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Disambiguating Consciousness: Bridging Eastern and Western Perspectives

THESIS

submitted in partial satisfaction of the requirements
for the degree of

Masters

in Cognitive and Information Sciences

by

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Abstract

Consciousness remains a perplexing ambiguity within the scientific community. My goal in this paper is to define and disambiguate the word "consciousness" to allow for a clear channel of communication. I will utilize theories in philosophy, evolutionary biology and language in my attempt to form a coherent framework for consciousness. I will also discuss prevailing theories of the neural correlates of consciousness (NCC's), including some issues in experimental design and methodology. At the end of the paper, I turn from Western philosophy and science to Eastern philosophy and attempt to find a common ground among them, bridging the Eastern and Western understanding of consciousness.

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Introduction

"Consciousness sleeps in the mineral, dreams in the plant, awakes in the animal and slowly becomes aware of itself in man."
- Attributed both to Pythagoras and Rumi

Consciousness in the Western Perspective

Consciousness is related to and often conflated with forms of information processing, such as intelligence and cognition. I will attempt to create a clear distinction between the two, beginning with an investigation of consciousness then moving into an analysis of information processing. After both ideas have been elucidated, I will discuss the co-occurence of the two within a single system. On my account, both consciousness and information processing come in degrees. Moreover, all systems involve some minimal amount of information processing and some minimal amount of phenomenal consciousness (this will become more clear in the discussion of "awareness" in the Eastern section). A system can have a high degree of phenomenal consciousness without correspondingly complex information processing (as in an animal with a complex sensory apparatus and agency but minimal cognitive processing), or can involve highly complex information processing with minimal phenomenal consciousness (as in Chat GPT). The goal is not to defend all of these points individually (others have done so and I cite them) but rather to clearly differentiate all the threads and show how they work together harmoniously to capture a broad range of phenomena. Furthermore, I hope to bring clarity to the convoluted network of terminology that already exists by placing each term at a specific location in this account.

Consciousness

I will take "consciousness" to be what is sometimes called "phenomenal consciousness" in philosophical literature (other synonymous terms are "experience", "sentience", and "consciousness"). A conscious process, in this view, is one such that there is something it is like to go through that process. Conscious experiences always have some subjective character. They always occur from some point of view. In this section I will introduce the main definitions and concepts I will rely on for the rest of the paper in relation to phenomenal consciousness. In order to provide some direction and clarity, I will make some claims reflecting my view, but these claims will not be thoroughly defended here. I will include my own specific definitions followed by a supportive elaboration including the perspectives of other philosophers.

Consciousness is more or less complex depending on the complexity of its physical substrate. As said by R. Balasubramian (2010), consciousness is involved in the

mind-sense-body complex of an individual substrate such that it becomes embodied consciousness. An entity's consciousness/experience (a substrate together with its consciousness is a “conscious entity”) depends on the content of experience and the content of experience depends on the entity's reception, processing, and interpretation of information. The reception, processing and interpretation of information depends on the make-up of the entity and its sensory and perceptual mechanisms.

However, an entity must first be an entity in order to to have experience, since subjectivity is essential to experience. There must be a distinction between subject and object in order for subjective experience to exist. Siddharameshwar Maharaj states that experience is only an appearance and that experience necessitates duality; "There is definitely duality when experience takes place. Where there is only One, there is no experience. For experience[1] to take place, some other object is necessary" (Maharaj, 2014, p. 164). By duality, we simply mean more than one, multiplicity, in which there is a subject and an object, an experiencer and that which is experienced. This duality starts at the physical level, with the self world-boundary establishing a distinct existence to act as an entity separate from its environment and the world, enabling a separate and unique point of view. Without a boundary separating the experiencer from what is experienced, there can be no consciousness or subjective experience. For Siddharameshwar, the first boundary is 'I Am', which is the formation of individuality, and all experience is limited to this individual form.

Evolutionarily, the self-world boundary may become increasingly defined, but remains permeable and continually shifting, expanding or contracting (Levin 2019, Spivey, personal communication). It should be emphasized that this boundary is not fixed or sharp, as not even the boundary of atoms is sharp, which are the building blocks of physical existence (Schrodinger, 1944). The basis of consciousness is establishing some degree of a self-world boundary and sense of agency to allow consciousness to be expressed and embodied from a subjective point of view. This self-world boundary is on a continuum, which allows individuality and agency to arise. Agency exists minimally in non-organic material, but biological life and primitive homeostasis allows for the proper organization for it to advance and scale upward (Levin, Man and Damasio, 2019). The idea of a self-world boundary will be further elaborated upon from an evolutionary perspective in a later section.

[1] It should be understood that Maharaj distinguishes normal experience from "pure" or "true" experience, in which the subject/object boundary dissolves and it is Reality experiencing itself, or Brahman experiencing Brahman. Although physically there are still various forms and “boundaries” the experiencer is the entire Field of existence itself, rather than the limited form of an individual. It is no longer a subjective experience. For this reason, we can say that duality is needed for subjective experience, but not "pure" experience. As said by Maharaj "When the observer gets 'True Experience,' the job is over. When both the 'field of Knowledge,' and 'the knower of the field' are gone, only the Supreme Reality, the 'Parama Purusha,' remains. It is experiencing without the experiencer or the observer" (Maharaj, 2014, p. 302).The "Field of Existence/Knowledge" is known as Sat-Cit-Ananda and will be further elaborated upon in the eastern section.

Consciousness always involves some feeling or sensation accompanying the reception of information as it flows through the substrate (the term “experience” emphasizes this aspect of consciousness). I take “feeling” to be that aspect of consciousness that corresponds to experiencing and sensing, that is at the basis of “what it is like” to be a being. This "feeling" is different from emotion, and should not be limited to emotional experience. Feeling encompasses emotion in the sense that emotions are felt, but other, non-emotional stimuli such as the sun shining on your body or the wind blowing on your face, are also felt. Feeling can be defined as somatosensory and proprioceptive sensations and perceptions, which includes basic bodily sensations such as the beating of your heart or coldness on your skin, to complex emotional states such as joy, boredom, or suffering (Backer, personal communication).

I share some features of this view of consciousness with philosophers such as David Chalmers and Thomas Nagel. Chalmers (2022) states a being is conscious if it has subjective experience, like that of seeing, feeling, or thinking. He further states that consciousness and sentience are roughly equivalent, in which the two are both equal to subjective experience. Thomas Nagel (1974) emphasizes the 'what it is like-ness' of an experiencing entity, in which there is something it is like to be that thing. This 'what it is like-ness' is independent of and beyond what we may imagine it to be, but is unique to the experiencer itself. Nagel (1974) further emphasizes the subjective character of experience, which is intrinsically linked to a single point of view.

The most essential aspect of the subjective point of view is the locus of viewing, or the locus of perception and experience, which is the 'metaphorical point' in the point of view (Godfrey-Smith 2019). Further, it must include how the subject perceives the world, because how the subject perceives is what shapes the unique point of view. The subject's mind and/or physical substrate are intrinsically linked to the viewpoint of consciousness, as our subjective experience is expressed through our substrate and informed by our sensory and perceptual mechanisms. Subjective experience must include the locus of experience and how and where that locus is experiencing from, which is inextricably linked to all the attributes of the physical substrate involved. The point of view includes location as well as the specific characteristics of a substrate that enable and form its unique experience. For example, two people looking at the moon from two different locations will consequently have different perspectives and experiences of it. However, two people may be looking at the moon from the same location, but what they experience may still be vastly different, as their perceptual apparatus influences how something is experienced. This point of view or subjective character is more essential to consciousness than the contents of experience (sensations, thoughts, external stimuli etc). Nagel states that all experience has a subjective character that is beyond our ability to conceive (Nagel 1974). The contents of experience can be known, but the awareness itself cannot, and is the only constant amongst the flux of transient experiences.

Here is how Ned Block defined phenomenal consciousness in the famous paper where he distinguished it from access consciousness (discussed below):

> Phenomenal consciousness is experience; what makes a state phenomenally conscious is that there is something "it is like" (Nagel, 1974) to be in that state...P-consciousness properties are experiential ones. P-conscious states are experiential, that is, a state is P-conscious if it has experiential properties. The totality of the experiential properties of a state are 'what it is like' to have it (Block, 1995).

From this we can understand phenomenal consciousness (P-consciousness) to be very similar, if not the same as how Nagel and Chalmers define consciousness. P-consciousness is experience, in which the totality of the experiential properties of a state are 'what it is like' to have it. The most fundamental P-conscious properties are sensations, but also include feelings, perceptions, thoughts, desires, and emotions (Block 1995). P-conscious and perceptual experiences often have representational content and can be conceptual, but not necessarily. In later sections we will discuss how P-consciousness and Access consciousness (A-consciousness) are different, and how they interact.

To summarize, consciousness is subjective experience. This subjective experience depends on establishing some degree of a self-world boundary to allow for a subjective point of view of the world, and of the information that is received, processed, and therefore experienced by that entity. Hopefully we have brought some initial clarity to what we mean by this word "consciousness" and its relation to subjectivity and agency. We will now move onto the distinct yet related idea of information processing.

Information Processing

"Information[2] processing" is a broad term covering information processing in the traditional sense that applies to both biological and non-biological systems. It is a way to describe how systems use and access information. Information processing exists on a continuum, coming in degrees corresponding to the complexity and function of

[2] Information is difficult to define in a non-circular way. It roughly means "data" that gets processed by a system, which implies it is not information until it is received in some way. Information comes from the word "inform", and the etymology of "Inform" is "to give form or shape to". "Data" comes from the word "Datum", and the etymology of "Datum" is "something given". Data is neutral and relative until it is received and processed, in which it now takes "form" having a specific value. Information is data that has meaning or value in some context for the receiver. This could be lightwaves hitting the eye or vibrations in the air hitting the eardrum, which may then take form as words, symbols or ideas. It could also be the electrical impulses between neurons in the brain sending information within a network. This is also understood similarly in computers and the internet, in which data is translated into pulses of light or electricity, called "bits" and then interpreted by the receiving computer. Also note that my view of information is not currently related to Shannon information or any other formalized version of the concept.

processing. In this section I will expound upon two main forms of information processing; cognition and intelligence. Although consciousness and complex information processing usually develop together, as will be seen in the discussion of the evolution of life, the two are logically distinct: a system can be involved in rich information processing with minimal consciousness (there will always be some consciousness for reasons that will only be clear later), or we can have phenomenal consciousness with very little complex information processing.

Information processing is logically distinct from consciousness in the sense that computers can have a high degree of information processing complexity without a correspondingly high degree of consciousness. However, when complex information processing happens in the substrate of a conscious being, that information processing corresponds to its experience (experiential information and content). This includes both implicit and explicit processes, in which A-consciousness encodes the explicit processes. Certain kinds of more complex information processing systems have special terms associated with them, in particular: cognition, intelligence, and global access.

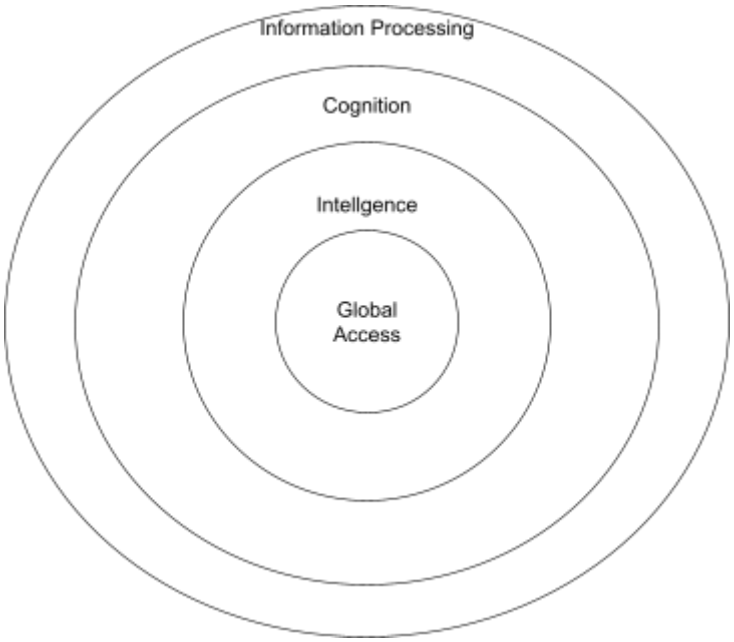


Figure 1: Graphic illustrating information processing and its different forms. Information processing encompasses all, with cognition, intelligence, and global access being increasingly advanced and specialized forms.

Cognition, intelligence, and global access are complex forms of information processing that are on a continuum. Intelligence differs from cognition in being slightly more advanced, necessitating some memory storage system, advanced learning capabilities, and adaptability in novel environments. Cognition and intelligence are

extremely close and interrelated concepts that can mostly be used interchangeably, however we will still treat them separately and go over how they have been defined historically. Global access is the highest form of information processing in that it requires representations, reasoning capacity, advanced working memory systems, and something like a "workspace" within which representations are compared. Again, each of these exists in degrees, on a spectrum. The boundaries between the circles in the figure are not sharp in the way the figure suggests.

Cognition is the processing, interpretation, and manipulation of information. The term derives from the Latin *cognoscere*, meaning to get to know or recognize. Neuroscientist Richard Byrne (2019) defines cognition as the activities and processes concerned with the acquisition, storage, retrieval and processing of information – regardless of whether these processes are explicit or conscious. Ulric Neisser (1967) described cognition as all the processes in which sensory input is transformed, reduced, elaborated, stored, recovered, and used. Lars Chittka (2019) explains how even the earliest animals, such as a fruit fly, actively probe their environment in such a way that can be regarded as cognitive, including processes such as prediction and attention. Recent discussions of basal cognition look at cognition in a way that does not require a brain or nervous system. In studying unicellular organisms, we observe their ability to recognize boundaries, respond to stimuli and change behavior accordingly. This shifts cognition from a brain or nervous system based process, to one that may occur at even the most simple levels of existence. According to biologist Michael Levin, cognition is not restricted to advanced capabilities such as planning, self-aware metacognition, language, etc.,...rather it serves as an umbrella term for all degrees of adaptive information processing and problem-solving, no matter how advanced or primitive" (Levin 2022, 2023).

"Intelligence" is the ability to learn, process and apply information and use information to successfully adapt to and achieve goals in novel and complex environments. Intelligence is defined by William James (1890) as the ability to achieve the same goal in multiple or different ways. This simple definition lays the foundation of intelligence as goal directed behavior and adaptability. Over the next century, philosophers, psychologists and scientists have expanded on this definition. Wang (1999) defines intelligence as the ability for a system to adapt to its environment with insufficient knowledge and resources. S.S. Colvin (2000) maintains that a person possesses intelligence if he has learned, or can learn, to adjust himself to his environment. Similarly, Fogal (1995), asserts that any system that generates adaptive behavior to meet goals in a range of environments can be said to be intelligent. Levin (2022) understands the degree of intelligence of an agent is roughly proportional to its ability to deploy memory and prediction (information processing) in order to avoid local maxima. Intelligence involves being able to temporarily move away from a simple vector toward one's goals. Many other authors share very similar definitions, with the main

characteristics of intelligence being learning and information processing, adaptability to environments, and goal directed behavior.

"Global access" is a form of information processing where some forms of information are made available for use by other domains within that system (This is called access consciousness by Block, but that introduces confusion and we are reserving "consciousness" for phenomenal consciousness, as discussed above). According to Block (2009), a representation is A-conscious (globally accessible) if it is broadcast for free use in reasoning and for rational control of action (including reporting). An A-state is one that consists of having an A-representation. A-Consciousness was developed to connect philosophy to cognitive sciences and create a quantifiable and scientifically tractable account of consciousness. A-consciousness is a cluster concept, in which broadcasting and reportability connect it to the "hard science" theories of consciousness such as Global Neuronal Workspace Theory, with reporting being the best practical guide to A-consciousness [global access] (Block 2009).

Global access implies some sort of centralization or central workspace which connects information processed by some regions to other regions, and an executive system which controls behavior accordingly. Global access is an abstract functional, architectural principle that relates to but is not the same as brain processes. Brains are the current ideal substrate through which global access can be instantiated given their complexity and organization. However, it is not implausible that AI may have some degree of global access, or will in the near future. When global access is integrated in a highly P-conscious system, it results in advanced states that are seen in humans. As Block states, the paradigm A-conscious states are 'propositional attitude' states, including things like thoughts and desire (Block 2009). A-consciousness is representational, functional, necessarily transitive and essential to reasoning. By "representational" we mean based on a hypothetical internal cognitive symbol that represents external reality and by transitive we mean that it is content dependent and it is always consciousness of something in particular, some content or representation. Content that is globally accessible is content that reaches the executive system, or a system in charge of rational control of action and speech (Block 1995). Block has also proposed that information accessed is identical to the content of working memory, i.e. that 'access' essentially means 'working memory', and that working memory is the global workspace of access consciousness (Overgaard 2018, Block 2008). Global access requires some working memory system which acts as a workspace for information to be shared and accessed by other regions within a system. This is connected to and illustrated by the Global Neuronal Workspace Theory which will be explained in detail in a later section.

Phenomenal vs. Access Consciousness

Thus far we have separately considered consciousness from information processing and how they are logically distinct. With this background in place, we can

now revisit Block's well-known distinction between access and phenomenal consciousness and see how they come apart. Separating consciousness from information processing as we have done gives us a way to describe naturally occurring systems with more clarity than we could before. For example, we can make sense of terms like "access consciousness" as encompassing both a form of consciousness and a form of global access, implying that access consciousness is global access within an already conscious entity. It should again be repeated that consciousness and information processing usually and naturally develop together, but can be split apart. We can understand these ideas by considering a two dimensional space where one dimension corresponds to the amount of consciousness and the other corresponds to the amount of information processing and global accessibility. See Figure 2. A system may have very high intelligence, information processing and global accessibility, yet have minimal consciousness, or have a high degree of consciousness but relatively less information processing .

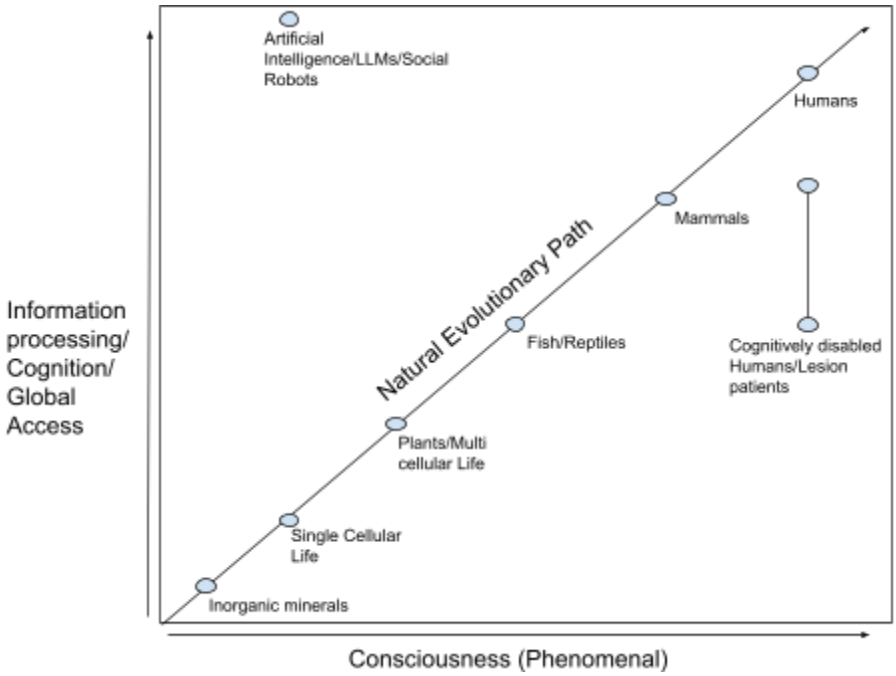


Figure 2: Chart illustrating the relationship between information processing and consciousness. The two are logically distinct, but usually and naturally develop and evolve together. This illustration is a rough estimate and does not include all potential substrates of consciousness.

From this standpoint the term "Access consciousness" makes sense as what happens when a phenomenal experience (i.e. consciousness) is combined with global access (a form of information processing). This is illustrated nicely by comparing it to Gurwitch's field theory of consciousness (Figure 3), in which the entire field of consciousness has a variable focus of attention (theme), surrounded by a structured periphery of inattentional contents (Yoshimi and Vinson, 2015).

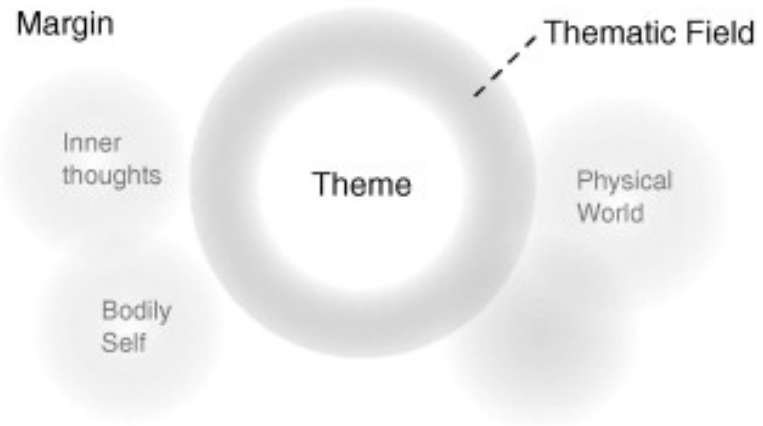


Figure 3: Gurwitch's Field Theory of Consciousness. The entire field is the (phenomenal) consciousness, while the theme is access consciousness, which is modulated by attention (Adapted from Yoshimi and Vinson 2015).

The field of consciousness is the P-consciousness, which is the totality of data or the totality of experiential properties (Block 1995, Yoshimi and Vinson 2015). Attention[3] acts as a filter that allows important perceptual information to be accessed, or made available for global processing and used in rational activity (Myers 2017). Access is attending to a part (the theme) of the totality of information available to an agent. The thematic field corresponds to a vague feeling associated with accessing additional unattended information, for example considering what to say next in a conversation or what direction to take in solving a problem, and the margin contains vaguely sensed information that is not informationally relevant to the theme. So we can see that the field corresponds to the totality of consciousness, but there is a specific structure occurring in it that "overlays" the consciousness on different forms of information processing, like global access.

We can now revisit Block's original way of separating P-consciousness and A-consciousness, but using our more-precise terminology. First we will consider Phenomenal without Access, then Access without Phenomenal.

Phenomenal without Access consciousness can be conceptually imagined in Block's case of the pneumatic drill. In this scenario, there is an extremely loud drill digging in the background while you are attending to other tasks. The noise was there all along and you were vaguely aware of it (P-conscious), however it wasn't until a certain time that you became consciously aware that you were hearing it (A-conscious). In terms of Gurwitsch this is like a content in the margin, that we are phenomenally aware of but

[3] Attention is an extremely elusive and complex concept that will not be fully explained in the current paper. For now, we will use it only in relation to current concepts and theories such as the Field Theory of consciousness, Access consciousness, and the Global Neuronal Workspace Theory.

don’t have global access to. Once your attention is drawn to the drill, the drill sound information in your experience became accessed, and you can now act upon it rationally, for example, by closing your window to dampen the sound. In this scenario, you may encounter an 'aha' type moment where you did not just begin experiencing the noise, but you realize you had been experiencing the noise for some time and it was just unattended to and unaccessed. This scenario, I believe, is a clear example of inattentional deafness, which occurs often in everyday life, but has only recently been studied systematically. How inattentional deafness and blindness relate to consciousness will be further discussed below.

This imagined example of P without A has been empirically demonstrated by Amir et al., in 2023. In their experiment, they attempted to mimic the common scenario in which a person is at home, completely absorbed in their work, not consciously aware of the constant sound emitted from a refrigerator compressor. If they were asked if they heard anything, they would reply "no", however, if the compressor were to turn off, they would notice that something changed in their experience. This reveals that the sound was in fact a part of their phenomenal experience, but it was only unattended to and unaccessed at the time. The authors outlined three conditions that would need to be met for this experiment to provide reliable evidence.

1. Participants have no access to the stimulus during presentation.
2. Participants demonstrate that they had some qualitative, phenomenal experience of the stimulus.
3. Condition (2) must be shown to not merely reflect unconscious processing.

The trial types included an A-trial, P-trial, and No Consciousness (NC) trial, in which the P-trial participants did not hear the noise but heard the change, indicating that there was experience of the noise without cognitive access to it, fulfilling condition one. Condition two was fulfilled in participants' retrospective access of phenomenal aspects of the stimulus in a discrimination task. In order to fulfill the third condition stated above, the authors demonstrated that performance in the NC trial was less than chance, showing that unconscious processing does not suffice in discriminating between sounds. The authors' results show evidence of phenomenal consciousness without access, supporting the view that the two are distinct.

Another example of phenomenal consciousness without access consciousness can be seen in cases of “overflow” , in which the Capacity of phenomenal Consciousness exceeds that of cognitive access (Block 2011). This parallels Block's original description of A-consciousness being an information processing image of P-consciousness and a rational use of information in cognition (Block 2005, Myers 2017). Overflow implies that the P-conscious experience is richer than what a person is able cognitively access and report.

Now we can turn to the more difficult, and less intuitive case of access without phenomenal. Global access without phenomenal consciousness implies the ability to

know something without experiencing it. This would entail an entity being able to have access to information that is not or cannot be experienced. Block (1995) originally proposed the idea of this occurring in a 'phenomenal zombie' in which the brain and nervous system is a material, such as silicon, that cannot support P-consciousness, yet the entity is computationally and cognitively comparable to a person that has access consciousness

Given my approach, a better example of access without phenomenal would be a computer simulation of access consciousness that is *not* implemented in an evolved biological system. Since global access is defined on the basis of attentional mechanisms, a memory storage system, and the ability to utilize this information for rational action such as goal oriented behavior or complex learning, we can see how it can exist in computational models, AI, and LLMs, which are not generally thought to be phenomenally conscious systems. Many neural networks exhibit such global access (Liu et al. 2021, Xie et al., 2022). and I will go over one computational model which models the Global neuronal workspace, the main neuroscience theory related to access consciousness. An example of such a system is discussed in the section on Global Neuronal Workspace Theory.

Coevolution of Phenomenal Consciousness and Information Processing

Thus far we have separately considered consciousness from information processing and how they are logically distinct. However, the separate occurrence of these is rare in the natural world (for example, a human with a disability or an engineered AI system). In practice, consciousness and information processing both develop and scale in complexity together. So in this section we consider what happens when consciousness unfolds in a biological system that is undergoing stages of information processing. This is what generates the various levels of conscious complexity and differentiations of consciousness.

Consciousness and experience depend on a subjective character and unique point of view, which starts with establishing a self-world boundary. Consciousness implies that there is something it is like to be that thing or process. The more the thing or process distinguishes itself as a separate phenomenon, the more unique its subjective experience, the greater consciousness it has. The degree of subjectivity depends on the self-world boundary, and the contents of a subject's experience correspond with the reception, processing, and interpretation of information. As we will see below, the natural evolution of life displays how information processing and subjectivity go hand in hand, and that the advancement of sensory and perceptual mechanisms (the means for low level information processing) facilitate the establishment of the self-world boundary.

Let us trace the development of consciousness into increasingly complex and differentiated forms starting from extremely simple systems and working up from there. In fact, surprisingly, we can start with non-living systems like rocks, as the divide

between living and non-living matter is not absolute or certain (Varn and Crutchfield, 2013). A rock has a point of view in the sense that it has location in relation to other things that affect it and specific response properties (Godfrey-Smith, 2019). Rocks can be observed to respond differently to different physical stimuli such as heat and light with a modification to its internal state. When heat interacts with a rock, there is a transfer of information causing different transformations within the compound depending on its constitution. Some mineral compounds melt slowly, some crack open and some explode. Another example of a mineral's responsiveness to external stimuli can be seen when observing a colored rock such as sapphire. When light of a certain wavelength interacts with a sapphire, an electron transfers from an iron to a titanium ion, resulting in a "blue" sapphire. Depending on the internal makeup of the sapphire and its trace elements, there will be a different responsiveness, resulting in various colors. It can be understood that minerals do not simply reflect light, but rather "They play with it. They interact with light as a wave, and they interact with light as a particle. Electrons move, gain, and lose energy" (Fernandez 2023).

In a sense, entities with points of view are everywhere, as any connected collection of matter meets the minimal criteria of subjectivity in having location and response properties – an input-output profile (Godfrey Smith, 2019). Even a digital camera has a point of view in its ability to respond to stimuli and modify its inner state (Godfrey-Smith, 2019). From the perspective of Michael Levin, "Simple things absolutely have goals - this is the principle of Least Action - little tiny goals" (M. Levin, personal communication). The Principle of Least Action, as described by Richard Feynman, implies that a particle senses all the paths in the neighborhood and follows the one that has the least action. Another way of stating this is in understanding that a true motion or movement is the optimum out of all possible motions. This conveys the idea that the workings of nature are somehow optimal, suggesting that nature is working in an efficient way, with minimal effort (Manton 2013). This principle parallels a saying by the ancient Taoist philosopher Lao Tzu, nature does not hurry, yet everything is accomplished.

Although these physical substrates may begin to minimally express consciousness and information processing, they are lacking a key feature; agency and defined boundaries allowing for a clear distinction between itself and the world. The cases of the rock, camera, and collections of matter can be seen as controversial, but they do reveal some minimal form of subjectivity, responsiveness and consciousness. This minimal consciousness in basic matter correlates with consciousness "*sleeping in the mineral"*, referenced in the introductory quote. Although interesting, this type of consciousness alone may not be enough for moral and ethical consideration, and may not be significantly helpful in our investigation.

Entities that have enough consciousness and subjectivity to be relevant in ethical and moral consideration would include, at minimum, living systems that have a strong

distinction between self and world/environment and are self maintaining, having the ability to continually synthesize the molecules that makes them up, preserving a pattern of activity through a reusage in materials (Godfrey-Smith 2016b). This self preservation can be seen in cellular life, in their ability to respond to the environment to maintain their own unique activity pattern and relation with their surroundings. When these cells come together to form multicellular life, it consequently results in greater complexity and highly integrated collectives. The self-maintenance, responsiveness, collective unity and more defined boundaries in cellular, multi-cellular, and plant life allows for a greater expression of consciousness, which now correlates with consciousness "*dreaming in the plant."* Plants and bacteria have been shown to have features of consciousness such as decision making (Lee et al., 2023, Spivey, 2023), and will be further elaborated in the discussion of Eastern perspective on consciousness.

Complex multicellular organisms, such as animals, and perhaps certain plant or fungi species, display an even higher level of complexity, integration and subjectivity. These systems exhibit definite individuality, in which there is a coordination of parts that connect the whole system. These systems can now be understood as a unitary organism with respect to their organization and development. (Godfrey-Smith 2019). The nervous system, which evolved around 600 million years ago, is responsible for allowing such high levels of complexity, coordination, and integration within multicellular systems.

A key feature of these complex multicellular entities is advanced and complex perception that accompanies greater movement and mobility, first described by Aristotle as the "Locomotive Soul". In this greater movement, combined with sensory perception, organisms encounter 'liabilities of mobility', in which the animal's own actions produce some of the stimuli that it has evolved to respond to, introducing uncertainty in the cause of the stimuli (Merker, 2005, Godfrey-Smith, 2019). This potential confusion requires the organism to distinguish between exogenously caused stimuli (exafference) and self produced sensory changes (reafference). This problem can be resolved by the organism establishing a loop within its boundaries by sending a signal of some kind from the action-producing part of the system to enable compensation in perceptual processing (Godfrey-Smith, 2019). As actions become more elaborate, the problem escalates and the required mechanisms become more complex and centralized. Through this, there is an increase in perceptual complexity and a growing awareness in the organism's self-caused stimuli, which forms and strengthens its distinction between self and world.

Another key feature, perhaps most essential to the intuitive understanding of experience and consciousness, is that of *feeling*. Feeling, as understood by Godfrey-Smith (I understand the term slightly differently, as we will see), is not sensation or perceptual engagement with the world, but the valenced registration of events and the distinction between good and bad. Other authors such as Ginsburg and Jablonka (2007), Denton (Denton et al. 2009), and Damasio and Carvalho (2013), have interpreted and viewed *feeling* similarly as transitory internal events with a motivational role. This

understanding of feeling has a key feature of motivation, in which what is felt plays a role in the organism's behavior. If something is felt as "good", it may be attracted to it for some benefit, and that which is felt as "bad", will deter the organism as a potential danger or threat.

Instrumental learning is a type of learning in which an organism learns that an action has positive or aversive consequences (Godfrey-Smith 2019), and is proposed to be the first step in the evolution of feeling. This unique learning style requires a memory-like system, allowing an organism to track its actions and their consequences. Through this, an organism has an internal, valuative system that registers and tracks good versus bad, and utilizes this information to change its behavior momentarily and guide future action. In knowing and tracking its own actions, the self/world distinction becomes stronger and more pronounced. As the system becomes more complex due to the changing environment, the internal registration may need to become more sensitive to subtle changes, giving rise to the registered feeling of good or bad.

Although this pathway to feeling through instrumental learning is coherent, I believe there is a misunderstanding at a fundamental level. While instrumental learning allows for the valenced registration of events as good or bad, it does not give rise to *feeling* itself, but rather the ability to discern between what feelings are beneficial and which are harmful. This discernment between harmful and beneficial feelings and stimuli can be seen as a primitive form of cognition and intelligence. The *feeling* aspect of experience is more fundamental than this, something that may arise simultaneously with sensation and perception. You feel the sun on your skin and you feel a happy or sad emotion, the same way a jellyfish feels salinity levels in the water. The feeling itself is not good or bad, it is only judged as such by some cognitive faculty. As stated above, feeling corresponds to the 'what it is like-ness' of experience. Feeling is part of experience, with the intensity and quality of feeling depending on the establishment of agency (self-world boundary), and the contents of experience (which includes both external information and the entity's perceptual mechanisms). For example, an entity such as a plant has a less established self-world boundary and may not have pain receptors, so it will not feel pain in the same way a human or animal does. However, plants do have specialized receptors to detect and process information in the form of light, temperature and touch, and in this comes the feeling of those specific sensations, followed by minimal behavioral and movement changes.

The registration of a feeling as good or bad depends on the feeling already being there, and it is possible for a feeling to occur without it being registered as beneficial or harmful. This implies that feeling is more fundamental than the internal valenced registration of it. The registration of experienced events seems to be more related to the informational processing of experience, in which instrumental learning progresses to Unlimited Associative Learning (UAL), which will be discussed later.

Even though evaluation and global access are logically distinct, we see here how evaluation sets the stage for more complex information processing. A system has to deal with valuative situations and make complex decisions and this leads to systems that can compare representations and decide what to do to get what they need to survive and preserve their self-world boundary. Instrumental learning requires some memory system allowing an organism to track its actions and their consequences. Furthermore, Godfrey-Smith states the valuative system is used in reshaping behavior and guiding future behavior, which is akin to the rational activity feature of global access.

Both features of advanced multicellular organisms, mobility and valuation, co-evolve with consciousness and complex information processing. Mobility gives a path to the advanced perception and the establishment of agency, while valuation provides a path to the accessibility of experiential information and the registration and discernment between various stimuli and feelings. These two features have evolved in different ways, with some organisms having more valuation than mobility and vice versa. For example, gastropods such as slugs and snails are quite immobile, yet show instrumental learning. Spiders on the other hand, are mobile and perceptually complex, yet score low in motivated feelings, perhaps leaving them to be motivationally robotic, complex trackers of the world (Godfrey-Smith, 2019). While these two features can be teased apart, they point to one common denominator – the distinction between self and world. The increased mobility that gives rise to greater perceptual complexity and the advanced instrumental learning that gives rise to the registration of *feeling* enables definite individuality to form, and this advanced complexity and valuation is rooted in a nervous system of a physical entity. It is at this point the distinction between self and world becomes established enough for the next level of consciousness to be expressed, in which consciousness *wakes up in the animal*.

One specific way of understanding the co-evolution of consciousness and information access is in terms of unlimited associative learning (UAL). UAL is rooted in the idea of an evolutionary transition marker, which is a property which we have evidence that the major evolutionary transition in which we are interested has gone to completion (Birch et al. 2020). The first step in finding a marker for consciousness is to have a list of capacities most scientists would consider sufficient for an attribution of consciousness to an agent, then we can ask, is there a single positive marker that requires the existence of systems with these capacities? (Birch et al. 2020). While Birch et al. take themselves to be pursuing markers of phenomenal consciousness, I will argue (at the end of the section) that they are actually markers of global access, a form of information processing that coevolves with consciousness. But we begin by understanding the features.

The list of capacities that the authors believe we can agree on to be jointly sufficient for consciousness are as follows:

1. Global accessibility and broadcast: workspace in which information is integrated and broadcast globally.
2. Binding/unification and differentiation: perceptions are unified rather than fragmented
3. Selective attention and exclusion: mechanisms to modulate salience between stimuli
4. Intentionality: ability to represent world and body
5. Integration of information over time: information can be stored over time rather than just at a single point in time
6. Evaluative system: value based categorization of stimuli and action (Ginsburg and Jablonka, 2019)
7. Agency and embodiment: sense of an embodied self (Ginsburg and Jablonka, 2019)
8. Registration of a self/other distinction: ability to interact with the world as separate from itself

It is important to note these capacities are taken by Birch, et al. to be sufficient for consciousness, and are not taken to be necessary for consciousness. That is, if a system has 1-8 there is strong evidence it is conscious, but there may be logically possible systems that are conscious but don't have all of 1-8.

According to Birch, et al., the single positive marker that requires the existence of systems with all the capacities is UAL (figure 3). UAL involves an organism having the ability, within its lifetime, to learn about the world and itself in an open-ended way. This does not imply a process that is entirely free of constraint, but rather that there is no serious prospect or singular direction within the possibilities. This involves a level of open-endedness where tasks can be completed in many ways while still having some natural constraints.

There are 5 crucial features of UAL that distinguish it from other, more limited forms of associative learning, so that these features form a natural cluster.

1. Compound Stimuli: conditioned stimuli can be a compound of discernable perceptual features arranged in a pattern (different or single sense modalities). E.g., hearing a firecracker explode while seeing the appearance of lights.
2. Novel Stimuli: Conditioned stimulus can be novel, rather than merely reflex eliciting nor pre-associated. E.g., stimuli not already perceived and present in an organism's memory system, such as seeing a new color for the first time.
3. Second-order conditioning: a conditioned stimuli can be associated with other novel stimuli or actions, allowing for long chains of associative links in an open ended way. E.g., pairing the sound of a bell with the presentation of food to

trigger salivation in a dog. In humans, PTSD is an example of second order conditioning.

4. Trace conditioning: time gap allowing the ability to learn how past stimuli relate to current stimuli. E.g., presenting a sound tone (neutral stimulus) before food (unconditioned stimulus) is presented.
5. Flexible, easily rewritable associations with value: the positive or negative value of a stimulus or action can change in response to changes in the world. If a reinforcer is devalued, the animal will adapt (Birch et al. 2020). E.g., The ring of a bell that indicated food is now accompanied by being hit, so the organism will now place a negative value on the stimulus and respond accordingly.

Pattern completion can be used to illustrate how these five features can work together to realize unlimited associative learning. Pattern completion is the ability to associate a partial pattern with the completed pattern. Pattern completion is involved in discrimination learning of novel, compound stimuli (features 1 and 2). Once the pattern or stimuli is deemed positive or negative, the partial pattern can be associated with other things (feature 3). Working memory plays a key role in feature 4, allowing the ability to compare and scrutinize another pattern while keeping the old one in working memory. The completed pattern's valence can then be rewritten depending on the situation (a food source becomes less enticing when a predator is near it, feature 5). It is important to note that these features do not logically imply each other, but depend on each other in realistic ecological settings (Birch et al. 2020).

We can now link the different markers for consciousness with the features of UAL. Global broadcast is needed to enable information integration from multiple senses while binding and unification are needed to construct compound stimuli. Selective attention enables certain stimuli to be more salient than others and intentionality is needed to represent stimuli when storing associative links. Integration is required to chain and build upon associative links and an evaluative system allows for classical conditioning and discrimination. Agency is needed for action selection and embodiment enables agency, and the self/other distinction is needed so an organism can discern its own actions as different from worldly stimuli. From this we can understand UAL to be a good *positive marker*, allowing us to recognize what organisms are conscious, but does not tell us which are not.

Some notable organisms that have the features required for UAL and which are, on this theory conscious, include most vertebrates, some cephalopods molluscs (ocotopods, squid, and cuttlefish, and some arthropods (honey bees and fruit flies), and in these taxa we can identify the brain regions underlying the relevant systems. These can be contrasted with organisms that lack UAL and are thus, on this theory, can not be confirmed to be conscious. Some organisms that Ginsburg and Jablonka conjecture have limited associative learning that is not fully UAL include other invertebrate taxa such as

gastropod molluscs (sea slugs), annelids, and nematodes (Birch 2020). These organisms lacking complete UAL may have some of the required features and may be lacking others, therefore deemed as limited associative learning, or they may have all the features separately, but have not yet been studied together. Organisms lacking UAL may be conscious but lacking highly complex information processing (cognition and intelligence). It is important to note that these organisms have not been fully studied and creating experimental paradigms to examine UAL in these creatures is difficult, so it is possible, even probable, that they have UAL but we have not yet experimentally discovered it.

UAL is posited to have its origin in the Cambrian Period, playing a key role in the Cambrian explosion, a period of time that undergoes a sudden and dramatic diversification of animal forms (Birch et al. 2020). It is a marker for the transition to experiencing systems, systems with states that feel like something to be in (Birch et al. 2020). The authors believe that subjective experience of a stimulus and access of that stimulus to UAL come and go together. If an organism has subjective experience, it has access to UAL, and if it has access to UAL, it has subjective experience.

Birch et al., believe that UAL is a marker of phenomenal consciousness. They posit consciousness in a similar perspective as Nagel, Chalmers, and Block's P-consciousness. They take it to be subjective experience in having a point of view, such that there is something it is like to be or the what it is likeness of an organism. UAL is a marker for such experience because when it is implemented in a living system it requires a package of underlying mechanisms and processes that are sufficient for conscious experience (Birch et al. 2020).

In a commentary, Peter Godfrey Smith, he applauds the UAL framework as a marker for cognition and intelligence, but not as a marker for subjective experience or P-consciousness. He proposes instead that UAL is a landmark in the evolution of smartness like unlimited heredity is a landmark in the evolution of evolution (Godfrey-smith 2021). He claims that unlimited heredity makes more elaborate evolutionary products, but that life could still exist and evolution could still operate without it. In the same way, UAL increases innovation, allows for expanded exploration of possibilities within an organism, and advances behavioral adaptation, but this is different from subjective experience. We could have all of these things absent of any subjective experience whatsoever. The hallmarks of consciousness, such as binding, selective attention, integration, etc., are essential for an organism beyond learning. As said by Godfrey-Smith, The hallmarks of UAL might be required, but the hallmarks have an importance that outruns it. From his perspective, UAL is an essential marker in the evolution of intelligence and cognition, but consciousness, experience, and subjectivity are orthogonal to it.

My perspective is similar to that of Godfrey-Smith in which UAL seems to be more related to cognition, intelligence, and A-consciousness rather than P-consciousness.

A-consciousness is defined as enabling broadcast for free use in reasoning and for rational control of action (Block, 2009). Access consciousness is on the spectrum of informational processing, in which the experienced content is available to be utilized more freely, allowing an organism to learn about itself and the world in various ways (Birch et al 2020). UAL allows for an expansion of learning, exploration, and novel behavior due to the increase in accessibility of information, and this increase in accessibility is enabled by UAL. However, before UAL evolved, organisms may have had subjective experience, and organisms that do not have UAL may also have subjective experience. The necessary features of UAL can also be seen in deep machine learning, where neural networks can be taught to access and manipulate information in a highly complex way (Liu et al., 2021), in which this learning revolves around accessing and manipulating information at a high degree, but that does not, however, indicate subjective experience or sentience. UAL was a pivotal step in the advancement of A-consciousness and the complex cognition that has evolved in humans and other species, but its claim as the origin or transition marker of subjective experience is unwarranted. However, it should be noted that UAL still holds as a pivotal step in the evolution of consciousness, as UAL allows for an even stronger self-world boundary and more complex informational processing.

We will now turn to another concept of "consciousness", namely reflective consciousness, in which consciousness *becomes aware of itself,* and discuss how the evolution of language may have provided a pathway for this form of consciousness to occur.

Reflective Consciousness and Language

Hopefully we have clearly illustrated how information processing and consciousness are distinct yet co-evolved, and how the two complement each other's presence and expression. We have fully developed this integrated account of consciousness where it involves complexity of experience arising from complexity of information processing, even though consciousness and information processing are logically distinct. There is one more class of conscious experience to discuss, which has been prominent in the consciousness literature: reflective consciousness. In this section we discuss what it is and how it evolved through language.

Reflective consciousness is the phenomenon of a conscious entity being aware of its consciousness and having the ability to reflect on the subjective character and its experiential content. It is sometimes used as the definition of consciousness in Higher Order Thought (HOT) theories and is related to metacognition, in which (a part) of the phenomenal experience is made into an accessible representation that can then be experienced (Gennaro, 2004, Brown et al. 2019)

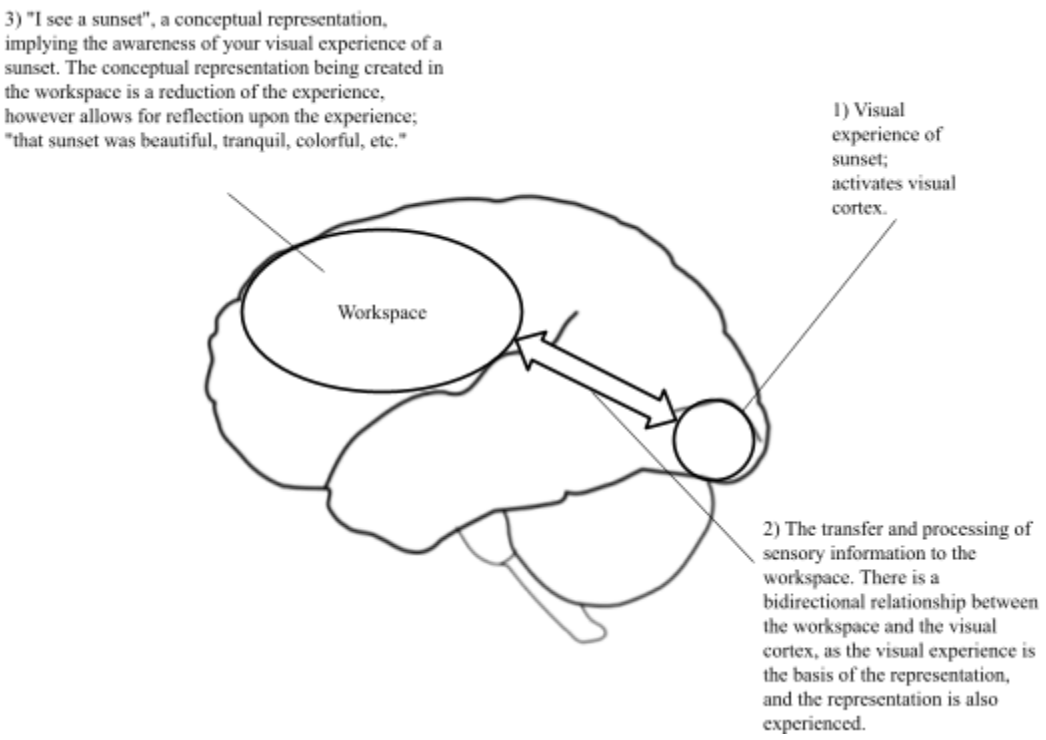


Figure 5: Illustration of access and phenomenal consciousness within the brain. We used the visual experience of a sunset for simplicity and clarity, however, the entire experience, including all involved sensory modalities, is made into an accessible representation. The content of experience (1) is transferred and connected (2) to the workspace in which a representation (3) is formed, and the representation is also phenomenally experienced (2), forming a feedback loop. The visual cortex activates with visual experiences and forms the basis of the representation formed in the workspace, and visualization of the representation activates the prefrontal cortex (workspace area) and causes neurons in your visual cortex to fire. This is also connected to long range recurrent processing utilized in the Global Neuronal Workspace Theory. Language is involved in the conceptualization essential to the formation of a representation, in which the complexity and sophistication of language allows for more comprehensiveness and accuracy. Through language, we can form a representation of the phenomenal experience, which is a dimensional reduction of the higher dimensional qualia.

Reflective consciousness is not the self-world distinction that all entities have, although this distinction is a necessary component of reflective consciousness. Reflective consciousness is not just acting and behaving as a separate entity and being aware of your body (which is yet another part of your perceiving the world), but rather being aware of

the consciousness that is aware of the bodily self and world.[4] Being aware of your hand is not reflective consciousness, in the same way we would not say a cat has reflective consciousness when it is aware of its paw in the process of grooming itself. Nor is being aware of the physical heart, brain or any other part of the body reflective consciousness, but is an instance of regular, first order consciousness. It is reflecting on the consciousness itself, the subjective point of view, that is reflective consciousness, which seems to be unique to humans. The substrate or physical body plays a role in the formation of this subjective point of view, but is also encompassed within and perceived by that consciousness. In the words of Nisargadatta (1973), you observe the heart feeling, the mind thinking, the body acting in which the very act of perceiving demonstrates you are not what you perceive, as it reveals separation between the perceiver and perceived.

We will now look at how language may have played an essential role in the development of reflective consciousness. In the paper "Why the brain needs language in order to be self-conscious" by Neuman and Nave, they define self-consciousness as synonymous with John Locke's definition of reflection being the perception of the operations of our own mind (Neuman and Nave 2010). Operations of our mind implies consciousness, and perception of the operations of our mind implies awareness of that consciousness. While it may be possible to have reflective consciousness without language, it is a primary route to consider since it has the required recursive structure and mechanisms. The authors' perspective emphasizes recursive signaling, in which the evolution of higher order [reflective] consciousness is deeply associated with the appearance of semantic capabilities that allow the subject to reflect on his mind-content through reentrant loops connecting value category memory to perceptual categorization.

Experience can be seen as a high dimensional space or 'qualia' space that cannot be fully accessed by the experiencing entity outside of the immediate present moment. This qualia space is reduced and reconstructed through language to preserve its essential features. The high dimensional space is a space of possible phenomenal experiences, and the recursive-hierarchical nature of language allows an object of reflection to be created, and this object refers back to the original experience. An illustration of this dimensionality reduction and reconstruction can be seen in cartographers projecting the spherical surface of the globe onto a two dimensional plane. The strategy of the cartographer is not a one-to-one mapping, as it is impossible to go from a three dimensional sphere to a two dimensional plane in this way. Instead, the cartographer can cut the sphere into small pieces or "points" which can then be reconstructed into a map,

[4] The entity that is experiencing also becomes a representation and an object of reflection. This, being the "psychological self", the "you" or self image that is a grouping of thoughts, memories, and concepts abstracted from your physical existence. For example, a person might say they are healthy, fit, happy, smart, etc, in which all of these are concepts representing their physical existence and relationship with the world, allowing the experiencing entity to reflect upon itself and experience. A feedback loop also occurs here, in which the psychological self is abstracted from the physical entity and its conceptualization can also cause various physiological effects. The experiencing entity is experiencing the psychological, conceptual self, and this experience influences the physical entity and alters the experience.

in which the lower dimensional plane accurately depicts the essential features of the globe.

A high dimensional dynamical system can be reconstructed, partially, from a low dimensional source of measurements or observations. Difficulties in studying complex systems stem from knowledge and measurement constraints, especially when variables are coupled in a synergistic way. This coupling, while problematic, also gives rise to opportunity, as it allows for the behavior of a whole system to be studied from the behavior of a single variable (Neuman and Nave, 2009). The original phase space trajectory cannot be structured, however, an equivalent phase space trajectory which preserves topological structures can be reconstructed with only one variable..

Recurrent points are used to detect a pattern in the data, and the importance of detecting recurrent points for the reconstruction of a dynamical pattern is essential (Neuman and Nave 2010). Psychoanalyst Matte-Blanco argued that repetition/recurrence is an indication of dimensionality reduction from a higher dimensional space. He gave an example of a triangle, which when broken down is a 3x repetition of a 1D line. The repetition is a clue for reconstruction of the higher dimensional figure (triangle).

The authors argue that language provides a medium for dimensionality reduction of a high-dimensional space. Through repetitions, language acts as a medium for reconstructing a phase space trajectory that is equivalent to the original phase space trajectory (Neuman and Nave 2010). The brain, when seen as a dynamical system, has state variables indicating active neurons and the phase space being likened to the high dimensional space. This qualia space is said to emerge through perception and interaction, later gaining differentiation. This differentiation begins evolving through instrumental learning, the ability to register and discern aspects of experience as beneficial or harmful, and is made more complex and refined through higher cognitive faculties such as language.

The brain may also be limited in gaining direct access to its phase space for the same reasons. The brain (substrate) cannot observe itself, in the sense that it cannot directly observe the experience it is having, just like the eye cannot see itself without a reflection. Even if it were possible that the brain had direct reflection and access to its activity, it would still face perplexities such as being unable to realize if the represented mental reality is a reflection or the reality being reflected. This is elegantly illustrated by Chinese philosopher, Zhuangzi, who dreamt he was a butterfly and upon waking, was unsure if he was Zhuangzi who had dreamt of a butterfly or a butterfly dreaming he was Zhuangzi. With the assumption that the brain (experiencing entity) has similar constraints and limitations as we do, being unable to directly observe its activity and experience, it is

proper to investigate how it got around this problem and what role language had in this dilemma (Neuman and Nave, 2009).

Language can be seen as an irreducible triad of referential activity – object, sign, and concept. Cat is the sign created for the concept that we scientifically define as the feline mammal, which refers to the cat itself in reality, which is the object. This is not just correspondence between sign and signified, but a correspondence representing activity, of referring (Neuman and Nave 2010). If in a room, you had a cat and infant, and you pointed to a window, the cat would most likely look at your hand, while the infant would most likely look at the window. The instinct and ability of following a pointing gesture is an essential aspect of our cognitive and linguistic development, which distinguishes us from other animals. This referential gesture, with pure gesture being the root of language, shows that in its most basic form, language may be considered to be a mediated form of represented action (Gasset, 1959). Language is a system of represented activity that provides us with the coordinates of a space, or patches (like patches of a map) to which the high dimensional experience may be projected (Neuman and Nave 2010). The more complex the language, the larger the phase space and the larger the phase space, the more points of ideas we can use to express our experience (reconstruct the qualia space). For example, the experience of tasting wine, the qualia space, is very unique and difficult to describe. Without a proper repertoire of concepts and words, the experience will be deficiently and inaccurately described. Humans use very unique words for this experience such as "Earthy", "Dry", "Buttery", "Chewy", "Flabby", etc., which allows us to more accurately and comprehensively represent the experience, although it is still a reduction.

When looking at a sentence such as "Is there any salt?" in the context of being at a dinner table, we further understand language's self referential capacity. This statement is not read just as a sum of its semantic parts, but as an illocutionary act, in which one is not just if there is any salt, but also requesting for the salt to be passed. The statement refers back through the context of the situation to realize a deeper meaning. If we were to say that same sentence in a different setting, for example, while creating a grocery list, we would treat the meaning differently. This highlights the ability of pragmatics (contextual understanding of a situation), to reconstruct the trajectory and reflect on the content of our mind. Furthermore, grammar is defined by Bates and Goodman (1999) as the class of possible solutions to the problem of mapping between a high-dimensional meaning space with universal properties and a low-dimensional channel that unfolds in time, constrained by limits on information processing. These features of language reveal its recursive-hierarchical nature, making it a perfect tool for reconstructing a high dimensional space into an object of reflection, by moving beyond propositional content to higher-order patterns (Neuman and Nave, 2009). In the same way we must reconstruct a phase space trajectory, by dimensionality reduction and repetition of a single variable, the brain too must dimensionally reduce the qualia space, and through repetition and pattern

recognition, reconstruct an equivalent phase space trajectory, in which language is the medium for this to occur.

We can connect this idea to access consciousness, global workspace and working memory. Reflective consciousness and language work together within the workspace of global accessibility. As was explained before, access to information is working memory, and is the global workspace. All these systems co-evolved, in which language determines the coordinates of the space, which is the workspace. As language becomes more sophisticated, from gesture, to symbolism, to words and complex concepts, the phase space becomes more comprehensive and representative of experience. The workspace is a lens through which experience may be accessed, and through language and the ability to form conceptual representations, a mirror of reflection. This reflection and reconstruction of brain activity and qualia is an example of highly complex information processing. Complex language finds itself on the higher end of the informational complexity continuum, in which the sophistication of language corresponds with the complexity and capacity of working memory/global workspace. This enables an experiencing entity to access, manipulate, communicate and reflect upon its experience. Complex language within a highly (phenomenally) conscious system is a pathway for reflective consciousness to manifest, corresponding with the quote "*consciousness becomes aware of itself in man."*

Neuroscience and Behavioral Research

Now that we have attempted to disambiguate consciousness, illustrate its evolutionary path, and elucidate some of the forms it may take, we will move to a discussion of prevailing theories within neuroscience. The two theories we will review are the Global neuronal Workspace Theory (GNWT) and the Recurrent Processing Theory (RPT). After explaining their position and claims, we will go over some philosophical implications in relation to the first part of this paper. Finally, we will go over electroencephalograms (EEG) and research using EEG relating to consciousness.

<u>Global Neuronal Workspace Theory (GNWT)</u>

The GNWT posits that a specified brain network acts as the neural instantiation of conscious awareness (Mashour et al., 2020). This brain network has specialized processors that are connected through distributed workspace neurons that have the ability to receive bottom up information and transmit top down information. Information is not only broadcasted throughout the brain, but also amplified and sustained through recurrent thalamocortical loops. This recurrent processing is essential to the instantiation of consciousness, as amplification of information makes it widely available for other processors, and sustainability allows information to be maintained on the stage of working memory (Mashour et al. 2020). The prefrontal cortex (PFC) plays a crucial role

in this model of global consciousness, but is not an exclusive region *where* consciousness occurs. The importance of the PFC is twofold; 1) its increased density of neurons are believed to be necessary for global broadcasting of information. 2) its vast web of connections to other regions of the brain, allowing it to dynamically modulate activity in various regions and function as a central hub or workspace. Certain regions such as the dorsolateral PFC and the inferior parietal cortex are hypothesized to have a specialized role (Mashour et al. 2020). Daehene further delineates his framework of consciousness into subliminal, preconscious, and conscious. Consciousness is understood to depend on sufficient bottom up stimulus strength and top down attentional activity, resulting in long distance loops and global synchrony. When something has the sufficient stimulus strength but is absent of top down attention, it is categorized as preconscious, where there are occipito-temporal loops and local synchrony, but a lack of activation in the frontal regions (Dahaene et al. 2006). Attention amplifies information allowing it to be more widely accessible by other cortical processors, while sustained and persistent neuronal activity keeps the information active in the representational space of working memory. The PFC is believed to be an essential hub in the global neuronal network, and activation in the PFC is often used as evidence for or against the presence or absence of consciousness, when this theory is assumed.

GNWT is often understood to be a theory of A-consciousness rather than P-consciousness. Global broadcast of information through the brain connects information from various regions to a central workspace, allowing that information to be consciously accessible. A-Consciousness, as explained above, is said to be more useful to study, as it is experimentally tractable. Dehaene also believes that subjective experience, P-consciousness, always accompanies access, so by studying one you are studying the other (Dehaene et al., 2001). However, since the recent study by Amir et al. has provided empirical evidence of phenomenal consciousness without access, GNWT is more pressured to decide whether the theory is about access or phenomenal consciousness. In our account, the GNWT is a theory of access consciousness, understood as phenomenal consciousness combined with global access in which neurons connected to the workspace correlate with information of the experience being accessed and able to be utilized in reasoning, however, the workspace is not correlated with the entirety of phenomenal experience itself. Additional phenomenal experience can occur in "overflow" or Gurwitsch's margin, for example, but not involve global access.

Connor and Shanahan (2010), created a computational model of the long-range cortical communication that occurs in the GNWT. The importance of long-range cortico-cortical connections is in their ability to allow information transference and communication between topologically distant and functionally distinct areas. A neural network model of competing access to the workspace was built by Dehaene et al. (2003),

and predictions continue to be tested and confirmed (e.g. Marzouki and Grainger, 2007, Van den Bussche et al., 2008).

Shanahan (2008) models the dynamics of long-range neuronal connections, emphasizing two main aspects: broadcast and reverberation. Connor and Shanahan (2008) define broadcast as the ability of a set of neurons to disseminate patterns of activation across many otherwise disconnected groups, preserving information inherent in their spatiotemporal structure. Reverberation is understood as the tendency of a broadcasting structure to sustain a pattern of activation over time, usually through recurrent connections.

The main aim of their work is to bring the ideas of broadcast and reverberation together in a GNW framework and investigate the role of neurons with long-range connections in a model that has less constraints, fewer parameters, and is more biologically plausible, yet still demonstrates expected GNW behavior. The workspace neurons are neurons which have long-range, reverberation-inducing connections, appropriate for sustained broadcast, which distinguishes them from the specialized areas. The connections are made to be long range by ensuring that the distance between any two connected workspace neurons is greater than a predefined parameter, and the reverberation of these connections is ensured by self excitatory cycles or loops of neuronal connectivity (A->B->C->D->E->A).

Recurrent Processing Theory (RPT)

In 2020 Rafael Malach provided evidence that conscious content and conscious perception are defined by local patterns of neuronal activity, independently of activity in frontal regions of the brain (and thus global access). Using a 1-back recognition task, he showed that frontal regions are activated specifically for decision making and reporting. The imaging showed evidence that frontal-parietal networks are specialized for higher order and meta-cognitive functions and a lack of evidence that these networks are for conscious perception (Malach, 2020).

The mistake that is often made in consciousness studies is that neural activity correlated with conscious perception is confounded with neural activity correlated with reporting and decision making. Malach believes that in using the 1-back recognition task, he has shown that neural activity for conscious perception occurs locally in the visual cortex, then when a participant is asked about what they saw, activity in the frontal cortex only occurs due to higher order functions such as decision making and reporting.

This understanding that local sensory cortices are sufficient for consciousness and frontal areas are activated for post conscious functions such as reporting aligns with the Recurrent Processing Theory of Consciousness (RPT) presented by Victor Lamme. Lamme first defines the information flow from visual to motor areas as the fast forward

sweep (FFS), in which activity spreads within 100-120 ms from the V1 to the dorsal and ventral areas, including the motor cortex and prefrontal regions. Once FFS has reached a certain area, horizontal connections start to connect more distant cells, and feedback connections start sending information from higher level areas back to lower, even all the way down to V1 (Lamme 2010). Recurrent processing (RP) is supported by the activation of these feedback connections, which are triggered by the FFS. Lamme further delineates neural processing into 4 stages (Figure 9):

> Stage 1: (0-150ms) Superficial processing during FFS. A stimulus is not attended and is masked, where the stimulus does not penetrate deeply into the ventral stream hierarchy.
>
> Stage 2: (100-200ms) Deep processing during FFS. A stimulus is attended and is masked, and it may travel through to motor and prefrontal areas to influence behavior as in unconscious priming.
>
> Stage 3: (200-300ms) Superficial processing of a recurrent nature (RP). A stimulus is not masked and can evoke RP, but is not attended to (example - inattentional blindness, change blindness, attentional blink).
>
> Stage 4: (300ms +) Deep, widespread RP. RP spreads through low level sensory to high level executive areas. The stimulus has time to evoke RP and is attended. This level of processing is similar to entering the global workspace.

Lamme claims that in cases such as inattentional blindness (discussed below), it is not the case that we fail to see a stimulus, but merely that we do not remember it, as it was not yet stored in working memory (therefore not accessible). Where in the GNWT, behavior (report) is taken as the primary evidence of conscious experience, Lamme believes the neuroscience of consciousness necessitates the possibility of a conscious experience occurring without being fully known, since it has not been stored in working memory. With this, an experience can occur through recurrent processing within sensory cortical areas without late activity reaching the motor or prefrontal areas.

Recurrent processing is sufficient for P but not A consciousness. It implies phenomenal consciousness or subjective experience, but it is not sufficient for conscious access or awareness of an experience occurring. Essentially, an organism can perceive and experience, have phenomenal consciousness, without knowing it is, which is associated with stage 3 localized recurrent processing, and the awareness or conscious knowing that an experience is occurring correlates with access consciousness and stage 4 widespread recurrent processing and GNWT.

Behavioral Studies of Consciousness

Consciousness can be studied via inattentional oblivion (blindness, deafness, etc), a phenomenon where certain stimuli fail to reach conscious awareness due to a lack of attentional resources. Since attention is limited, unattended items fail to reach consciousness, giving scientists a straightforward approach to study conscious perception and access to experience (Cohen, Chun 2017).

Inattentional blindness was first successively studied in the lab by Mack and Rock in 1998, and was extended in its investigation by many others including Simons and Chabris in their famous Gorilla experiment. The Experiment by Mack and Rock was simple yet effective in design, finding an occurrence of inattentional blindness at different rates in various conditions. The primary two conditions involved a foveal and a parafoveal presentation. Both presentations included a non-critical trial and a critical trial, in which each trial had fixation phase, a stimulus phase, and a mask (figure 10). The participants were asked in the stimulus phase to compare the size of two lines in a cross. This is where the critical stimulus (a small, visible image/shape on screen) would appear in the critical trials. The mask is meant to eliminate any processing of the visual display after it disappears from the screen.

The Parafoveal presentation had the fixation point and the stimulus occur at the same place, while the foveal presentation had the stimulus occur at a different place than the fixation, and the critical stimulus occur at the fixation point. Mack and Rock hypothesized that blindness would occur more in the parafoveal presentation, where the fixation and stimulus were at the same place, however, the results found that the foveal presentation actually had a higher occurrence of blindness. Mack and Rock posited that switching attention from fixation to an image away from fixation may cause an inhibition of attention at the fixation where the critical stimulus is, resulting in more blindness.

The gorilla experiment by Simons and Chabris (1999) took this phenomena of inattention to the next level, applying it to a more real world situation. Their experiment involved observers watching a video of people throwing a basketball around. Participants were asked to watch a 75 second video of people passing around basketball, in which they paid attention to either a dark colored or light colored team. The task for the observers was to keep a mental count of the amount of passes thrown (easy mode) or a mental count of the amount of passes thrown aerially versus bounce passes (hard mode). About 45 seconds into the video of the people passing around the ball, a person in a gorilla costume (figure 12), or a person holding an umbrella would walk through the group of ball passers. This gorilla or umbrella person was the critical stimulus that was used to measure inattentional blindness. From this experiment they found that out of all

192 observers across all conditions, 54% noticed the unexpected event and 46% failed to notice the unexpected event, and that more observers experienced blindness in the hard condition (55%) than the easy condition (36%)..
In these experiments, the critical stimuli such as the gorilla are part of the field of consciousness, yet are unattended to and therefore not accessed in that moment. If attention were not forcibly drawn to other stimuli, the critical stimulus would have been accessed and perceived. For this reason, consciousness research that involves tasks such as these should be understood to be looking at A-consciousness or cognitive access, rather than P-consciousness or experience.

EEG Studies of Consciousness

Electroencephalography is a procedure that measures electrical activity of the brain over time using electrodes on the scalp and is used in measuring consciousness. An event related potential (ERP) is a measured brain response to a specific sensory, cognitive, or motor event. Inattentional deafness and blindness can be studied in conjunction with EEG, allowing us to identify the neural correlates of this phenomena. When an unexpected stimulus is detected, it manifests in EEG as a spike in the P300 event related potential (ERP), with greater attention causing a larger P300 (Sur, Sihna 2009). The alpha band is connected to engagement and attention, and when attention is disrupted, an alpha reset occurs (Shahin 2020, personal communication, Händel et al., 2011).

The first ERP that we will look at is the P3b, which is a late onset positivity (300-600ms) found in frontal parietal areas and is commonly associated with priming, cognitive processing, memory storage, context updating, closure viz. network reset, response facilitation, decision, reactivation of stimulus–response (S–R) links, and making of conscious representations (Verleger, 2020). One issue with the P3b in oddball paradigms is that it is observed only in response to the consciously detected deviant stimulus and not to the standard stimulus that is also consciously perceived. However, this could be understood that the P3b occurs in the standard stimulus but is greater when a change is consciously detected. The P3b is proposed to index an ignition of cortical activity throughout a distributed 'global neuronal workspace' involving frontal-parietal areas, and thus, is used as one of the main pieces of evidence for the GNWT (Dembski and Koch 2021). However, the opposing interpretation of the P3b is that it reflects post perceptual processing such as behavioral report or decision making, and not consciousness itself. One example of this experimentally is shown in the P3b only correlating with consciousness when stimulus detection was the primary task, and not in a matching task when the presence and absence of the stimulus were equally task relevant (Dembski and Koch 2021). This difference between task relevant and task irrelevant conditions is currently being investigated and will be expounded upon in a later section.

Overall, the most up to date evidence on the P3b points at it not being minimally sufficient for consciousness, so it may not be a true NCC.

The perceptual awareness negativity (PAN) is an umbrella term for the awareness-negativity that has been found to occur in visual (VAN), auditory (AAN) and somatosensory (SAN) modalities (Dembski et al., 2021). The PAN is an early onset negativity that occurs between 100-300 ms. The PAN is very closely related to the N1 and N2 ERP and is isolated by calculating the difference in neural signals between consciously perceived and non-perceived stimuli in the 100-300ms time range. The PAN is currently used as evidence to support early processing theories of consciousness such as the RPT and IIT (Dembski and Koch 2021).

Cohen et al. (2023), recently found a NCC associated with perceptual awareness that is independent from early sensory processing and from later report. The authors refer to a novel fronto-central, task independent ERP that correlates with perceptual awareness, which they refer to as the N2 (Cohen et al., 2023). The N2 occurs between 250-300 ms after stimulus onset and seems to be an ERP with mixed features of the VAN and P3b. It is fronto-central like the P3b but occurs earlier, and it is in a similar time window as the VAN (150-300ms) but is distinct in that it never occurs earlier than 250ms and its associated electrodes are more anterior and similar to the P3b. In their experiment, the VAN did not meet the pre-registered criteria for bifurcation in both report and no-report conditions, while the N2 did. The P3b on the other hand, did not show up in the no-report condition at all. This leaves the N2 to be the only neural signature of consciousness and perceptual awareness.

It should be noted that an “NCC” is not meant to be a single spatial region of the brain from which consciousness arises or 'turns on' in the brain, but rather a key neural pattern associated with perceptual experience.

The authors also reveal an interesting temporal relationship between the N2 and the P3b, in which the P3b begins right when the N2 comes to an end (figure 14). This can be interpreted as conscious perception occurring in a stage of processing between low-level sensory encoding and higher level broadcasting across global neuronal networks (Cohen et al. 2023). This ERP would provide support for Lamme's recurrent processing theory.

<u>Design Theory and Task Relevancy</u>

Currently, one of the main issues in the neuroscience of consciousness is the confound between *reports of conscious* perception and the conscious perceptions themselves. For this reason, there has been a push to develop ‘no-report’ experimental paradigms to properly isolate NCCs. Although no-report paradigms are a good start, the root of the problem is confusing NCC’s with post perceptual processes and

neurocognitive events. For example, holding a stimulus in working memory in a one back task does not involve verbal report initially but is still task relevant, and thus does not remove the confound. Both of these cases make the paradigm task relevant, and introduce a confound. The goal is to create task-irrelevant paradigms that can still contrast between conscious and non-conscious stimuli (Pitts 2018). In connection to current EEG evidence, the P3b might be a victim of such conflation. Most experiments that find the P3b as a NCC do not have a task irrelevant paradigm, which means it could be activated in correlation with a post perceptual process rather than consciousness. The most current, novel task irrelevant experiments are pointing towards the N2 or the PAN to be a true, first NCC of visual awareness and the P3b to be secondary or post perceptual. Bringing back in the ideas of phenomenal consciousness and access consciousness, the AAN or N2 may be a correlate of phenomenal visual consciousness while the P3b a correlate of access consciousness.

Our current research goal is to create a novel no report paradigm in which we can use EEG to compare and contrast between task relevant and task irrelevant conditions. Participants play an engaging game while listening to white noise, with random 150ms inserts of pink noise acting as the critical stimuli. There are 4 total conditions: Report-play, play only, report-watch, and watch only. In the loaded condition (playing the game) we expect there to be more deafness, which would result in a lower N2 related ERP, which is our neural signal of consciousness. In the report conditions we expect a higher P3, which is associated with report. We validate the paradigm with reporting by ensuring there is more deafness (N2 related ERP decrease) while playing the game, then we apply this to the no report conditions in which there should still be a lower N2 in the load condition, Notice we are comparing playing the game vs. not playing game without reporting and so any change in N2 will be purely based on degree of consciousness without any confound relating to reporting. The beeps in the no-report condition are task-irrelevant, since they are not part of the game and participants are not asked to pay attention to them. Our design deals with all the concerns up to this point in the literature, while providing an engaging and versatile experimental platform.

Consciousness in The Eastern Tradition

Now that we have explicated our view from the Western perspective, we will turn to Eastern philosophy with the hopes of bridging perspectives and bringing more clarity and comprehensiveness to our account. One might ask, with the precise scientific methodology of the West, why should we turn to Eastern philosophy? I'll turn to my favorite physicist and biologist, Erwin Schrodinger:

> Well, so it is because our science- Greek science- is based on objectivation, whereby it has cut itself off from an adequate understanding of the Subject of Cognizance, of the mind. But I do believe that this is precisely the point where our present way of thinking does need to be amended, perhaps by a bit of

> blood-transfusion from Eastern thought. That will not be easy, we must beware of blunders – blood-transfusion always needs great precaution to prevent clotting. We do not wish to lose the logical precision that our scientific thought has reached, and that is unparalleled anywhere at any epoch.
>
> - *Erwin Schrodinger, 1944*

Western thought, although thorough and precise, often gets caught in its own isolated box, studying the world as a separate object from itself. A transfusion of Eastern thought may remedy this in its insightful realizations and unifying, bigger picture perspective. We will start with analyzing and defining the Sanskrit word चित् or Cit. According to Vedanta and the Śākta school of Hindu philosophy, the ultimate nature of reality is described as Saccidānanda, or "sat - cit - ananda", in which "sat" is existence or being, "cit" is consciousness, awareness, or spirit, and "ananda" is bliss or joy. These three parts are really one, in which *being* is *awareness*, which is *bliss*. However, we will be focusing on the Cit or awareness aspect for this paper.

Cit, Awareness and Consciousness

Cit is a difficult word to translate to English, however Western philosophy has come to a very similar cluster of concepts – consciousness, feeling, and experience. The main words considered as promising translations of Cit are awareness, pure consciousness, pure experience, or pure feeling, with "pure" being an important signifier of it not being attached or conditioned by anything. Cit in itself is not particular, nor conditioned and concrete and is undifferentiated, spaceless, timeless, and all-pervading. We can understand Cit as awareness fundamental to existence, similarly to the panpsychist understanding of consciousness as being a fundamental aspect of matter. It can be further extrapolated as the source of the underlying "intelligence" correlated with the self organization principle and the principle of least action. From this perspective, the entire system of reality is aware or *awareness*, in which awareness is absolute and the common matrix of every experience (Nisargadatta, I am that). To avoid confusion, we will use the word awareness as the translation of Cit, the *pure consciousness,* that is all-pervading, undifferentiated, and changeless, which is different from the conditioned "consciousness" discussed in the first part of this paper, that is expressed through different forms of creation. Awareness (synonym: cit) is consciousness in its purest state, the essence and source of consciousness.

Awareness, being undifferentiated and formless, needs a vehicle in which to be expressed, differentiated and formed. We will use the word "substrate" as the vehicle and medium for which awareness is expressed. When the awareness, the Cit, is expressed within a particular substrate, it becomes conditioned and refracted in a certain way, which we can call "consciousness", as Nisargadatta (1973) states that consciousness is on contact, like a reflection against a surface. Carl Jung (1939) states exclusion, selection, and discrimination are the root and essence of everything that is conscious. This is also

understood by dream researcher and psychophysiologist Stephen Lebarge stating, consciousness is awareness plus mind and the structure of the brain, and by Erwin Schrodinger stating Consciousness finds itself intimately connected with, and dependent on, the physical state of a limited region of matter, the body (Erwin Schrodinger, What is Life).

When awareness is refracted or expressed through a physical substrate, it becomes consciousness. Since all physical entities are substrates, this account implies a form of panpsychism, however not all entities are conscious in the same quality or degree. It is important to note that the consciousness expressed in a rock versus a plant, versus a human are vastly different, thus each entity should be treated differently.

When awareness is entangled with the substrate it is expressed in, it is similar to a candle and a flame. The substrate is the candle, and the flame is consciousness, and the quality of the flame depends upon the quality of the candle. Another helpful metaphor is that of light being refracted through a glass prism. Cit, awareness, is the pure light and the prism is the substrate which it is refracted through. The pure, formless awareness now takes form and quality based on the shape and material of the prism and the angle at which it hits it (combination of perceptual/sensory mechanisms with location and point of view). Consciousness is the intermingling or channeling of awareness, Cit, with a substrate, and each physical substrate has a different quality which correlates with its self-world boundary, perceptual complexity, integration/organization. This understanding is echoed by 13th century sufi mystic Aziz Nasafi:

> The spiritual world is one single spirit who stands like unto a light behind the bodily world and who, when any single creature comes into being, shines through it as through a window. According to the kind and size of the window, less or more light enters the world. The light itself however remains unchanged.

Since Cit is all pervading, it is manifesting in all parts of existence and differs only in degree of manifestation. Akin to Godfrey-Smith and Levin's view of inorganic particles having response properties, inorganic matter is thought to be sensitive and responsive to physical and chemical stimuli such as light, temperature, sound, electricity, magnetism, which are examples of the faculty of perception and responsiveness to external stimuli (Woodroffe, Shakti and Shakta, 1929). Consciousness is composed of the functions of relationship to environment, including response to stimuli and atomic memory in the lower or inorganic plane (Woodroffe, Shakti and Shakta, 1929). Recall the example of rocks and minerals in the phenomenal consciousness section above. This consciousness is, however, not near the degree that animals or humans express consciousness, due to differences in the quality and complexity of the substrate. As shown in figure 1, the evolution of the substrate correlates with the expression of consciousness.

The Veiling of Consciousness

We will now take a closer look at how consciousness is "veiled" in the Eastern tradition and how these "veils" relate to concepts in the Western tradition. By veil, we mean something that obstructs or conceals the true nature of the object it is connected to. In Vedanta, everything in existence has a certain Guna, or quality. The Tamas Guna is that of inertia, inactivity, and darkness, and is known as the principle of veiling consciousness. The raja guna is that of passion and activity, while the Sattva guna is that of illumination and intelligence, and is also known as the principle of presenting consciousness. A rock or some form of inorganic matter, for example, is said to to have a predominance of Tamas so consciousness is so greatly veiled and the life force is so restrained that we get the appearance of insensibility, inertia, and mere mechanical energy (Woodroffe, Shaki and shakta). This predominance of Tamas correlates with a lack of valuation (intelligence) and perceptual complexity in minerals, the two features presented in the evolution of consciousness outlined by Godrey-Smith.

We see in Western philosophy and perspective that the physical is the starting point in which consciousness emerges and builds up in complexity. This differs from many Eastern traditions (although not all, there are physicalist positions in Eastern traditions as well). The Vedic traditions hold consciousness to be fundamental, but is veiled by physicality (maya), and this veil is slowly shed over time, allowing consciousness to shine through, like the sun shining through clouds in the sky. Plants, according to Hindu traditions and philosophers such as Udayana, Cakrapāni, and Vyasa, have a dormant consciousness which is dull, and they are capable of pleasure and pain, and possess various senses (Woodroffe, Shakti and Shakta). Plants begin to slowly move from Tamas (inertia) to Rajas (activity), and animals further this by embodying more Rajas and advance into Sattva (intelligence).

Recall from Godfrey-Smith and Aristotle that mobility is a pivotal step in the evolution of perception and complexity, and this connects with the Rajas (active) nature that begins to be expressed more in animals. Higher complexity and intelligence begins to evolve in animals to humans, in which the Sattva nature, the illuminating presentation of consciousness, becomes more dominant. Furthermore, like the Western perspective, a centralization or type of nervous system plays a key role in the expression of higher consciousness.

> In plants, however, (unlike animals) the cellular consciousness is diffused or distributed amongst the tissues or fibres; there being apparently no special conducting or centralizing organs of consciousness such as we find in higher evolutionary forms. Animal consciousness in its highest modes becomes self-consciousness…In the animals there is an endeavour at centralization of consciousness which reaches its most complex stage in man, the possessor of the most highly organized system of consciousness, consisting of the nervous system

and its centres and functions, such as the brain and solar plexus, the site of Ājñā and upper centres, and of the Maṇipūra Chakra.

- *John Woodroffe, Shakti and Shakta*

As we move up along the evolutionary ladder through the hierarchy of being, entities begin to express less Tamas and more Rajas and Sattva (Woodroffe, Shakti and shakta). We move from the darkness and dullness of consciousness within minerals to plants, to the activity, intelligence, and illumination of consciousness from animals to humans. This progression aligns with the Western evolution of consciousness and follows the statement in the beginning that "Consciousness sleeps in the mineral, dreams in the plant, wakes in the animal, and becomes aware of itself in man."

Similarities and Differences between Western and Eastern Perspectives

I have attempted to make clear some similarities between Western philosophy and science and Eastern philosophy and mysticism. Both sides convey a similar evolution of consciousness with mobility, centralization, a subjective character, and a point of view as being essential aspects of consciousness. Awareness is the common denominator of all experience, whether it be a rock detecting information in the form of heat and light, or a human detecting information in the form of an idea. An entity's experience depends on the content of experience and the content of experience depends on the entity's reception, processing, and interpretation of information. The reception, processing and interpretation of information depends on the make-up of the entity and its sensory and perceptual mechanisms.

It should also be stated that there is a very fundamental metaphysical difference between the Eastern and Western perspectives. The Western view tends to be more physicalist and materialist, claiming mind and consciousness to be illusory byproducts of matter with emerging complexity. Even with the unorthodox panpsychist view, most claim consciousness as a fundamental part of matter, with matter retaining a more fundamental place. The Eastern tradition tends to lean more towards idealism or a sort of neutral monism (according to which, 'being' is fundamental and matter and mind are two manifestations of it). For the Vedic tradition, "Consciousness is not a product of evolution. The latter merely manifests it" (Woodroffe, Shakti and shakta). Awareness is fundamental and is veiled by physicality from being fully expressed, although it also needs physicality to be expressed and formed in a differentiated way. The culmination of the individual expression of consciousness is in realizing "Tat Tvam Asi" meaning "You are That", as said by Nisargadatta “You are consciousness only in manifestation. In truth, you are ‘That’, which is prior to consciousness itself. ‘You’ are the Pure Awareness.” The individual consciousness can fully (not merely intellectually) know and simultaneously experience both its individuality as well as the undifferentiated nature of reality. This is akin to Carl Jung's concept of “individuation”, which merges the conscious and unconscious, in which the unconsciousness is synonymous with the universal

consciousness (Jung, 1939)[5]. Awareness, Cit, or rather Saccidānanda, is an infinite expanse in which all limited beings exist. All forms of being, whether mind or matter, are appearing, disappearing, and existing within this infinite continuum. This seems to differ from a mind based idealism, as both mind and matter come from this one reality. For this reason, it seems to be most similar to a neutral monist view, which does not polarize towards one side of the spectrum, denying or affirming one as more real than the other, but rather holding both to be equally real and unreal manifestations of an underlying, absolute reality.

[5] Individuation is the "process by which a person becomes a psychological individual, a separate indivisible unity or whole, recognizing his innermost uniqueness, and he identified this process with becoming one's own self or self-realization, which he distinguished from "ego-centeredness" and individualism. The self, the totality of personality and archetype of order, is superordinate to the ego, embracing consciousness and the unconscious; as the center and circumference of the whole psyche, the self is our life's goal, the most complete expression of individuality" (Jung, 1939).

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