical structures. Thus, heteromodal sensation is bound into experience; emotion and cognition may be bonded to experience by the claustrum as well. It is very likely, however, that some degree of binding also occurs in the cortex itself, which is rich in associative areas. The organized hierarchy in the occipito-temporal cortex, for example, mediates a progressive increase in the degree of abstraction that supports the act of reading (Dehaene 2009). But, as Smythies and colleagues suggest, it may be that certain "weak intercortical synchronizations are potentiated and processed by strong intraclaustral synchronizations." The entire suite of distributed activity would serve as the neural substrate for consciousness.

This theoretical framework has strengths and weaknesses. One lethal weakness that it does *not* have, however, is the commitment of a "category error" by imputing human consciousness to activity in a given neural structure in the brain at a particular moment. There is no fixed point or destination in any neural circuit at which the rubber of consciousness hits the road of a neuron. Consciousness *is* the circuit, or, more properly, the amalgam of orchestrated or synchronized activity within a host of circuits. Someone might say, well that is all well and good, but how does this translate into what I experience when I look at *Woman with a Hat* by Matisse at the San Francisco MOMA? The rebuttal: What you experience is caused by distributed activity in the brain, perhaps coordinated in the manner outlined above. You are at once "redding" (her hair), "bluing" in multiple tones (her hat), "shaping" based on the orientation of lines and edges (and there may be a parsimonious way in which the brain accomplishes the latter), "womaning" at a higher level of cognitive overlay; and you may be saddened by the downward arc of her lips and slightly intimidated by the brash and wildly incongruous colors in this fauvist masterpiece. Perhaps you are also reminded, involuntarily, of an old photo of a long-dead aunt. And, all the while, contemporaneously, you are "selfing." The point is, your brain is acting on innumerable abstract stages, on which performers "view" (the term is used loosely here) themselves and other performers. The actors and the spectators are one. "Viewing" of the production is an *action* that continually invents itself, and not the result of passive information processing by a sedentary homunculus. And it is the totality of those linked choreographed performances *that creates you and the world you inhabit*. You and your maker are one.

One appeal of all of this is its simplistic beauty. This is also a liability. The claustrum is not the solitary "Grand Central Station" of the brain. There are other concourses, and independent connectivity of brain regions clearly must play a role. For example, forebrain activity stimulated by contemplation of an emotionally charged future event activates visceral motor nuclei through

hypothalamic connections. Emotion and its physiological correlates may, therefore, circumvent the claustrum entirely in some or, perhaps, many cases.

Where does this leave us, then? Over two thousand years ago, Erasistratus posited the existence of *spiritus animalis* within muscle. We now know that electrical stimulation of muscle results in the intracellular influx of calcium which, in conjunction with two key regulatory proteins, leads to coordinated cross-bridge cycling of actin and myosin within the chained sarcomeres of muscle fibers, thereby producing muscle contraction. There is no *spiritus animalis* in muscle. These subcellular events explain *exactly* how muscles contract. In a similar way, distributed brain events, of infinitely greater complexity, explain experience, cognition, memory and selfhood. I've attempted to emphasize and build a bit on the union of an intriguing, albeit scantily supported, theory put forth by Crick, Koch, Smythies, Edelstein, and Ramachandran, and a recent model of phenomenological consciousness adduced by Humphrey. The unified edifice is architecturally attractive, although Humphrey may beg to differ on this point (unconvinced as he is of the importance of the claustrum based on personal correspondence), and much remains unknown. It must be admitted that the data supporting the "integrational" function of the claustrum are, indeed, quite limited and other pathways must undergird experience as well, even if the claustrum does enjoy a prominent role. But if the model discussed in this paper proves to be a phantom, that would be a pity.

Potential Implications of this Model of Consciousness for Poetics

1. Role of the Tools of Poetic Legerdemain in Augmenting Conscious Experience

Poets avail themselves of associative resonances all the time. These associations are "bound" at varying levels, either personally, culturally, or universally. Quite apart from the connotative branches and shoots that explode from the bough of denotative meaning, these affiliated resonances tap the groundwater of emotion and sensation with the implements of sound and rhythm, line length and configuration, and many other poetic devices. Accents, for example, packed together stir intensity. Euphony, created by velvet consonants (e.g., m, l, y, w) or soft vowel sounds elicits pleasure through its mellifluousness. Cacophony, of course, is jarring, and befitting of its own subjects, perhaps amplifying the meaning of a poem about a murderous flood or the remote detonation of an improvised explosive device. Anaphora, the repetition of the same phrase or word at the beginning of stanzas, may hypnotize in the manner of a psalm. Enjambment may provoke tension or surprise. Similarly, a "reduced line," consisting of only one or several words, may call up vehemence, shock, or drama. Polysyndeton (the repetition of conjunctions such as "and," of which Hemingway was fond) conveys runaway power and passion. Like anaphora, it may also mesmerize. Symbolism is grounded in associative meaning, of course. Rhyme also elicits reactions. Triple rhyme can sound antic or comedic, and feminine

rhyme is soothing. In all of these cases, might it be that the claustrum binds these device-triggered associations and sensations to the content of the poem, thereby sharpening meaning? Future functional MRI studies may provide answers but, for at least one powerful class of poetic brushes that alter the hue of sensation - namely rhythm and meter - scientific data that have accrued in recent years enable hypothesis generation that goes beyond mere hand-waving.

Although it would be impractical to completely catalog all forms of poetic sorcery in this paper, rhythm deserves emphasis as a means by which the poet enlivens the experience of reading a poem by conscripting bound heteromodal associations between sound and emotion that are moored to the semantic content of the poem. For example, the pyrrhic foot may confer a balm-like effect in a poem. Conversely, the poet can deploy the brio of the galloping anapestic meter, the headlong rush of iambic tetrameter, or the, disconcerting, bizarre, and gauche unnaturalness of dactylic meter[2]. Poetry inheres in the binding of evoked experience, both phonetic and semantically derived, with the concentric ripples of memory and affect that attend that coupling. This is why poetry, for much of its span on earth, was spoken, heard, memorized and recited. Poetry is phonological and lexical. But how do these rhythmic features of a poem elicit experiential sensations that transcend the borders of meter itself?

The neurological substrate of rhythm and beat perception has been parsed with various and progressively more discriminatory tools over the decades. Both exogenous prompts (e.g., volume of a note or an established syllabic accent) and, fascinatingly, *endogenous* influences affect our sensation of meter. Factors that color our registration of beat may be unconscious. For example, perceived accent is affected by the inter-onset *interval* between notes (Parncutt, 1994). That is to say, obviously noticeable differences in loudness or tone are not alone accountable for our sensation of rhythm. Furthermore, our take on the rhythm embedded in a particular series of notes may be consciously modified even in the absence of any external cues (Iversen et al., 2009; Nozaradan et al., 2011). Willful modulation of beat, in which accent is imaginatively conferred on an unaccented note, produces objective correlates detectable as evoked EEG potentials (EPs) or magnetoencephalographic evoked response amplitude fluctuations in the beta range. What does this all mean? In simple terms, as with other sensations, we do not merely passively *perceive* beat and meter (in Humphrey's sense of the term "perceive."). We also *create* the sensation of beat and meter based on an admixture of objective and subjective accent. Regions of the brain activated when beat is sensed are rife. EEG scalp topography reveals generalized distribution of beat-associated EPs across both the left and right hemispheres. Compared with non-metric auditory stimulation, when perceptual accents occur at regular intervals, functional neuroimaging reveals differentially enhanced activation in the supplementary motor area (SMA)/pre-SMA, and bilateral activation in the pallidum, putamen, caudate, and superior temporal gyrus (Grahn and Brett, 2007). Simply put, the functional grip of meter on the human brain is far-ranging, and practically every finger of its hand touches a region of the brain that is also connected to the claustrum (Arikuni 1985; Tanné-Gariépy 2002;

Smythies 2012). And, as we have seen before, the claustrum, with its reciprocal/re-entrant connections, also converses with the parts of the brain involved in other modes of sensation, memory, and emotion. Is the claustrum a nexus that binds meter to emotion and other sensations? Grahn and Brett did not include the claustrum as a region of interest in their fMRI interrogation. Additional study appears warranted.

As before, this is not to say that it "all comes together" in the claustrum. Nor is the claustrum the only relay station through which the various parts of the brain that are activated by beat may interact with each other. For example, the pre-SMA and SMA are connected with the basal ganglia through a separate pathway. Despite this, reasoned inductive hypothesis generation invites exploration of the role of the claustrum in the "dressing" of meter in its rich experiential garb.

2. The Lock that Receives the Key to Involuntary Memory

Wallace Stevens, like Proust and others before him[3], explored the violent power of involuntarily evoked memory (e.g., in his "A Dish of Peaches in Russia). In a single spasm, a unimodal sense impression, or some limited constellation of such sensations, draws from memory a fully embodied moment or bygone time, cloaked in full polysensory apparel. It is as if the singular trigger, the isolated bolt of fabric, has taken a lesson in the poetic technique of metonymy, serving as the emblem of, and key to, a large room that is profusely furnished in byzantine detail. As with metonomy, in which the naming of a conspicuous and meaningful shred of something larger serves to encapsulate the whole despite its own diminutive nature, a unimodal sense impression may be so potent and rich in association that it involuntarily unstops the vial of a recollected experience in all of its heteromodal sensory complexity. Is the claustrum the lock that receives this key?

3. Vertiginous vs. Perspectival Poetry

I'll end with an examination of an insight the theory of consciousness under discussion might have for "associative" (or, perhaps more appropriately, "dissociative") poetry, a species of poetry which has been in vogue for several years now, and which has estranged a number of readers. The latter form of poetry has been described by Tony Hoagland (2010) as "vertiginous" in an essay that drives a wedge between traditional "perspectival" poetry, which seeks to provide a coherent human perspective, and this newer type of poetry, which is disorienting, seemingly filled with "peacocky randomness" (as Hoagland puts it) and violent juxtapositions that are meant to reflect a bald questioning of the solidity of human consciousness, knowledge, and language. Unfortunately, in his essay, Hoagland cites a quote from Wallace Stevens as a banner defining the philosophy of the poetry of vertigo. In a rejoinder (Sahner 2010), it was argued that the majority of Stevens' poetry is perspectival, effectively describing human phenomenological experience and its limitations in a comprehensible way. In any event, there is great value in

Hoagland's lucid description of the elements of the poetry of vertigo (PV). I would contend, though, that PV is not completely entropic and haphazard. Unless the poet has truly conjoined words randomly (and there are means by which to do this without conscious intervention), the words that find themselves adjacent to each other in PV do so because they have been written by a human being with a human mind. The associative resonances, however dim and opaque, are there, at least for the poet who wrote the piece.

Although I am not among them, many contemporary poets find enjoyment in PV but, because such work is, to many readers, so disorienting, so off-putting and seemingly indulgent, devotees of perspectival poetry find it alienating. Perspectival poetry has dominated the practice of verse for thousands of years for good reason. It is approachable, even if a successful approach may require effort. The reader is able to commune with the writer in a heightened reality made possible by poetic technique (i.e., trope and other devices). Conversely, practitioners of PV or, in a similar vein, poetry that purely mines the peculiar associations within the author's mind without providing any context to assist the reader, make it difficult or impossible for that communion. In fact, in order to understand some of these poems, one is left with the impression that one needs to *be* the author.

Although the neuroscience is speculative, I would suggest that PV poets give completely free reign to their unique experiential associations (mediated by claustral connectivity?) without regard for comprehensibility. Poetry can be thought of as existing on a sliding scale which, at one pole, is exceedingly difficult to approach or understand and, at the other, is stultifying and arid.

Poetry of Vertigo → Perspectival Poetry (Fresh and Device-Enhanced) → Greeting Card Verse

At the far left, idiosyncratic and seemingly random associations bleed out onto the page with no explanation. The middle (within which there are many shades from left to right) is comprehensible but may require some healthy exertion. The right end of the scale is leaden and colorless. Emily Dickinson said that "if I feel physically as if the top of my head were taken off, I know that is poetry." The precise point on the above scale at which the reader loses his or her head is a matter of taste, ambition, and sensibility. For most, I think, the center of the blade is sharpest. Here, associations and observations of experience may be foreign or intellectually challenging, but they can be assimilated by the careful and susceptible reader. The associations of consciousness here can be apprehended. Fold in poetic legerdemain (metaphor and many other techniques), and "centrist" poetry becomes, I would claim, the apotheosis of the form, namely, poetry that offers an exhilarating union with another intellect. That is the domain of a long train of poets, including Wallace Stevens, Zbigniew Herbert, Philip Larkin, W. H. Auden, Yeats, Dickinson, Keats, Shelley, Blake, Donne, Shakespeare, Milton, and others.

Notes

[1] For additional details, the reader is referred to an excellent recent retrospective on Jaynes's work by William Rowe published in the American Journal of Psychology in 2012.

[2] Mary Kinzie (1999) covers meter extraordinarily well and far more extensively than I have here. Her keen observations cut to the quick of rhythm in poetry.

[3]Proust's antecedents in the literary rendering of involuntary memory included both Chateaubriand and Baudelaire, as noted by Muhlstein (2012)

The original photograph in Figure 2 ("Hedge and Fence") was taken by the author.

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