Sartre and Neuroscience: Embodiment or Bad Faith?

Christian Gilliam

Introduction

Hazel E. Barnes (2005: 117) points out that while "Sartre scholars cannot be fairly described as being opposed to science, they have, for the most part, stayed aloof." Sticking to a phenomenological method, Sartre scholars tend to defend themselves by pointing out that their studies focus on lived experience, and psychic and therapeutic issues. The phenomenological approach attempts to make a 'bracketed judgement', or to "*put out of action the general thesis which belongs to the essence of the natural standpoint*," which "*bars* me *from using any judgement* **that** *concerns spatio-temporal existence* (Dasein)" (Husserl 2012: 58). Indeed this is true, and what we have examined of Sartre thus far has been an exposé of the phenomenological experience of Being, devoid of any judgement of the 'natural world'. As such, for the most part, "there has been virtually no concern with the biological substratum," as Barnes (loc. cit) puts it. Yet Gary Cox (2006: 12) makes a pertinent point when stating:

> Given his generally dismissive attitude towards the natural world, Sartre would probably be hostile to this kind of naturalistic account. Yet rejecting a naturalistic account or the emergence of consciousness- for which there is, after all, a wealth of scientific evidence- invites instead a metaphysical account that seeks to explain the emergence of consciousness as a magical and mysterious gift of the gods.

Yet, we are reminded that Sartre's existentialism "would surely dislike a metaphysical account of the emergence of consciousness more than a naturalistic one" (loc. cit). With the rise of neuroscience as a dominant and respected science, there is an eagerness on the part of philosophers dealing with consciousness to validate their respective approaches with 'science', so as not to be confused with mystics, transcendentalists, and theologians and thus be left out of the materialist dominated hegemony within academia. As Rex Whelson (2011: 300) puts it: "Today, it is increasingly common to find philosophers using neuroscientific and cognitive scientific findings to support a philosophical point about consciousness and its properties." This is of course understandable given the huge challenges such research presents to the philosophy of mind and consciousness. To ignore them would indeed be equivalent to burying ones head in the sand. To consider them, also, would not amount to a major departure from phenomenology insofar as we accept such theories "*only after I have placed it in the bracket*" (Husserl 2012: 59). Certainly if phenomenology starts out from a kind of Cartesian doubt (see Husserl 2012: 53), a purely cognitive function, then surely it is apt to consider the biological.

As such this paper expands on Hazel Barnes work, in attempting to enter Sartre into a dialogue with neuroscience.

Computational Mind vs. Phenomenological Mind

The prominent challenge to Sartre's theory of consciousness is to be found in the determinism of the traditional cognitivist hypothesis, computer functionalism or strong artificial intelligence (see Searle 2004: 45). The hypothesis essentially asserts that the mind is an automaton, or what T. H. Huxley famously calls 'conscious automata'. Accordingly computer-like mental processes coordinate *everything* in psychic life, and are entirely unavailable to 'conscious' reflection. Such theories equate cognition with symbolic computation, establishing a discrepancy between personal and subpersonal, since "none

of us has any awareness of computing in an internal, symbolic medium when we think" (Varela et al. 1993: 49). In this instance the mind is taken to represent a 'program' whereas the brain is the 'hardware' (Searle 2004: 45). Minds operate like computers, in that cognition can actually be defined as computations of symbolic representations. The mind then, can be taken to represent or reflect an algorithmic Turing Machine, following definitive rules or a program. Japan's ICOT Fifth Generation Program is typically portrayed as a literal construal (or attempt) of the cognitivist hypothesis, which for many has reinforced the computational view of cognition. Cognition and 'consciousness' or qualia are split, and so the conflation between the two as found in emergentism is seen as false. Railing against our intuitive attitude towards consciousness, and our everyday experience, it means that 'consciousness' is not essential for cognition, that it does not exist as a qualitative or subjective substance. Functionalists like Daniel Dennett view consciousness as a mere illusional affect of the functional operation of cognition, a cruel trick.

This of course generates serious issues for those who wish to naturalise 'free-will'. As Gillett and Liu (2012: 30) put it: "Determinists accounts of human psychology argue that free will is an illusion reflecting neural processing to do with proprioception and the explanation of our bodily activity." Such a deterministic view is rather embarrassing for the humanist and for the Sartrean, simply because it robs man of his self, it cuts across one's intuitive sense of self as a unity, and challenges all preconceived visions of responsibility, volition, spontaneity and intimacy. We therefore face a split between what Jackendoff calls the computational mind and the phenomenological mind (see Varela et al. 1993: 52).

In this sense the problem facing Sartrean's and existentialists today, potentially, is what Jackendoff also calls the 'mind-mind problem' (Varela et al. 1993: 52). We see the mind as a computational system, as deterministic in this sense, while we experience a phenomenological mind, a consciousness, an ability to negate or to say no, to refute and change opinions, to think and be. We have a subjectivist, personal experience of 'self' that, on the intuitive level, cannot be squared with such algorithmic representations. So the problem presents it self, how are we to understand this relationship between computational states and experience? Is there indeed a free consciousness as Sartre defines it; are we in fact nothingness, or merely organic computers? Without volitional consciousness, there is no Sartre. What the phenomenologist may be 'bracketing' out in the 'natural world', might actually be critical in understanding the very consciousness phenomenology depends on.

Hazel E. Barnes (2005) provides her own to solution to this problem, and the neglect of the biological substratum by Sartre and his follows. Barnes contends that Gerald M. Edelman's research provides a neurobiological basis for Sartre's description of consciousness that effectively negates the computational model and thus the mind-mind problem. Edelman begins by stating that consciousness is not an entity but a process, an activity, which cannot exist independently of the body. Edelman also provides a theory that sees consciousness as intentional and unifying, but also dynamic, and which also has the ability of nihilation, as Sartre posits it. In Edelmans account we have a consciousness that is free, self-making and ethically responsible. Most importantly consciousness is the result of neuronal reactions when the brain responds to signals from the outside or from the body or between parts of the brain itself.

According to Edelman higher-order consciousness can only be developed on the basis of primary consciousness. Briefly, in order for therer to be sense of self, a person must be

able to make a clear distinction between itself and the world around it, or to be able to categorise between the self and non-self. The distinction is made clear for social interaction. This requires, at a very basic level, memory. Memory enables the person to make categorisations, and recategorisations of previous categorisations. Related to this the brain must be able to learn, that is to attribute value to categorisations. I.e. 'warm is pleasant, cold is unpleasant'. Lastly as the brains anatomy contains different areas for registering internal states to external stimuli, there is a basic, non-verbal or pre-linguistic, awareness of separateness from the world. In order for the three mechanisms to create a primary sense of 'self' there needs to be a basic unity between them through time. That means there is an ongoing interaction between all these mechanisms. To sustain this the brain requires global reentry pathways, connecting these anatomical structures. Unlike the Turing machine or a computer, Edelman provides a global view of the brain- Theory of Neuronal Group Selection (TNGS)- identifying the diversity of locations and functions in the brain and its adaptability in overcoming fragmentation. TNGS contains three central tenets: development selection, experiential selection and reentry.

Broadly speaking Edelman's approach reflects the most prevalent in neuroscience, namely the attempt to establish neuroanatomical correlates for consciousness, and working from this an attempt to provide neural models of consciousness and conscious properties. Flying in the face of the typical cognitivist hypothesis, *qualia* and intentionality are given ontological merit. Yet, unlike the idealists, such a view exists from a strictly naturalist or physicalist conjecture. Said view has been widely accepted in the last twenty years as the most probable (see Whelson 2011). To be sure there is wealth of various opinions, theories and writers on this broad theory alone. As Antonio Damasio (2012: 6) puts it, "the study of consciousness has expanded so much that it is no longer possible to do justice to all contributions being made to it." That is to say that at this juncture it is best to give a general outline to this prevalent view, with perhaps some particular examples. Underlying it is a broad assumption that consciousness is in fact real, that it has volitional qualities, and that crucially it has neurobiological underpinnings. Crucially though, what will be discovered is that, as far as consciousness is concerned, the jury is still out. Despite the cognitivist view seeming highly unlikely, there is great disagreement within the naturalist view. As such the request that philosophy, or a Sartrean, must provide a definitive neuro-correlates of consciousness seems absurd at this point.

Naturalism and the Neural Correlates of Consciousness: is it real?

The general naturalist outline, to which Barnes (2005) clearly attaches herself, was first truly outlined by John Searle. Searle (2004: 79) describes consciousness the same way one might describe thirst. That is, consciousness is caused by the behaviour of neurons and are realised in the brain system, which is itself composed of neurons. The biological character of mental states, as described by Searle, avoids both materialism (Dennett) and dualism (Descartes). Biological naturalism about consciousness has a set of four theses, which I will quote directly (79):

1. Conscious states, with their subjective, first-person ontology, are real phenomena in the real world. We cannot do an eliminative reduction of consciousness, showing that it is just an illusion, Nor can we reduce consciousness to its neurobiological basis, because such a third-person reduction would leave out the first-person ontology of consciousness
2. Conscious states are entirely caused by lower level neurobiological processes in the brain. Conscious states are thus *causally reducible* to neurobiological processes. They have absolutely no life of their own, independent of their

neurobiology. Causally speaking, they are not something "over and above" neurobiological processes

3. Conscious states are realized in the brain as features of the brain system, and thus exist at a level higher than that of neurons and synapses. Individual neurons are not conscious, but portions of the brain system composed of neurons are conscious
4. Because conscious states are real features of the real world, they function causally. My conscious thirst causes me to drink water for example

What we see is that consciousness is caused by brute physical processes in the brain. Such a view, according to Searle, requires that we clear up and correct a number of false assumptions. First we should refrain from thinking that all mental activity or mental states are at odds with physical states. That is the false dichotomy that the language of Cartesian dualism introduced to philosophy, and to which cognitivists and functionalists such as Dennett, are captive of. Conscious states are system-level, and biological, much like digestion, or growth, or the secretion of bile are system level biological features (Searle 2004: 80). Such a distinction, between mental and physical, relied on a false set of beliefs and definitions. It is often asked how do qualitative, subjective, and intentional phenomena fit into the physical world? Before we can answer such a question, says Searle, we must first outline the formal features of any reasonable conception of the physical. They are as follows (82):

> First, real physical phenomena are located in space-time. (Thus, solidity and liquidity meet this test. Ghosts, of they existed, would not.) Third, where real, physical phenomena function causally. (Thus solidity is a real physical phenomenon. Rainbows, under the description "rainbow" are not real physical arches in the sky. They do not cause anything.) And the physical universes causally closed in the trivial sense that anything that functions causally in it must be part of it.

Such a description is entirely consistent with what we usually deem as 'mental', as opposed to physical entities: subjective, qualitative, intentional. They are "located in the space of the brain at certain periods of time, causally explicable by lower-level processes and capable of acting causally" (82). The major points is that "*There is no reason why a physical system such as a human or animal organism should not have states that are qualitative, subjective, and intentional*" (loc. cit). Once the traditional categories are changed, the facts fit, and suddenly we find that qualia can exist in physical systems.

Second, we must be weary of 'reduction', and be mindful of the difference that exists between causal reductions and ontological reductions. We cannot think of consciousness without looking at its surface features. Yes consciousness is causally explainable by neuronal behaviour but we cannot make an ontological reduction and say that it is nothing but neuronal behaviour. It may be useful to do so in medical cases, but when assessing consciousness as a totality, if we want to capture the first-person, subjective features of the phenomenon, we must refrain from ontological reductions or obsessive analyses of microstructures:

> So consciousness differs from other phenomena such as liquidity and solidity that have surface features, in that we are reluctant to carve off the surface features and redefine the notion in terms of the causes of the surface feature, because the point of the concept is to identify the surface features (Searle 2004: 84)

Third, moving away from the 'billiard ball' causality case, we must recognise that in lots of cases of causation the cause is simultaneous with the effect. Hence, consciousness is a continuous force operating in nature, that is bottom-up in the sense that lower-level microphenomena cause higher-level macrofeatures. The point is "that we are discussing the causal order of nature, and the order is often not a matter of discrete events sequential in time, but of microphenomena causally explaining macrofeatures of systems" (Searle 2004: 86).

Fourth, we must be cautious of identity. Consciousness is identical with a brain process, but it is additionally a qualitative, subjective, first-person process going on in the nervous system. It has both neurobiological features and phenomenological features. The first-person painful feeling in the brain, says Searle, is not the same as the third-person neurobiological process. Following the method common to Husserlian phenomenology, Searle (87) stresses that:

> The concept of identity is not much help with the mind-body problem because we can make our events big enough to include both the phenomenological and the neurobiological. The right move, as usual, is to forget about these great categories and try to describe the facts. Then go back and see how you have to adjust the preconceptions you may have of the other categories in order to accommodate the facts

Such a conception of consciousness is similar to the materialism that Marx tries to introduce to philosophy in-order to correct Hegel's 'spiritual' and 'abstract' definition of consciousness. Accordingly the universe as a whole is made up of physical particles that exist in the fields of force, which are often organised into systems. However those who have tried to save the essence of Sartre's phenomenological account of consciousness, whilst squaring it with 'neuroscience' are still at odds with materialism for materialism abides by the view that "consciousness as an irreducibly qualitative, subjective, first-personal, airy-fairy, and touchy-feely phenomenon does not really exist" (Searle 2004: 88). Searle, and those trying to naturalise Sartre, on the other hand say: "consciousness precisely as an irreducibly qualitative, subjective, first-personal, air-fairy, and touchy-feely phenomenon is a process going on in the brain" (88). And where the dualist says this is true, they disagree with him as well, for the dualist will then go on to say that consciousness is not part of the physical world, which is the exact opposite to the point they are trying to establish. They are eager to preserve the essence of Sartre while making conscious experiences a feature of the brain. In this sense there is no distinction between *res cogitans* and *res extensa*.

Searle goes on to identify eleven structures of consciousness and neurobiology, which are worth glossing over:

1. Consciousness has a qualitative character (93)
2. Conscious states exist as a type of ontological subjectivity, in that they exist only when they are experienced by a human or animal subject (4)
3. Consciousness exists as a unified structure. It is not divisible in the way that physical objects typically are (95-96)
4. Consciousness has intentionality, but not all consciousness is intentional and not all intentionality is conscious (i.e. the sense of anxiety that one sometimes gets when one is not anxious about anything) (96-97)
5. Consciousness has mood a certain favour, a tie it one's conscious experiences (97-98)

6. There is a centre and a periphery, I can pay more attention to some things than others (98)
7. For any conscious state there is a degree of pleasure or unpleasure (98)
8. Conscious experience is subject to situatedness, or to the background situation. What country I am a citizen of, the time of day, the time of year, are all examples of this (98-99)
9. There is both an active and passive consciousness (99)
10. Consciousness has a Gestalt structure. Experiences do not just come to use as disorganised mess, but rather as well-defined, and sometimes even precise, structures (think of the Necker cube)
11. Consciousness is also related to a sense of self (101), wherein the patio-temporal continuity of the body, the relative temporal continuity of structure, memory and the continuity of personality, are all intertwined (see 196-198)

The above observations are also compatible with, or rather supported and expanded by, the recent research of neuroscientist Antonio Damasio (currently the director of the Brain and Creativity Institute at the University of Southern California). Damasio's work provides perhaps the most complementary theory of consciousness to Sartrean studies. It has come closest in overcoming the explanatory gap problem, in giving a far more in depth idea as to *how* the brain's activity results in conscious properties being instantiated. Correlation evidence may be compelling but it almost always fails to answer in any compelling way *how* and *why* certain neural events and processes instantiate the conscious property it does. As Searle (1998: 48) says "Edelman has given no reason why a brain that has all these features would thereby have sentience or awareness." Damasio's step-by-step bottom-up theory of consciousness, as we shall see, offers the most compelling attempt to overcome this issue to date.

Unlike Edelman's work, Damasio's lends itself quite easily to Sartrean language and interpretations of intentionality and pre-reflective vs. reflective consciousness. As Damasio puts it there is a 'conscious-unconscious' interplay (note already the stark similarity with the later Sartre's notion of conscious-unconscious and presence-absence) established through a coevolving process (Damasio 2012: 270). Consciousness is not devalued by the presence of the nonconscious process, rather it is maintained that the reach of consciousness is amplified, in that noconscious processes "become a suitable and convenient means to execute behavior and give consciousness more time for further analysis and planning" (270). Simply put, nonconscious forces allow us to walk home whilst thinking about the solution of a problem, rather than about the route we take. We still manage to get home safe *and* engaged in deep conscious deliberation. Moreover conscious deliberation "is largely about decisions taken over extended periods of time, as much as days or weeks … and rarely less than minutes or seconds" (Damasio, 2012: 271). Common knowledge regards a pre-reflective disposition (again note the similarity with the notion of pre-reflection stated in the previous chapter on the unconscious) as "lightning-speed choices" which are thoughtless and automatic, whereas conscious deliberaton is about *reflection over knowledge* (271). Through deliberation we conjure up the ability of successful 'nay-saying' (loc. cit) (or what Sartre would call negation).

This brings us onto Damasio's hypothesis of the neural basis of consciousness. According to Damasio there are three correlates of conscious making: brain stem, thalamus and postmedial cortices (PMCs). The three correlates allow for the development of the proto-self, which acts as a prerequisite for the core self, which also acts as a prerequisite for the autobiographical self, finally leading to extended consciousness, or the self that is capable of conscious deliberation or negation. Like

Searle and the naturalists, Damasio believes that consciousness is a bottom-up process, that high-level macro-structures are the result of lower-level microphenomenon. This is not the place to go into explicit detail of Damasio's theory, but I will endeavour to give a basic outline nonetheless.

Damasio first follows the hypothesis that wakefulness and mind are indispensible components of consciousness, with the 'self' being the distinctive element. Wakefulness depends on the operation of certain nuclei in the brain-stem tegmentum and the hypothalamus. These nuclei influence the cerebral cortex via neural and chemical routes, which will determine the degree of wakefulness. Wakefulness depends, then, on a delicate interplay between the hypothalamus, brain stem and cerebral cortex. So for instance the amount of light available will greatly determine the function of the hypothalamus, in that it is coupled with hormonal secretion patterns tied in part to day-night cycles. The brain-stem determines the natural value of each ongoing situation. The value (i.e. how much should the situation matter) determines the signal and degree of emotion responses to situations as well as how awake and alert we are (Damasio 2012: 186-187). This establishes the primary base of consciousness.

Further, and most importantly, the self is built in stages. The first stage, the protoself, is a neural description of relatively stable aspects of the organism. The main product of the protoself is spontaneous feelings of the living body, or primordial feelings, which is made possible by walkfulness (Damasio 2012: 181). The protoself is an integrated collection of separate neural patterns that map, moment by moment, the most stable aspects of the organism's physical structure, generating body and felt body images. Anatomically, these maps arise both from the brain stem and from the cortical regions. The contents of these maps and images are assembled from the interoceptive signals that hail from the internal milieu and the viscera. Introspective signals are integral to the operation of an organism in that it tells the central nervous system the ongoing state of the organism, ranging from the optimal, the routine, to the problematic (Damasio 2012: 190). Such signals are of course critical for physiological corrections, such as feelings of thirst.

Interoceptive signals play an important role in developing the protoself, in that they provide the organism with primordial feelings. Indeed the "importance of the interoceptive system for the understanding of the conscious mind cannot be emphasized enough" (Damasio 2012: 193). Interoception provides a source of the relative invariance required to establish "some sort of scaffolding for what will eventually constitute the self" (193). Relative invariance proves to be a plausible biological means to ground the singularity of self. In short, we live in one body (although the cortical component of this system is of paramount importance, the brain-stem component is viewed as foundational for the self process [see pp. 195]). Further, sensory portal maps provide the organism with the perspective of the mind relative to the rest of the world. Other than biological singularity, provided by the protoself, sensory portals give us a standpoint in relation to what is happening outside the mind (198).

The second stage: the core self is generated when the protoself is modified by an interaction between the organism and an object and when, as a result, the images of the object are also modified. The modified images of object and organism are momentarily linked in a coherent pattern. The relation between the organism and object is described in a narrative sequence of images, some of which are feelings (Damasio 2012: 181). The core self is the moment when the protagonist enters. It is a moment when the mental profile of the protoself is raised and made to stand out. The coreself is a result of changes in the protoself. Anytime an organism encounters an object the protoself is

changed. This is because mapping requires an adjustment of the body, by the brain, in a suitable way (hence the relationship between the organism and an object-be-known [see 188]; this of course echoes Sartre's notion that consciousness is consciousness of something). Changes in the protoself lead to the momentary creation of the core self, and initiate a chain of events (203). In the first instance, the primordial feelings are transformed into a "feeling of knowing the object," or a feeling that differentiates the object from the other objects of the moment. Second, the feeling of knowing is generated into "saliency" or attention, or a "drawing of processing resources toward one particular object more than others" (203). Once again echoing Sartre's notion that consciousness is always consciousness of something, or his pre-reflective theory, Damasio states: "The core self, then, is created by linking the modified protoself to the object that caused the modification, an object that has now been hallmarked by feeling and enhanced by attention" (2012: 203). This chain of event creates a narrative (albeit nonverbal) in the mind, which in turn creates a protagonist to whom certain events are happening. The protagonist is "the material me" (203). It is a series of images then, an image of the organism, the image of an object-related emotional response and an image of the monetarily enhanced causative object that is producing the conscious mind. Thus: "*The self comes to mind in the forms of images, relentlessly telling a story of such engagements*" (loc. cit).

The third stage: the autobiographical self, which permits 'extended consciousness' or autobiographical self-perception, occurs when objects in one's biography generate pulses of core self that are, subsequently, momentarily linked in a large-scale coherent pattern (Damasio 2012: 181). This stage is founded in the core self, for there needs to be a protagonist for any sort of autobiography to exist, or rather there needs to be a basic sense of self, for memory to have a reference point. The autobiographical self leads a 'double life', being both overt and at times dormant. The latter takes part in nonconscious processing, where lived experiences are reconstructed and replayed (although it can happen through conscious reflection), their substance reassessed and inevitably rearranged. The nonconscious process uses the convergence-divergence architecture, turning the encrypted knowledge contained in dispositional space into explicit, decrypted displays in the image space (211). Essentially, this stage concerns the role of memoranda in structuring the self. In this sense the posteromedial cortices (PMCs) play an active part in that they are a high-level convergence and divergence region, part of the convergence-divergence regions (CDRegions), which are hypothesized as coordinating the contents in the conscious mind. PCMs act as an integrator/coordinator that remain active at all times, attempting to hold highly disparate sets of background activity in a coherent patters (229).

Thus the neurobiology of consciousness is organised around the brain structure involved in generating the lead triad of wakefulness, mind and self. Three major anatomical divisions- the brain stem, the thalamus, and the cerebral cortex- are principally involved (243). Although neurally reducing consciousness is "quite an extraordinary proposal" as Whelson (2011: 295) puts it, Damasio's comes closes to closing the explanatory gap. Rather than merely locating neural networks via neural imaging, that appear to correspond to certain conscious properties, Damasio provides a working model or narrative that outlines a *process* that gives a credible idea as to *how* and *why* the brain's activity results in conscious properties being instantiated. The self comes to mind in the form of images, which is built upon primitive somatic feeling. Certainly Damasio sets out a truly convincing case, and it may be tempting to use his theories as a way to validate Sartre. But try as we might, consciousness remains to be an illusive and thorny topic.

Back to Phenomenology?

"Every generation of scholars is prone to believing that it is the first to finally see things clearly. This is true also for the study of consciousness" writes Rex Welshon (2011: 1). Certainly all the above theories still, fundamentally, fail to *satisfactorily* answer the fundamental question of how subjective experiences and thought processes arise. That is, moving out of the comfort out of 'bracket', we have still left unanswered the explanatory gap problem or the hard problem of consciousness:

> The hard problem of consciousness and the explanatory gap problem present stark challenges to anyone who thinks that consciousness is easy to explain by identifying particular neural processes and correlating their activity with the instantiation of conscious properties, for both problem prompt worries about the apparent epistemological distance between the world of electricity, chemistry and physics and the world of conscious experience and about the apparent difference in kind between the two domains. (Welshon 2011: 2)

Damasio's work, as already noted, has come closest to actually reaching some theory as to how the brain actually produces and stores thought, which is why it was worth considering. Yet even he admits, "it would be foolish to presume definite answers" (Damasio 2012: 6).

Now that does not mean one should take a giant leap of faith either towards the reductionist materialists or to the dualists. Neither does it mean we should abandon neuroscience all together, and revert back to a strict phenomenological suspension or bracket. Crucially *it does not mean we should give up on the brain*. We know for instance that the neuron is an integral part of brain function. We also know generally speaking, how neurons work: a neuron receive signals from its 'dendrites', processes them in its 'soma', and then fires a signal through its 'axon', out of the 'bouton' through the 'synaptic cleft' to the neighbouring neuron. The signal is transmitted through neurotransmitters (small amounts of fluid). Once the neurotransmitters make contact with receptors on the postsynaptic dendtrictic side, this causes gates to open and ions to flow in or out of the dendrite. There is then an electrical signal on the axon side, followed by chemical transmission in the synaptic cleft, followed by an electrical signal on the dendrite side. The cell then does a summation of all the signals it receives from its dendrites, and based on this, adjusts its firing rate to the next cell in line. Neurones in turn receive both "'excitatory signals' and 'inhibitory signals', with each neuron only sending one type of signal. But then we still have a vague understanding how we go from this to 'qualia' or consciousness and intentionality (Searle, 1997: 25-27). In other words we now know that neural networks play some role in the manifestation of thoughts, feeling and memories. These surely must be considered. In this sense we agree with Welshon (2011: 309) who concludes:

> Even if the harder problem is, as advertised, extremely hard to answer, we are not therefore forced to accept either that it has to be answered before trying to fill in the already identified explanatory gaps with more and better neuropsychological and other neuroscientific explanations of human consciousness or that not answering it first weakens whatever neuropsychological and other neuroscientific explanations of human consciousness we discover.

Further there is very little in current neuroscientific thinking that disqualifies the reality of qualitative properties, with the exception of the now outdated classical, computational or functionalist model. Indeed "neural network models have made significant inroads

against classicism's pre-eminence" (Whelson 2011: 301). Even McGinn (2000) and the new mysterians, who maintain that there are innate epistemological limits to our understanding of consciousness, embrace the ontological subjectivity that is characteristic of consciousness.

Certainly the analysis of exploration of 'qualitative' side of the brain, of consciousness and its characteristics is an outgrowth of the phenomenological method common to Husserl and Sartre. In this sense the neuroscientific community has come to endorse a general understanding of consciousness that is in support of phenomenological experience. Only we have yet to come to a stage where we can truly understanding *how* and *why* consciousness is as it is from the neural level. Critically, contra Daniel Dennett's account, wherein we are all Zombie-like machines, whereby all we are defined by a continuing Darwinian reprocess of gene and meme imitation and adaptation, a machine if you will, we see that there is a subjective ontological side of consciousness. In reality there are numerous arguments that can be effectively used against he cognitivists that, despite not having a firm neurobiological account of consciousness, certainly side with the phenomenological account of consciousness as intentional/ or of *qualia*.

The oldest argument is perhaps Locke's 'inverted qualia' or what Searle (2004: 59) refers to as 'spectrum inversion'. Similarly the existence of qualia, the fact that conscious experiences have a qualitative aspect, was argued for by Thomas Nagel in his thought experiment 'What Is It Like to Be a Bat'? In short, even if I were to have a full functionalist neurobiological account of a Bat's consciousness, my knowledge would be incomplete, insofar as I would have no idea what it is like *to be* a Bat. Similar arguments are found in Frank Kacjson's 'What Mary Didn't Know', Ned Block's 'The Chinese Nation', Saul Kripke's 'Rigid Designators' and of course John Searle's 'The Chinese Room'. Accordingly we cannot be computer-like or purely machine-like beings, for computers use programmes, programmes are syntactical, minds have semantic contents, syntax by itself is not the same as nor sufficient for semantic context. The last two arguments against functionalism that Searle (2004: 64-65) presents is the 'conceivability of Zombies' and 'the aspectual shape of 'intentionality'. The first basically states that if my body could exist without my mind, then my mind is not identifiable with my body as a functionalist would put it. The latter points out the aspectual shape of intentional states. Intentional states represent the world in some aspects and not others, which cannot be accounted for causally (see Searle 2004: ch. 6).

Thus Sartre's account of consciousness is not so far fetched. Certainly there is less dispute these days that consciousness is real and that it has volitional qualities. Indeed neuroscientist Beauregard has gone so far as to say that the materialist or deterministic approach is no longer tenable, while Roger Penrose maintains that computer algorithms are incapable of developing consciousness, suggesting that human consciousness is not in fact computational, severely undermining the Turin-Church, or symbolic-computation hypothesis. Simon Berkovick calculated that the number of synapses in the brain is incapable of storing lifetime memories including related thoughts and emotions. Herms Romijin maintains that the storage of memory in the brain is anatomically and functionally impossible. Similarly Roger Penrose maintains that the consciousness cannot be localised in the brain and that theoretically the brain is incapable of causing consciousness alone.

It certainly seems that the subjective-intentional nature of consciousness is a real existing thing. As said before, the problem begins when we try to account for *how* exactly consciousness arises. The truth is no one knows, for sure. More importantly, such a

revelation - that we are far from understanding consciousness - flies in the face of those who demand that Sartre or in fact any philosopher who speaks of consciousness must square their views with the scientific community, or that they must provide a substantive neurobiological account of consciousness. The 'community' should never be ignored. Conversely the idea that speaking of consciousness *must* be coaxed in scientific lingo amounts to the same problem we identified earlier as the warped 'will to truth', the attempt to provide everything with a scientific stamp, to cherry-pick ideas to substantiate your own. Indeed if anything, our brief exploration of the prominent theories that suggest consciousness is a neural activity, has shown that we very are far from understanding consciousness at all. The jury is still out, so to speak.

Such is the level of disagreement that some prominent figures in neuroscience have even returned to the Cartesian interpretation of consciousness within a quantum context (i.e. Charles Sherrington, John Eccles and Wilder Penfield). Others, such as Alva Noë have become totally disillusioned with the materialist/naturalist paradigm arguing that they all started off from an unargued-for starting assumption, remaining strongly biased towards a materialistic perspective, "because one restricts one's questions to the domain where materialism in unchallenged" (Jeffrey Schwartz in Lommel 2007: 188). Instead the brain acts as a facilitator.

The conclusion to be taken from this, is that at this stage we a purely in the theoretical, not the objective, when we attempt to 'naturalise' consciousness and somehow 'prove' Sartre right. What is more pressing is the issue of embodiment. As said earlier, *we should not forget the brain*. It is clear that whatever the origins of consciousness, it interacts with or indeed communicates through neural networks. Whatever the 'mind' or consciousness may be - perhaps something contrary to conventional views or non-local, outside of the brain and so on as John Eccles and Bahram Elahi maintain - it appears to be undeniable that neuronal networks act as an intermediary for the manifestation of thoughts, whether they produce them or not. Truly it is here that 'negation' and the dialectic is at stake, and it is to this that those who wish to 'naturalise' Sartre should turn.

Embodiment and Neurophenomenology: the greater challenge

The real challenge posed by neuroscience at this stage is that of embodiment or "world-involving content" as Whelson (2011: 298) puts it. Embodiment places a greater role on the part of our situation in determining our 'chess game' so to speak, greater than Sartre's facticity perhps allows for. As Damasio (2012: 272) puts it:

> We cannot run our kind of life, in the physical and social environments that have become the human habit, without reflective conscious deliberation. But it is also the case that the products of conscious deliberation are significantly limited by a large array of nonconscious biases, some biologically set, some culturally acquired, and that the nonconscious control of action is also an issue to contend with.

Regardless, as we will see, although embodiment challenges Sartre and places us in a particular context, we still have the option of negation, which appears to reaffirm, if not substantiate, the theory of consciousness outlined in the previous chapter. As we will argue, it is the failure to negate or to carry through the conclusions founding conscious deliberation, that leads to, or rather is, bad faith.

What follows is an appreciation of the three levels of the embodiment of concepts: the neural level, the phenomenological conscious experience, and the cognitive unconscious

(George Lakoff and Mark Johnson, 1999: 102). This also includes, naturally, the incorporation of the neural account of memory. As Connolly (2002) rightly observes, findings in neuroscience highlight the role that virtual memory plays in embedding perception and thought to cultural traditions, or processes of power-knowledge, to a point that is, at first, beyond consciousness.

First of all, we have the case of what Connolly (2002: 26) describes as '*infra-perception*', which donates a crude processing of the amygdala, in emergency perception. It refers to a moment when perception must inform an action, but which is based on a virtual memory. The virtual memory is lost in the perceiver who is engaged in the middle of the action in question. Take for instance, the moment when you instinctively freeze upon seeing car lights, while crossing the road at night. Such infraperception "teaches us about the layered character of everyday perception, as well as about our impressive capacities to respond to emergencies" (loc. cit). Further, ordinary perception is thought to move faster than consciousness. Thus, even in situations wherein there is no immediate danger, and therefore no immediate action is required, our consciousness is tamed and/or filtered. That is because perception is subtractive, and the virtual memories mobilized, help to determine what is subtracted.

We see then the intersection between perception and learning/ memory. Crucially memory no longer represents our past to us, in this instance, but acts it. It is, shall we say, pre-reflective. Further "virtual memory also has a characteristic charge of affect mixed into it" (Connolly 2002: 28). A virtual memory is infused with an affective charge, as in a surge of panic or a feeling of joy etc. As the virtual memory is called-up to help translate a sensory encounter into experience, so too are the relevant affective charges. Through this, both thinking and judging are directed and shaped. As such "Thinking and judgment are already well under way before they enter the picture as conscious processes" (28). Consciousness then, is slow and linear, whereas as virtual memory and parallel processing are fast and rapid, and hence prior to consciousness.

We are therefore assessing the mixing of cultural experience into neural networks, as defined by the organisation of perception within the brain, attentively following the neuro-phenomenology of Varela's et al's (1993: 9) 'enactive' model. Generally speaking it is the implicit model of memory that interests us. By implicit, is meant a system that is not verbalisable and hence can only be conveyed through task performance. It is also inaccessible to consciousness. As Mishkin et al (1984) and Tulving (1985) explain, there are forms of learning, such as procedural skills (motor and cognitive skills), priming, conditioning and habituation that correspond to the implicit system. Information that is encoded in the implicit system is said to be inaccessible to consciousness, insofar as it is a bottom-up procedure. For it to be reached by consciousness it must cross over to the explicit system, via a top-down approach. Such neuroscientific theories of memory help to give a naturalist grounding to our view of the pre-reflective presented in the previous chapter. The implicit system is essentially a pre-reflective system that stores cultural and habitual thinking or indeed semantic memory, prior to consciousness.

Implicit memory or implicit knowledge is directly related to implicit learning, wherein a subject learns, independently of any conscious attempt to learn, and largely in the absence of explicit knowledge about what was acquired. Take for instance the way children learn a language. Implicit learning then, is sort of a 'learning-by-doing'. As explicit systems are, by their very nature, explicit, its substance is known consciously and hence behaviourally adaptive and flexible. In direct contrast, implicit systems, being by their very nature implicit, are hard to reach and unknowable in many ways. This "leads to

the curious but common situation that we often cannot explain why we do what we do or how we know what we know" (Dietrich 2007: 165). Thus building a representation in the implicit system "is referred to as "internalizing" or becoming 'second nature' in colloquial speech" (165).

In short, implicit sorts of skills, forms of knowledge, habits and so forth, can fully bypass consciousness. This is partly why it has been suggested that "implicit knowledge holds the key to *what it is like* to be something" (Dietrich 2007 169). It is also why others have suggested that qualia, or first person experience is merely a result of embedded, implicit knowledge. It is tempting to try and avoid the complexity that comes with such biological or neuroscientific viewpoints of personhood, as it could potentially rob us of our freedom and responsibility. However what we find is that consciousness is divisible between the pre-reflective and the reflective. Through reflective thinking we can re-appropriate the forms of knowledge that make up our (pre-reflective) implicit system. That does not mean to say it is easy, for if the implicit model is defined by habitual thinking, and is by its very nature unconscious, then it cannot be re-appropriated at the drop of a hat. It is worth repeating: the explicit system or consciousness, does not know about knowledge that is imprinted in the implicit system, making it unavailable for representation in working memory. However implicit knowledge can reach consciousness by being explicated, through a top-down process i.e. reflective consciousness.

The explanation of the dispositional nature of memory (as opposed to the recollective account of it) that Connolly utilizes is a continuation of Damasio's work. In treating a patient with ventromedial prefrontal damage, Damasio located the function of 'somatic markers' (see Damasio 2006: 33-36). A somatic-marker is a "culturally mobilized, corporeal disposition through which affect-imbued, preliminary orientations to perception and judgment scale down the material factored into cost-benefit analyses, principled judgments, and reflexive experiments" (35). As somatic marker is pre-reflective, in that it operates below the level of reflection, or within the implicit system, and informs our conscious acts. As we said, Damasio's patient suffered with ventromedial prefrontal damage. Appearing to have wiped out his somatic-markers, the patients behaviour in social scenario's was vastly affected; such as when asked by his clinic when he would be available for another appointment, and then taking thirty - minutes or so - while considering weather conditions and the like- to come to any kind of answer.

This may seem to contradict Sartre's theory of emotion, which as we saw in the previus chapter, argues that emotion is primarily a way of grasping the world, a sort of 'magical behaviour' aimed at negating something in the external world. Certainly Damasio's 'somatic markers' appears to fit into what very peripheric theory Sartre reject, in that it asserts that emotion is identical to perception of patterned bodily changes. However Sartre does not aim to reject the body or the somatic level of consciousness. Rather he reproaches these theories for neglecting the role of 'meaning'. Further, somatic markers do not reflect any biological pre-determined, or pre-wired predispositions. There is nothing 'pre' about them. They are neurophysiological, yes, but they have "intersubjective and linguistic elements mixed into them" (Connolly 2002: 36). And here's the important bit, when thinking about our relation to the world, to others and the role of the Background:

> Culturally preorganized charges shape perception and judgment in ways that exceed the picture of the world supported by the models of calculative reason,

> intersubjective culture, and deliberative democracy. They show us how linguistically complex brain regions respond not only to events in the world but also, proprioceptively, to cultural habits, skills, memory traces, and affects mixed into our muscles, skin, gut, and cruder bran regions. (Connolly, 2002: 36)

Thus Damasio's theory is complementary to Sartre's in that it accounts for the somatic, whilst also accounting for the role of meaning or intentionality. Unlike the ultimate peripheric theory, Damasio does not maintain that emotion is entirely closed-off from the world or our relation to it, it is not a private or internal affair of the body alone. Emotion, then, is still a meaningful aspect of our relation to the world, our being-in-the-world.

Ultimately this is what leads to Lakoff and Johnson's (1999: 13) assertion that the cognitive unconscious not only includes all our automatic cognitive operations, but also all our implicit knowledge. Therefore all "of our knowledge and beliefs are framed in terms of a conceptual system that resides mostly in the cognitive unconscious." And so our unconscious conceptual system operates like a "hidden hand" that "shapes how we conceptualize all aspects of our experience" (loc. cit). The cognitive unconscious "constitutes our *unreflective* common sense" (loc. cit). Subsequently the "mind is inherently embodied" and thought is "mostly unconscious" (3).

We have located the process of the life-world in shaping consciousness and thought. That does not mean to say that consciousness can never break through cultural biases located in the brain as somatic markers. We maintain that consciousness has a reflective element as well, that can greatly shape and alter forms of thought, albeit within a limited framework, and if practiced through certain techniques, allow for creativity. Such a description of the pre-reflective or cognitive unconscious, does not negate our description of the look either, for the importance of how one appears, or should appear, to the other may exist pre-reflectively, and be practiced on an individual through the look, the gaze and the judging of others. It is a phenomenological experience that is consistent, or at least does not directly contradict, findings in neuroscience.

Similarly following in the footsteps of Merleau-Ponty, George Lakoff and Mark Johnson (1999) posit the embodied-mind hypothesis. Their hypothesis radically undercuts the *per*ception/*con*ception distinction, wherein the same neural system engaged in perception plays a central role in conception. Such a view contains the presupposition that reason is subject to our embodiment, or rather an acceptance of the embodiment of reason. To reach this conclusion Lakoff and Johnson consider the integrated theory of primary metaphor, integrating Johnson's theory of conflation, Grady's theory of primary metaphor, Narayanan's neural theory of metaphor and Fauconnier and Turner's theory of conceptual blending. Primary metaphors are automatically and unconsciously acquired by simple functioning in the most ordinary of ways, in everyday life, starting from our earliest years (i.e. *child-world*).

In early development, an individual *conflates* subjective nonsensorimotor experiences and judgments with sensorimotor experiences. The child, in short, is unable to fully distinguish between the two. Eventually, according to Grady's theory, such associations constitute cross-domain mapping between the two. Take, for example, the expression or metaphor of 'a warm smile'. Accordingly warmth becomes associated with the emotion of love or affection via a simple hug. When a parent hugs a child, the presence of bodily warmth and the sensorimotor experience that goes with it, becomes associated with subjective experience of the affection that is accompanied by it. In neural theory, the conflations are instances of coactivation of both domains, during which permanent

neural connections between the domains develop. So in the case of affection as warmth the subjective judgment is the affection, the sensorimotor domain is the temperature of the hug, thus the primary experience is the feeling of warmth while being held affectionately. Take another example: 'big is important'. Children associate importance with their parents and the adult world, which are of course authority and guardian figures. They also happen to be much larger than children. Thus the subjective experience is 'importantance', the sensorimotor domain is size, and the primary experience consist of a child finding big things such as parents who can exert major forces on the child and dominate their visual experience. Subsequently we are inclined to associate the statement 'tomorrow is a big day' with 'tomorrow is an important day'.

Three things are happening then. In the first instance the correlation arises out of our embodied functioning in the world. Second, the source domain of the metaphor comes from the body's sensorimotor system. Finally, the correlation is instantiated in the body via neural connections (Lakoff and Johnson 1999: 54). Although this is presented in a linear fashion, it is crucial to note, according to Lakoff and Johnson, that such a process actually arises through parallel connections. Everyday experience in early life provides automatic formation of hundreds of primary metaphors that par subjective experience and judgment with sensorimotor experience. Secondary metaphors are formed from primary ones through conceptual blending, or the fitting together of small metaphorical pieces into a larger whole. Further the more such experiences take place the greater they are imbedded. When a judgment is coactivatied regularly with a sensorimotor domain, permanent neural connections are established through synaptic weight changes (Lakoff and Johnson 1999: 57). Recurrent neuron firing increase synaptic weight: "The more times connections are activated, the more the weights are increased, until permanent connections are forged" (57).

Through this, subjective experience is provided with a rich inferential structure, imagery and qualitative 'feel'. Crucially primary metaphors are part of the cognitive unconscious, or pre-reflective, in that they take place through the normal process of neural learning, and such a process is beyond initial active choice (similar to Domasio's theory). Further, taken together, primary metaphors form complex metaphors which structure commonplace knowledge, cultural models, folk theories, beliefs and values. Hence neural connectivity of the brain makes it natural for complex metaphorical mappings to be built out of preexisting mappings. It therefore follows that Truth and Knowledge represent embodied reason because our ideas are framed in terms of our unconscious embodied conceptual systems (see pp. 555).

It is not immediately clear how all these examples would fit into an integrated theory. But on a general level we are left with the impression that the account of consciousness, or better, pre-reflective consciousness, that is devoid of any neurobiological consideration is vastly limited. This does not necessarily undermine the nothingness of consciousness nor related to it its freedom and transcendence, for such an account is still consistent with the phenomenon of negation, or our ability to say 'no' and change. If anything it complements the existential notion of the unconscious as outlined in the previous chapter, extending its influence or shaping on negation via the neurobiological. Unlike Sartre's unconscious or pre-reflective consciousness, such change or negation is not as easy. Although the extent to which Sartre's unconscious limits conscious life is not very clear in his later writings.

But it must be stressed that the line diving bad faith and unconscious or rather pre-reflective consciousness is not clear-cut at all. We must also be clear that such an account

(as in our account of memory, and the taking in of information) is not empiricist for it is not atomistic. Cognition is embodied; there is a dialogue between an organism and its environment, in which each patterns the other. Hence we come to an understanding or appreciation of the biological meaning of the total situation in which behaviour occurs. As Maturana and Varela (1992: 172) confirm:

> It is important to realize that we tend to consider learning and memory as phenomena of changing conduct related to "taking in" or receiving something from the environment. This presupposes that the nervous system functions with representations. We have already seen that this supposition obscures and complicates tremendously our understanding of the cognitive process. Everything we have said points to learning as an expression of structural coupling, which always maintains compatibility between the operation of the organism and its environment …. To describe learning as an internalization of the environment confuses things by suggesting that in the structural dynamics of the nervous system there are phenomena that exist only in the descriptive realms of some organisms, like ourselves, capable of language

What does this mean? Namely that behaviour is a relational phenomenon. An organism's range of possible behaviour, in our case the humans', is determined by its structure. However the nervous system is characterized by a form of plasticity, which involves continuous transformation in line with transformations of the environment. Some structures that make possible a certain behaviour only develop if there is a particular history of interactions, in which case the structures are ontogenic and behvaiour is learned. So even something as simple and fundamental as walking is learned through the human context. The nervous system does not pick up information as such but rather brings forth a world by specifying what patterns of the environment are perturbations and what changes trigger them in the organism (see Maturana and Varela 1992: 169). The nervous system is not solipsistic as it participates in the interactions of the nervous system and its environment, which trigger structural changes that modulate its dynamics of states. Nor is it representational for it is the nervous system's structural state that specifies what perturbations are possible and what changes trigger them. Therefore when information reaches the retina it does not give us a direct representation. The lateral geniculate nucleus (LGN) receives information from the retina while being simultaneously influenced by the superior colliculus, the reticular nucleus of thalamus, the locus coeruleus, the occipitial cortex and the hypothalamus. The LGN, then, is not simply a relay station for rental projections (see pp. 162). It is high time the existentialist considered these insights. Or rather it is high time that we, as descendants of existentialism, stop neglecting the insights of Merleau-Ponty.

Critically such an account of embodiment and perception is what enables us to take yet another jump to the mircopolitical, as defined by Deleuze and Foucault. As William E. Connolly (2011: 52), speaking about Merleau-Ponty and Foucault, puts it:

> The initial connection between these two thinkers across difference is that both see how perception requires prior *disciplining* of the sense in which a rich history of sensory inter-involvement sets the stage for later experience.

Hence when Foucault speaks of 'discipline', as in a system whereby the subjects posture, demeanor and sensibilities is molded. This leaves us in a curious state vis-à-vis Sartre's ethical call for authenticity and his repugnant attitude towards 'bad faith'.

Conclusion

The true cause of consciousness is still unknown. Although we have come a long way in understanding consciousness, certainly in terms of overcoming the classical approach, we are still far from being able to make any substantial conclusions. In this sense I find it unnecessary to 'vindicate' Sartre's intentional consciousness. It is unreasonable and absurd. Conversely, that does not mean that we should entirely neglect the neurobiological. We still know a relatively fair amount regarding neural networks, memory, perception and so forth; in short *embodiment*. These finings have huge implications, in that the Sartrean ethic of authenticity is put in jeopardy. If the neuroscience of embodiment has taught us anything, it is that consciousness is not as pure as Sartre would have it, even with his recognition of the pre-reflective. We have social experiences before and below language as well as within it. To this extent unconscious forces, habitual ways of thinking, somatic markers and so forth, deeply mystify self-transparency.

Perception and judgement are greatly shaped by forces beyond the realm of standard calculative reason. The brain or mind is situated, biological, social, everyday-experience orientated, culture-dependent, real-time constrained. It is, in short, *embodied*. That does not mean to say that we are not defined by nothingness. It means to say that our nothingness, our anti-essence, is concealed. We are, to a great degree, at the whims of the pre-reflective, but certainly not in strictly deterministic sense. Certainly our heads are literally filled from childhood onwards, with society's junk, yet the act of negation remains to be a constant possibility in every instant. Yet it takes *great* effort to elucidate ones own habitual thoughts, to establish a truly reflective posture.

References

Barnes, H. E. (2005) 'Consciousness and Digestion: Sartre and Neuroscience', in van den Hoven, A and Leak, A. (ed) *Sartre Today: A Century Celebration*. Oxford, Berghahn Books pp. 1-14

Connolly, W. (2002) *Neuropolitics: Thinking, Culture, Speed*. London, University of Minnesota Press

Cox, G. (2006) *Sartre: a Guide for the Perplexed*. London, Continuum

Damasio, A. (2006) *Descartes' Error: Emotion, Reason and the Human Brain*. London, Vintage Books

Damasio, A. (2012) *Self Comes to Mind: Constructing the Conscious Brain*. London, Vintage

Dietrich, A. (2007) *An Introduction to Consciousness*. London, Palgrave Macmillan

Gillett, G. and Liu, S. C. (2011) Free Will and Necker's Cube: Reason, Language and Top-Down Control in Cognitive Neuroscience, *The Journal of the Royal Institute of Philosophy*, vol 87 (339), pp. 29-50. Cambridge University Press

Husserl, E. (2012) *Ideas*. Trans. W. R. Boyce Gibson. Routledge, London

Lakoff, G. and Johnson, M. (1999) *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought*. New York, Basic Books

Lommel, P. V. (2010) *Consciousness Beyond Life: The Science of the Near-Death Experience*. Trans. Laura Vroomen. New York, HarperCollins

Maturana, H. R. and Varela, F. J. (1992) *The Tree of Knowledge: The Biological Roots of Human Understanding*. Londo, Shambhala

McGinn, C. (2000) *The Mysterious Flame: Conscious Minds in a Material World*. New York, Basic Books

Merleau-Ponty, M. (2002) *Phenomenology of Perception*. Trans. Colin Smith. London, Routledge Classics

Mishkin et al. (1984) 'Memories and habits: Two neural systems', in Lynch, G., McGaugh, J. L., and Weinberger, N. W., editors, *Neurobiology of Learning and Memory*, pp. 65-77. Guilford, New York.

Sartre, J. P. (1981) *The Family Idiot,* vol. 1, Trans. Carol Cosmon. Chicago: University of Chicago Press

Sartre, J. P. (1988) *Life/Situations: Essays Written and Spoken*. New York, Random House US

Sartre, J. P. (2002) *Sketch for a Theory of the Emotions*. Trans. Philip Mairet. London, Routledge

Sartre, J. P. (2004) *The Transcendence of the Ego*. London, Routledge Classics

Sartre, J. P. (2007) *Existentialism & Humanism*. Trans. Philip Mairet. London, Methuen

Sartre, J. P. (2008) *Being and Nothingness: An Essay on Phenomenological Ontology*. Trans. Hazel E. Barnes. London, Routledge

Searle, J. (1997) *The Mystery of Consciousness*. London, Granta Books

Searle, J. (2004) *Mind: A Brief Introduction*. Oxford. Oxford University Press

Tulving, E. (1985) *Elements of Episodic Memory*. Oxford, Oxford University Press

Varela, J. V. (1999) 'Present-Time Consciousness', in Varela, F. and Shear, J. (ed) *The View From Within: First-person Approaches to the Study of Consciousness*. Thorverton, Imprint Academic

Varela, J. V. et al. (1993) *The Embodied Mind: Cognitive Science and Human Experience.* London, The MIT Press

Varela, J. V. and Shear, J (1998) *The Tree of Knowledge: The Biological Roots of Human Understanding*. Trans. Robert Paolucci. London, Shambhala

Whelson, R. (2011) *Philosophy, Neuroscience and Consciousness*. Durham, Acumen