Journal of Scientific Exploration
Anomalistics and Frontier Science

ESSAY

A Three-Aspect Model of Consciousness

Dan G. Graboi
dgraboi@sbcglobal.net

SUBMITTED January 31, 2023
ACCEPTED June 28, 2023
PUBLISHED October 31, 2023

https://doi.org/10.31275/20232873

HIGHLIGHTS

A new framework and model called "TAM" is proposed that unifies consciousness and psychic-type phenomena.

ABSTRACT

A model for consciousness is proposed based on Nisargadatta Maharaj 's interpretation of Jnana Yoga/Advaita Vedanta. Concepts from modern physics, neuroscience, and information science are integrated into that framework. A novel understanding of *information* in the context of a system with consciousness is proposed. Information generated in the neurophysiology of a brain's unique "wiring structure" is hypothesized to become dissociated from the neurophysiology and transformed into a universal format within a nonphysical domain in which consciousness is assumed to occur. Sharing features with Bohm's Implicate Order, the nonphysical domain has nonlocal properties which support instant correlation of information throughout. The energy of a carrier is not needed to transport information in the nonphysical domain. This allows for low-energy neurological systems to transfer information associated with thought across large distances, as observed in telepathic psi phenomena. An experiment to test for the existence of a nonphysical dimension that supports instant telepathic information transfer is discussed. It is argued that *three* is the minimum number of aspects necessary to model a practical framework for consciousness.

KEYWORDS

Consciousness, awareness, mind, brain, information, psi, nonphysical, memory, knowledge representation.

INTRODUCTION

In the prevailing scientific paradigm of materialism, the universe is comprised of matter-energy and space-time, and all phenomena are viewed as products of their interactions. This paradigm has worked supremely well for technological development, but it fails to account for what Chalmers (1995a) referred to as the "hard problem of consciousness." Michael Levin (1995, n.d.) has argued against the sufficiency of materialism in explaining consciousness and suggested that parapsychology provides the most forceful arguments against a materialistic worldview. John Beloff (1985) has argued that the existence of psychic phenomena is not compatible with materialism. Charles Tart claimed that the existence of psi phenomena requires us to consider a "nonphysical aspect to reality, rather than wait around with faith in what philosophers have termed *promissory materialism* to eventually explain

the phenomena away" (Tart, 2009, p.13).

A nonphysical aspect of reality is found in the philosophical position of *dualism*, whose modern formulation traces to Descartes: In addition to physical matter and energy, *dualism* holds that the universe contains *mind*, which is nonphysical – and, therefore, non-spatial – an element which cannot be reduced to matter or energy and is responsible for consciousness. *Dualism* implies the existence of a covert domain of reality outside the physical domain that interacts with the physical domain.

Physicist David Bohm proposed a theory in which there are two orders of reality: (1) the *Explicate Order*, which is the familiar physical domain of matter-energy and spacetime, and (2) the *Implicate Order,* a nonphysical domain based on *information* which exists outside space and time (Bohm, 1980). He theorized that the Implicate Order is the foundation for both matter-energy and consciousness. In a process called "unfolding," the Implicate Order "informs" (i.e., determines) everything that exists in the Explicate Order. The theory proposes an oscillation in which the Implicate Order "unfolds" into the Explicate Order, which then "enfolds" back into the Implicate Order, and so on. In this dynamic process he termed *holomovement,* Bohm used the example of a *hologram* to explain how the information contained in the Implicate Order is expressed in the Explicate Order. Like a hologram, every small region of physical space in the Explicate Order contains an expression of all the information in the Implicate Order. Bohm further hypothesized that every quantum particle in the universe is informationally and nonlocally interconnected within a single organically whole potentially infinite dimensional system, which is the Implicate Order. He asserted that in the Implicate Order, "the consciousness of mankind is one" (Weber, 1986, p. 41). Bohm's Explicate Order is the visible and measurable order that emerges from the Implicate Order, the unobservable, nonlocal, unmanifest realm of potentiality that underlies all physical manifestation. Bohm's theory can be seen as a form of *neutral monism* since it posits a holistic view of reality in which the physical and mental aspects are not fundamentally separate but are rather two aspects of a deeper, underlying unity. In Bohm's view, the Implicate Order represents this underlying unity.

Nisargadatta Maharaj (1897–1981), in his acclaimed book, *I Am That* (1981), expressed a model of reality as an organic whole which goes beyond dualism and Bohmian neutral monism in that it consists of three aspects. Two of these somewhat resemble the *mind* and *matter* aspects of *dualism,* while the third aspect, a source of *pure awareness*, is more fundamental and "beyond" the other two. Maharaj's book presents a complete, coherent, clear, and understandable description of his view of the structure of reality and consciousness. Douwe Tiemersma, Philosophical Faculty, Erasmus Universiteit Rotterdam, Holland, wrote, "Maharaj's Interpretation of truth is not different from that of Jnana Yoga/Advaita Vedanta. But, he has a way of his own" (Maharaj, 1981, p.4). Maharaj's teachings on the nature of consciousness and reality have had a significant influence on modern spirituality, including the Neo-Advaita movement. In his book, *I Am That,* a collection of conversations, Maharaj expresses the profound thought accumulated in a tradition based on the Upanishads, which has, since ancient times, explored the nature of consciousness and its place in reality. This knowledge can provide the basis of a model for consciousness which includes psi phenomena.

In this paper, I will use the view of reality and consciousness expressed in Maharaj (1981) as a basic framework. Building on this foundation, I add operational principles from contemporary science to construct a model with three distinct aspects. I will argue that the three aspects expressed by Maharaj (1981) can explain what a single material aspect alone (materialism) or even a single material aspect and a single nonmaterial aspect cannot. I will argue that a 3-aspect framework provides a clear advantage for scientific investigation of consciousness phenomena over frameworks with fewer aspects.

Psi Phenomena Are Part of "Everyday Consciousness"

In order to understand any system that supports a variety of phenomena, it is necessary to include an examination and explanation of the endpoints of its behavior. When seeking to understand the system in which consciousness exists, normal conscious perception can be regarded as one end of the behavior range, while a variety of psi phenomena - intimately connected with the phenomenon of consciousness - represents the other end of the range. Maharaj's view is consistent with the view that psi phenomena are within the range of ordinary consciousness phenomena: "Q: Can you enter into the mind and heart of another man and share his experience? M: No. Such things require special training" (Maharaj, 1981, p.195). A skill that requires training, like learning how to swim, would not be expected to be classified as something out of the ordinary, "mystical" or "supernatural."

Spontaneous experiences of psi occur frequently and in all cultures. In the laboratory, experiments have produced a stream of statistically significant results, showing that psi is a phenomenon that can be studied and measured scientifically. People who experience various forms of psi in experiments (for example, telepathically perceiving a brief, blurred image of the Capitol Building

being viewed by a known person miles away) do not report these as "mystical experiences." They are better understood as the operation of another "sense" that takes in information from somewhere – it is not clear where – and renders the received information perceptible in the imagination. Part of the imagination is called the "mind's eye" when processing visual information. In the act of sending information out, for example, telepathically sending an image viewed on a screen to a friend, it is just a question of looking at the image and knowing who the intended receiver is. There is nothing mystical or supernatural in this case, either. What is amazing is that the receiver is able to accurately perceive the visual features of the image being viewed from a distance by someone else - although perhaps it is no less amazing than being able to perceive what is directly in front of our eyes. Psi researcher Rupert Sheldrake stated, "Telepathy is normal not paranormal, natural not supernatural [...]" (Sheldrake, n.d.).

In this discussion, it will be important to distinguish *the mechanism of consciousness* from the *contents of consciousness.* Seeing a flower, smelling a rose, feeling a touch, thinking a thought about what you want for dinner, perceiving a telepathic image of a red car near the overpass, in each instance, the *information* in the *contents of consciousness* can be represented by a *data structure populated with data elements.* In the cases above, each populated data structure would be different. But, the process by which the information specified by each data structure enters the *contents of consciousness,* the basic underlying mechanism, is assumed to be the same. Framed in this way, with the *contents* separate from the *underlying mechanism*, it is easier to understand how even what is viewed as a "mystical experience" may indeed have *content* that is "mystical" while the system that makes the *content* conscious may be no more mystical that the system that keeps the heart beating while the individual is having the experience. Nevertheless, it is important to distinguish what is clearly a "mystical experience" from the type of "everyday consciousness" that is the focus of this paper. A mystical experience is often described as a state of expanded awareness, heightened consciousness, or altered state of consciousness that transcends the everyday sense of self and the material world. Mystical experiences, which occur in all cultures, are often associated with feelings of awe, love, and unity, as well as with insights, revelations, and a sense of profound meaning and purpose. It can be argued that these types of experiences, which involve a sense of union or direct contact with ultimate reality or the divine, are in a class by themselves, outside the scope of "everyday consciousness" and deserve special treatment. They are outside the scope of this paper. The forms of psi which are considered to be within the range of "everyday consciousness" and which receive continued experimental study in the laboratory are (1) telepathy – mind-to-mind connections, (2) clairvoyance – perceiving distant objects or events, (3) precognition – perceiving future events, and (4) psychokinesis (PK, MMI) – mind-matter interactions. These types of psi will be regarded as "ordinary psi" and part of the functioning of the "everyday consciousness," for example, as experienced by subjects in experiments involving the four types of psi phenomena mentioned above.

Besides the mechanism that delivers content into consciousness, the second factor to consider regards *the mechanism that underlies the acquisition of different types of content.* Marwaha and May (2015, 2016) proposed that the many forms of psi phenomena, such as telepathy, clairvoyance, precognition, and mind-matter interaction (MMI), are all expressions of the same underlying process, and that process is precognition. However, experimental results and reports of spontaneous incidents provide evidence of psi phenomena that display a stimulus-response behavior pattern (Radin,2004, 2017; Achterberg et al., 2005; Richards et al., 2005; McCoy, 2011). This evidence argues against precognition as the sole underlying mechanism for psi *content acquisition* since an underlying real-time mechanism in such cases would be the simpler assumption. But, the idea that the many forms of psi phenomena are all expressions of the same underlying process remains a powerful simplifying assumption. Others have held this basic view (see Radin, 2019; Williams, 2013). It is likely that the acquisition of *psi content* from different time periods (past, present, future) and different regions in physical space employs a single underlying mechanism.

Carpenter's (2004, 2005) theory of *first sight* assumes that it is the norm to use psi ability "unconsciously at every moment as part of the holistic process of construction that leads to all experience and all action" (Carpenter, 2010, p. 1). In the world view expressed by Maharaj (1981), it is natural to assume that the same process that underlies normal consciousness also underlies consciousness in at least the four "ordinary" types of psi phenomena mentioned above.

In this paper, I will assume that parapsychological results are generally true. I will not discuss the evidence for the existence of psi phenomena such as telepathy, etc., as studies that do this are widely available. For meta-analyses on various modes of psi phenomena, see Cardeña (2018), Bem et al. (2016), Mossbridge et al. (2012), and Utts (2018), all of which report substantially significant effects. For credible accounts of cases of various forms of psi phenomena, see Mayer (2007), Targ (2012), Talbot (1992), and Mishlove (2016).

The model to be articulated below is called "TAM," an acronym for "three-aspect monism." Main assumptions of the TAM model are summarized in the Appendix.

Three "Expanses"

According to Maharaj (1981, p. 191), reality consists of three *akashs*, translated as *expanses*: (1) the expanse of matter-energy (EM), "the physical space with all that can be contacted through the senses," (2) the expanse of consciousness (EC), "the mental space of time, perception and cognition," also referred to as "universal mind (Maharaj, 1981, p. 227)," and (3) the expanse of the source (ES). The *expanse of the source* can be understood in the model as an omnipresent and fundamental source of undifferentiated nonphysical *"awareness energy"* which is required to bring about consciousness.

Current Western science is focused on the physical *expanse of matter-energy*. However, Maharaj points to an extensive nonphysical aspect of reality. The nonphysical *expanse of consciousness / universal mind* is claimed to be the home of the individual as well as the universal *mind.* Moreover, "The body can neither enjoy nor suffer. It is the mind alone that experiences" (Kak, 2016). The nonphysical realm is claimed to be that in which conscious entities experience the *contents of consciousness*.

In this view, the body with its brain is physical and exists in the *expanse of matter-energy*. Consciousness is viewed to occur when *pure awareness* energy of the *source* contacts *matter* (Maharaj, 1981, p. 83). With respect to human consciousness, this process will be understood as one that transforms information generated in the brain (made of matter) into *the contents of consciousness* in an individual *mind,* which can be understood as a *region* of the *expanse of consciousness.*

This view is parsimonious. It rests on the idea that there is a fundamental and universal source of pure awareness analogous to a source of physical energy. When pure awareness interacts with *nonconscious information* found in matter (e.g., a pattern of neural excitation in a brain), consciousness, which is nonphysical, is generated in the *mind* associated with the brain of the individual that generates the information. Everything made of matter, for example, a brain in the *expanse of matter-energy* ("EM"), is constantly in contact with the *expanse of consciousness / universal mind* ("EC") and the "pure awareness energy" of the *expanse of the source* ("ES"). The result, under the right circumstances, is conscious experience, to one extent or another, strongly associated with that matter. An individual experiences *the contents of consciousness*. Conscious awareness is described as a type of "reflection of the *source*," analogous to the reflection of the sun on countless dew drops (Maharaj, 1981, p. 323). Consciousness is viewed as something that "does not shine by itself. It shines by a light beyond it" (Maharaj, 1981, p. 151). It is also referred to as something that is "borrowed" (Paramarthananda, n.d.).

In folklore, there is the expression, "a fish would be the last to discover water." The *expanse of consciousness* should not be dismissed as something abstract and remote. If it exists, it must affect us all strongly and at all times. Its presence would act in every thought and sensation we have; we are essentially "swimming" in it and interacting with it significantly from birth to death. Accepting its reality would mean a significant minute-by-minute belief system shift from pure materialism.

Chalmers (1995b) suggested that "conscious experience be considered a fundamental feature, irreducible to anything more basic" (p. 83). Maharaj (1981) expresses the alternative position that consciousness is not fundamental since it is "dependent." Maharaj claims that the *source* is fundamental and independent and cannot be explained or understood by the *mind;* yet it can be experienced in a state "beyond consciousness" (Maharaj, 1981, p. 232). Consciousness is viewed as being dependent upon the *source* of *pure awareness energy*. If the dependent component of consciousness can be regarded as not fundamental, there is reason to believe that much, but not all, of what is considered to be "consciousness" can ultimately be understood, simulated, and modeled.

Awareness vs. Consciousness

Maharaj makes an important distinction between *consciousness* and *awareness*:

> There can be no consciousness without awareness, but there can be awareness without consciousness ... Awareness is absolute, consciousness is relative to its content; consciousness is always of something. Consciousness is partial and changeful, awareness is total, changeless, calm, and silent. And it is the common matrix of every experience. ... Since it is awareness that makes consciousness possible, there is awareness in every state of consciousness. (Maharaj, 1981, p.29)

> Watch yourself closely, and you will see that whatever be the content of consciousness, the witnessing of it does not depend on the content. Awareness is itself and does not change with the event. (Maharaj, 1981, p.322)

> Awareness becomes consciousness when it has an object. The object changes all the time. In consciousness, there is movement; awareness by itself is motionless and timeless, here and now. (Maharaj, 1981, p.180)

This distinction between *consciousness* and *awareness* indicates that *two components* are involved in the phenomenon of consciousness: one, the *contents,* can be defined in terms of *information*, the other, *awareness,* cannot be defined in terms of information and is outside both the physical aspect of matter (EM) and the nonphysical aspect of the *mind* (EC). The definitions of these two terms are not distinguished in English. However, in this discussion, they should be understood as defined above, with "consciousness" always having informational content and "pure awareness" being something else entirely, unchanging and without content, not expressible in terms of mathematics or information. It is linked with the *expanse of the source* (ES) and is not "dependent" upon anything; it is fundamental.

Nonconscious vs. Conscious Information

Consider the case of looking at a red ball thrown at you to catch. The ball is red, but how does the subjective experience of the color "red" enter consciousness? This is equivalent to asking how pain or any subjective experience can enter consciousness. The human brain has over 25 spatially distributed neurophysiological centers that process different types of information in the visual field (Robles et al., 2014). One center contains neurons that respond to different colors; another analyzes shapes; another can compute the trajectory of a moving shape and generate information about where it will be along its trajectory. These separately located contributions of information to the contents of consciousness are generated within specific neural network structures in an individual's visual and cognitive system – layers of neurons connected to other layers with various connection strengths. In a specific brain's neural network, neuroscientists believe that the *activation pattern* of all the neurons in the network defines the totality of *information* being produced in that network at any one time. This information is meaningful within the specific brain's neural wiring structure that generated it, a structure that changes and grows with the learning experiences of the individual.

The format of such brain-specific neurally encoded information is considered in the TAM model to be *nonconscious* because it is produced within the physical material of the brain, which, by itself, cannot experience conscious awareness. This *nonconscious information* is assumed to become *conscious information* in the nonphysical entity referred to as the *mind* of the individual. This is assumed to occur when pure awareness energy from the *expanse of the source* contacts the matter of the brain, which includes the current state of the neural information structure of the neural networks in the physical brain. The *nonconscious information* produced in the brain can be understood as a *specification of information* for conscious awareness. I propose that the neurally-encoded nonconscious information (termed "neurological information") is rendered into a conscious format based on the neurally generated information in its "pure state," i.e., *as disassociated from the unique activation pattern within the "wiring structure" of a specific brain*. This "pure information" *binds* with qualia information resident in the *expanse of consciousness* and becomes *conscious information* in the *mind*. Furthermore, information in its consciously experienced form in the *mind* has a universal format in that *minds* of other individuals – i.e., other *defined regions* in the *expanse of consciousness* – can potentially access and understand it, regardless of the specific "wiring structure" of the biological system that generated it. The need for independence of "wiring structure" is clear from the psi phenomenon of telepathy since no two brains have the same "wiring structure." But, since the format of this information is universal, even vastly different "wiring structures" can make use of the same information. For example, a human, a dog, a bird, or a bee can, in principle, understand a telepathically received visual image of a tree. It may also be true that similarity of "wiring structure" can strengthen psi sensitivity: There is some evidence to support the idea that similarity of "wiring structure" as found in monozygotic twins facilitates telepathy (Karavasilis et al., 2018).

It is important, however, to distinguish *format*, *content*, and *meaning*. The *format* of information in the EC is assumed to be universal in all cases. Then, there is the *content* of the information. Content has a *scope of universality.* In the case of an image of a tree, the visual shape content has a wide scope – a tree shape looks like a tree shape to any being with eyes. But other information, like color, is content with a narrower scope. A bee can see ultraviolet, which is not visible to humans. Information *content* can include *semantics,* which generally has a relatively limited scope. For example, a hand gesture might have a certain meaning for just a small number of individuals. Information can be more abstract, for example, the idea of danger. But, abstract information is connected with *meaning*, which is not universal. To summarize, the *format* of all *content items* in the EC is assumed to be universal, while each *content item* has a *scope of universality.*

Although *nonconscious neurological information* discussed above is viewed as distinct from *conscious informa-*

tion, both formats, along with the continuous operation of pure awareness, are viewed to occur holistically for the individual. This is the principle of *monism*: "All is one, however much we quibble" (Maharaj, 1981, p.128). The whole organ hosting the modes of physically produced nonconscious information and nonphysically produced conscious information deserves the term *brain-mind.*

Experimental results support the assumption that the intercommunication process between the physical brain and the nonphysical *mind* is bidirectional. In telepathy experiments, EEG and fMRI data showed a peak of brain activity at roughly the same time in both sender and receiver (Radin, 2004, 2017; Giroldini et al., 2016; Richards et al., 2005). A question to consider is the similarity of formats of *dissociated neurological information* and the format of the same information encoded in the *expanse of consciousness* (termed in this discussion "EC-information"). Are the two formats identical? If so, the information generated as a result of an activation pattern in a specific neural network would already be formatted as "pure information" that *is* also formatted as EC-information, which enters the *contents of consciousness* already in a universal format without the need to undergo any further format conversion in the process.

Information Has Physical Purchase

Regardless of format, implicit in this formulation is the assumption that *information* is, in some sense, *real*, a *substance* that has the ability to cause a material effect in the universe. Though it may seem at first nonsensical and counterintuitive, this view is being increasingly embraced by the scientific community. Physicist John Archibald Wheeler enunciated this basic idea in his famous catchphrase "It from bit" (1989) — "it" refers to all the matter-energy of the universe, and "bit" meaning *information*. Bohm implied this view in the concept of the Implicate Order, which is composed of *information* and which, in his and Hiley's (Bohm & Hiley, 1993) idea of *active information* (discussed below), has the power to influence matter. Just as space and time have joined the list of entities with degrees of freedom and dynamics of their own that interact with matter-energy, so *information* joins that list of concepts originally thought to be intrinsically lacking a dynamics of their own. Paul Davies considers information a "source of fuel" that has "physical purchase:" "the principle is established, that information is a source of fuel. It enters into the laws of physics. So, it has some physical purchase, and that's the point" (The Planetary Society, 2020). "Information, not in its prosaic everyday sense but as an abstract quantity which, like energy, has the ability to animate matter" (Davies, 2019, p.7). Bohm used the transitive verb "*inform*" as something information can do. The Implicate Order "informs" everything that exists in the Explicate Order. Hiley referred to the quantum potential (the information field of the Implicate Order) as internal energy and as a new quality of energy (Hiley, 2006). Some physicists claim that information is the primary substance of the universe and not matter (e.g., Wheeler, Bohm, Davies, Lloyd). Others place it on an equal footing with matter; "Nature can no longer be seen as matter and energy, but must be interpreted as matter, energy and information" (Campbell, 1982). When the information in a brain-mind is viewed in this active way, the psi phenomenon of mind-matter interaction (MMI) enters the outer reaches of possibility.

The Nonphysical Domain Presents Like a Hologram in Spacetime

Bohm used the analogy of a hologram to explain how the information in the Implicate Order affects the Explicate Order. A hologram of a 3-D representation of a region of space can be created on a 2-D photographic plate and cut up into small pieces, and each small piece contains the information about all the space in the 3-D region. Not only does the hologram contain all the information, but *it contains a representation of all the information in every small region of the plate*. Bohm's *holomovement* is like a continuous 4-D movie in which each individual who occupies a small region of spacetime has access to a representation of all the information in the universe used in the repeating "unfolding" operations of the Implicate Order. Bohm viewed the brain as part of the Explicate Order, which is a projection or unfolding of the Implicate Order. The brain was viewed to process information by enfolding/unfolding holographic-like patterns that are encoded in the Implicate Order.

In the context of the TAM framework, following Bohm's and others' example (Bohm, 1980; Talbot, 1992; Targ, 2012), the topology of the *expanse of consciousness* is assumed to present itself holographically in the *expanse of matter-energy:* each individual experiences a consciousness of reality from their perspective using what amounts to a local bidirectional viewport into a constantly-updating high-dimensional hologram that holds the entire information content of the *expanse of consciousness.*

Each *mind* is assumed to be *informationally connected* to the EC hologram. A change in one *mind* changes the entire hologram, instantly available to every small region of spacetime, which includes every *mind*. Targ, discussing Bohm's work, mentioned, "The important idea here is that each of us has our mind in our own piece of the spacetime hologram, containing all the information that exists or

ever was [...]" (Targ, 2012, p. 206). Williams adopts a similar view: "...relying heavily on Bohm's pioneering work, I am proposing that our conscious experience is ultimately rooted in an information rich, nonlocal 'space.' ... our minds share this inherently nonlocal space" (Williams, 2019, p.32). John A. Wheeler stated, "all things physical are information theoretic in origin and this is a participatory universe" (Wheeler, 1989, p.311).

Bohm spoke of the Implicate Order in terms of a high-dimensional "quantum field" as a base for both consciousness and matter. F. David Peat cautioned as to the correctness of referring to it as a "field":

> "Is it really correct, for example, to speak of a 'field' of information, since information does not fall off with distance, neither is it associated with energy in the usual sense. Possibly the notion of field should be widened..." (Peat, 1995).

Bohm mentioned:

> "unlike what happens with electric and magnetic potentials, the quantum potential depends only on the form, and not in the intensity of the quantum field ... Such a notion is clearly fundamentally different from the older Newtonian ideas." (Bohm, 1990, p. 276).

The quantum potential was also called by Bohm and Hiley an "information potential." It influences the form of processes (i.e., it is *active*) and is itself shaped by the environment (i.e., it is *responsive*). Bohm and Hiley developed the notion of "active information:" The "overall form of the system ... exerts an influence on a given particle via active information no matter the distance. Thus active information is a way of describing a kind of action from an underlying field which in turn depends on the entire system's configuration" (Williams, 2019, p. 15). In the TAM model, the nonphysical data structure of the EC is theoretically not structured according to time. Theoretically, it operates timelessly, outside space and time, in the *here and now.* There is ample experimental evidence to indicate that specific information from both the past and future exists in the data structure of the EC (Cardeña, 2018; Radin, 2006; Rosenberg, 2021; Targ, 2012).

Structural Information, Neurological Information, and EC-information

There are at least two very different types of information that can be associated with material objects. Taking a rock to be an example of a material object, such an object can be considered as a structure from which all its configuration information can be abstracted. This familiar concept of information, which can be expressed in any number of formats, will be referred to here as "structural information," or alternatively, "geometric information" derived from the *physical configuration of a material object*. But although the structure of an operating brain can be compared to that of a rock in that both are configurations of atoms, it is not like a rock in two respects. For one, it is a *living* object. For another, it is an *active* material object constructed from elements which, as discussed by Tononi et al., in order to be an acceptable physical substrate for consciousness (PSC), must "have at least two different states (for example, being on or off), inputs that can affect those states and outputs that depend on them" (Tononi et al., 2016, p. 452). Such an active structure, for example, a network of neurons in a living brain, has the ability to *produce information*. While the structure of both a dead and living brain can be characterized by "structural information" mentioned above, the information produced by the activity of a living neural network is of a different character entirely. This type of information – called "*neurological information*" – was described above as "nonconscious." This type of information is directly associated with the specific "wiring structure" that produced it. This information, considered in its "pure form" when it has been dissociated from the structure that produced it, can be considered the *outbound stream of information* based on the state of the brain's neural networks. This information, dissociated from the brain, will be regarded as being in "pure information format." This system interacts with *pure awareness energy*, and pure information enters the EC, gets distributed holographically everywhere instantaneously, and becomes conscious in the individual brain-mind of the individual who produced it. The information in the EC will be referred to here as "EC-information" ("EC" = "*expanse of consciousness*"). In contrast to *structural information, the format of EC-information is universal for all conscious entities (a working assumption).* Note that calling this format "universal" is somewhat like claiming there is no format at all – in which case, this type of information would be "self-declaring" and "formatless."

Neurological information is produced by neurological interactions, such as are found in a living brain made of atoms. Simultaneous with its production, it is acted upon by *pure awareness energy* and enters the region of the *mind* in the *expanse of consciousness* as EC-information where it may persist in the *data structure of the EC*. In psi phenomena such as telepathy, a receiver of psi information is able to tune into EC-information associated with a specific thinker. The received information is assumed to become conscious for the receiving individual when pure aware-

ness energy interacts with information-producing neurological subnetworks, which produce *the same* or *similar pure information*, causing them to activate, which leads to their entry into the *contents of consciousness*. In this case, we are looking at the *inbound information stream* into the brain, originating in the *mind.* An analogy can be made to the operation of existing holographic correlators, which can, in a single operation, retrieve item(s) from a large database even when the cue does not fully match the stored item or is a partially obstructed view of the stored item (see Shahriar,2003).

In the TAM model, it is a working assumption that pure awareness energy can interact with information-producing neurological subnetworks in the brain in both directions, allowing information produced by a thinker to enter the EC, as well as any information resident in the EC to lead to selective neural activity via a process of attention. In both cases, the neural activity in the brain *informs* (to use Bohm's term) the *contents of consciousness* – the *mind,* and the *EC-information in the mind informs* the brain. Everybody's *mind* is a part of the EC, giving everybody potential access to the enormous information resources of the EC.

The Expanse of Consciousness Compared to Bohm's Implicate Order

Many core concepts of the Implicate Order apply to the concept of the *expanse of consciousness* (EC). In both, *information* is central. Both are nonphysical, nonlocal, and project holographically in the physical domain. In both, *information* can "act like a fuel" (The Planetary Society 2020), capable of "informing" the *contents of consciousness* and capable of *interacting* with *matter.* "The word inform is here taken in its literal meaning, i.e., to put form into (Bohm, 1990, p. 279)." As "active information" the Implicate Order both represents the information in a physical environment and can act on the physical environment to change it. Bohm and Hiley (1975) presented how this concept leads to the notion of an "unbroken wholeness of the entire universe." Maharaj expressed the same unbroken wholeness of the universe: "Everything affects everything. In this universe, when one thing changes, everything changes. Hence the great power of man in changing the world by changing himself" (p.360).

There are differences between Bohm's holographic universe theory and TAM. In Bohm's model, there is an oscillation between the Implicate Order and Explicate Order. There is no analogous oscillation between the *expanse of* consciousness (EC) and the *expanse of matter-energy* (EM) in the TAM framework. In this framework, all three *expanses* are viewed to operate holistically, simultaneously, and continuously. Bohm's model with its two orders can be seen as including both the EC and the ES into the Implicate Order since, in Bohm's theory, the Implicate Order is understood to represent the deeper underlying unity (ES) of both the mental (EC) and physical (EM) in the framework of neutral monism. But, the ES differs from the Implicate Order since the ES is clearly characterized as being *changeless* and *"contentless"* (Maharaj, 1981, p. 34), while the Implicate Order includes change and content. TAM is based on a "trinitarian" scheme, which adds a third aspect, a source of "pure awareness energy," to the physical and mental aspects. This *source* aspect Maharaj claims is fundamental and independent, that which makes consciousness possible, while the other aspects are viewed as dependent (1981, pp. 33-34, 161). Bohm's Explicate Order is also dependent since it derives from the Implicate Order.

The TAM model differs from Chalmers (1995a) suggestion that we explore how consciousness may be in some sense fundamental (not emergent from matter). The prevailing scientific opinion is that consciousness is an "emergent property" of matter with an appropriate structure as it grows in complexity. In the TAM framework, consciousness is not fundamental – its contents can be defined in terms of *information.* – and the assumption is that *pure awareness* is *agnostic* when it comes to its interaction with matter.

Nonlocality in Psi Phenomena

The idea of nonlocality makes sense in a holographically distributed "field of information" where the "field" is not populated with an energetic component that falls off with distance, and the "field" is not associated with energy in the usual sense. Nonlocality is supported by behavior observed in psi phenomena. The quality of received information in psi phenomena does not degrade with distance (Utts, 2018; Targ, 2012), nor is it hampered by physical barriers (Radin, 2006; Targ, 2012). Disregard for physical space and barriers is seen in telepathy, psychometry, precognition, remote healing, and other forms of psi. Disregard for space and barriers is also seen in the phenomenon of quantum entanglement. Disregard for time as well as space is not ruled out. "The future may be enfolded in the present as possibility" (Bohm 1985, p. 132). Note that in order to encode a future possibility in the context of a participatory universe in which the future is not determined, *computation* would need to be added to the data handling resources in the *expanse of consciousness.* The notion of adding a layer of computational complexity to the EC deserves serious consideration, given observed precognitive behavioral data from

psi phenomena (see, for example, Rosenberg, 2021). The other possibility is that the future is already determined, and the data structure of the EC stores all the information present, past, and future. If so, no additional computational resources would be needed to predict the probable future, but free will would appear to be lost. The *expanse of consciousness* (EC) is viewed to operate holographically, and all the information in the EC hologram is fully available in each small region of physical space. Operating nonlocally everywhere at once, any information transfer that takes place in this domain is insensitive to physical distance, physical barriers, and whose content is, in some way, insensitive to time as well. The meaning of "information transfer in the *expanse of consciousness*" is now examined.

Information Transfer in the Expanse of Consciousness

A conventional signal like radio or light propagates by using a source of energy that is transmitted across physical space. The energy of an electromagnetic field or other energy source is used as a *carrier*, and the movement of this energy through space (with the information it encodes) is limited to the speed of light. As it radiates out from its source in 3 dimensions, the amount of measurable energy of a signal available at a receiver decreases as the square of the distance (the "inverse square law"). Physical obstructions can block or weaken signal propagation. In contrast to a conventional signal, psi information transfer does not become weaker with physical distance or obstructions and is thought to be instantaneous. Since physical space in the EC between the source and receiver of psi information does not exist, the need for energy to accomplish propagation of information is eliminated. The information does not "go" anywhere. Since a carrier is not needed, no energy need be consumed in "signal propagation." The very idea of "propagation" becomes misleading. Since instant information connectivity is assumed to exist between all *regions*, hence, all *minds* in the EC, this type of connection can be regarded, not as functionalized by "propagation," but rather by "correlation." "Correlation" is the term used in quantum physics to describe the phenomenon of entanglement.

Connectivity via correlation is found in "quantum theories of consciousness" which have been proposed by a number of physicists and philosophers. Penrose and Hameroff proposed a theory that suggests that consciousness emerges from quantum processes in microtubules in the brain (Hameroff & Penrose, 2014). Henry Stapp (2009) argues that the brain is a quantum device and proposed a "quantum theory of psi" in which the quantum processes that occur in the brain can lead to nonlocal connections with other minds and with the physical environment. Dean Radin suggests that the universe is entangled and proposed that "psi is the human experience of the entangled universe. ... the mind/brain behaves as a quantum object. Imagine that our mind/brain is sensitive to the dynamic state of the entire universe... Maybe it doesn't involve information transfer at all. Maybe it's purely relational and manifests only as correlations" (Radin, 2006, p. 284).

The basic principle in quantum mechanics is that information is the currency of reality, not matter: the universe is an informational structure, not a substantive one (to paraphrase Stapp, 1999). A quantum object, for example, an electron, has an unknown location and can be anywhere while it is in its "wave function" format. But a transition occurs, called the "collapse of the wave function," when there is a "*discontinuous change in our knowledge* (Heisenberg, 2007, p. 29/1958)." The question arises, where does a "discontinuous change in knowledge" take place?" The cause of wave function collapse is known as the "measurement problem" and is the subject of continuing debate and research. In the von Neumann/Wigner formulation, the wave function of a quantum system does not collapse until it interacts with a conscious observer.

If the underlying operation of the TAM framework obeys the principles of quantum mechanics, the "knowledge" that undergoes a "discontinuous change" would refer to the *knowledge base of the EC,* which includes the *mind* of the individual. Stapp's view is that consciousness arises from the collapse of the quantum wave function in the brain. He argues that the collapse of the wave function occurs when the brain is stimulated by an external event, such as a sensory experience, and that this collapse is responsible for creating conscious experience.

Radin posited that the "local effects" of brain state are stronger and more immediate than our "background" awareness of the entangled universe. "[the] sensory-bound brain state [is] entangled and influenced by the rest of the universe, but its local effects are so much stronger and immediate than our 'background' awareness that only on rare occasions are we aware of its entangled nature [...] (Radin, 2006, p.265)." In the framework of TAM, "brain state" equates to the production of *neurological information*, and the operation of the *expanse of consciousness* correlates information in the "entangled universe."

Quantum mechanical theories of consciousness and psi are consistent with the TAM framework. It should be mentioned that a *region* of the nonphysical space of the EC has no location, rather, it is defined nonlocally as a *collection of information*. No "propagation" or physical

movement of energy over distance need occur. Because an energetic physical carrier is not used in psi information *correlation*, the communication of psi-encoded information via the EC requires only the small amounts of electro-chemical energy used in configuring the activation profile of brain neural network neurophysiology. Furthermore, if correlation is the correct way to view information transfer in the EC, then it is highly likely that the correlation is noise free, analogous to the 100% perfect correlation behavior of physically separated entangled particles which share information.

Currently, it is not possible to use entangled particles to communicate information because entanglement breaks when an attempt is made to measure the state of an entangled particle. Making a physical measurement "does something" to break the connection. This occurs in the case of making a physical measurement in the *expanse of matter-energy,* but when considering the telepathic correlation of information hypothesized to occur between *minds* in the nonphysical *expanse of consciousness,* the assumption is that while telepathy is occurring, there is nothing that would "do something" to break the correlation. Since psi information is only rarely received with high clarity and usually in brief glimpses, the widely observed loss of quality observed by receivers of psi information must be attributed to factors other than "a noisy channel."

Only Some Neural Activity Becomes Conscious

Using the perception of color as an example, in humans, the color that is actually perceived consciously is specified only after complex calculations in higher brain centers have processed the raw signals from neuronal photoreceptors in the retina. These calculations correct the perceived color for ambient illumination color and intensity, the phenomenon of "color constancy" (Komatsu, 1998; Foster, 2011). Where a color is perceived in the visual image involves other complex calculations that correct for the distance of objects from the eyes – "size constancy" (Qian & Yazdanbakhsh, 2015; Chen et al., 2019). Other complex calculations combine visual information from the two eyes to generate a conscious, always upright 3-D percept with depth. Processing of visual data occurs in both directions in the hierarchical visual processing system, from low level inputs to high levels ("feedforward"), and from high levels back down to low levels ("feedback"), as well as laterally between and within dozens of brain visual data processing centers. The only information that enters consciousness from all this unconscious neural activity is the final output, the processed, corrected visual information. Low-level information and information produced in intermediate processing stages is masked from consciousness, preventing conflicts with the final processed information and sparing the user from dealing with additional and unnecessary information processing of the conscious content. Also, none of the plethora of neural activity that results from brain-processed information dealing with digestion, heartbeat, temperature regulation, etc. becomes conscious. And when sleeping, the information that enters consciousness changes markedly. What mechanism is used to select what information in the brain becomes conscious and what does not? To date, nothing has been found in neuron physiology that differentiates between neurons whose activity have conscious correlates with those that do not.

Attention

A candidate for selective filtering of conscious information is the process of *attention*. In normal situational awareness, our attention does not include information of low importance in the current situation. One possibility is that *only what gets attention enters the contents of consciousness.* It is beyond the scope of this paper to describe in detail how a mechanism of selective attention might work (See Graboi & Lisman, 2003 for one potential mechanism), but although there is much work yet to be done, it is likely that the neural mechanism of attention will ultimately be understood, placing it in the category of Chalmers' "easy problems of consciousness," as opposed to the "hard problem." Various attention mechanisms are already finding their way into artificial intelligence systems (Hwong, 2017). General findings show that neurons involved in attention typically have 20-30% increased firing rates, and increases in synchronous firing (spiking coherence) have also been observed (Lindsay, 2020).

An interesting question is whether a sender's conscious attention to one particular object or feature in an ensemble affects what visual features are telepathically received. In telepathy tests in which the sender focuses attention on a particular object in the room, the receiver can get an impression, not only of the object being attended by the sender but of the larger field of vision viewed by the sender – including other objects (Graboi, unpublished data, 2021). And in the phenomenon of remote viewing, a telepathic receiver can actively focus visual attention to different locations in the sender's field of view (see Targ, 2012); "Pat Price ... described psychically flying over the site at 5,000 feet to get a bird's-eye view ... He then offered to "go inside" the bunker, where he found a file cabinet with names on the drawers ... He read off the names ... all of which proved to be correct" (Targ, 2004, p. 36). How does a receiver of visual psi information *navigate?*

What part of "psi navigation" takes place in the brain, what part takes place in the *mind,* and in what manner is the information about the scene encoded in the brain-mind so as to allow attention-driven navigation?

Qualia are Resident in the Expanse of Consciousness

If it is in the *mind,* not the body, that sensation occurs (Kak, 2016), and the *mind* resides in the *expanse of consciousness,* it follows that the *expanse of consciousness* must contain (or be able to generate on the fly) the information necessary to produce the experience of *sensation* in an individual. The human experience of "the redness of red" is termed a *quale.* The *quale* of "red" is provided to the consciousness of an individual at specific locations. These locations are specified by the individual's visual perceptual processing stage that produces a conscious correlate for, e.g., the color of a surface, to be "red." Columns of neurons have been found in the inferior temporal (IT) cortex of the macaque monkey, with a visual system very similar to that of humans (Komatsu et al., 1992). Within these columns, neurons highly selective to slight variations of the same color are stacked, one on top of another. In this region, there are many such columns, each tuned to a slightly different color (Zaidi et al., 2014; Conway &Tsao, 2009). IT cortex has millions of color-tuned cells, sampling the color space quite finely with narrow tuning (Zaidi & Conway, 2019). This region appears to be involved with binding colors to the surfaces of objects (Rosenthal et al., 2018; Zeki & Marini, 1998). It contains essentially a large lookup table for neurons selective to the perceptible colors around the color circle. It is sensible to assume that the visual system would activate one (or a relatively small number) of these color neurons most strongly (which typically inhibits adjacent neurons) and neurally associate this activation with the activation of the neurons involved in decoding the shape of the associated object in the visual field. This information, namely, the association of a specific "corrected" color neuron in IT with a specific surface of an object represented in a neural center devoted to shape analysis, is hypothesized to contribute to the visual neurological information that becomes EC-

Information in the *contents of consciousness* – the *mind* of the individual perceiving the object. In this process, an *information handling process* in the *expanse of consciousness* would bind the quale "red" to the specified visual field location in the perceived image. It follows that the *expanse of consciousness* must be home to a *process to access and merge* into the *contents of consciousness* the set of qualia that corresponds to the large lookup table of different color selective neurons in IT.

Content-addressable storage (CAS) is a method used to store information so it can be retrieved based on its content. Holograms have been used to implement CAS (see Shahriar,2003). If the EC hologram behaves in a way analogous to a CAS, and if the *pure information* output from the brain is in a compatible format, then a mechanism by which the brain might directly access specific information, including qualia, stored in the EC is conceivable. Karl Pribram (1991) discovered 3-dimensional electric fields in volumes of the fine dendritic webs found in deep cerebral cortex. These fields are consistent with the idea that human memory is distributed and structured as a hologram. If deep cortex is "holonomic" as Pribram suggests, a deep brain interface to a corresponding hologram-like information structure in the nonphysical domain is conceivable (see Di Biase, 2009). Currently, the notion that the brain processes information in a holonomic, holographic manner has not been definitively proven.

In psi phenomena, receivers of psi information often readily perceive colors, but the accuracy with which received color shades are perceived remains to be determined.

Data Structure of the Contents of Consciousness

We aren't normally conscious of our breathing. It is automatic and does not normally enter what an individual is aware of at the moment, understood as the *contents of consciousness.* As discussed above, the "easy problem" of *attention* can be solved to determine what information enters the *contents of consciousness* at a given moment. The neurological information with the highest activation, having the highest current importance, would enter the *contents of consciousness* and receive attention. The lesser activated information can be considered to be *subconsciously activated* and, therefore, to be *subconsciously present* in the *contents of consciousness.*

The information in the *contents of consciousness* at any one time is therefore structured like a pyramid, with the currently most important information at the top having the most *current relevance* (or *importance, priority*) and consuming the most attention (a limited resource). The currently less important information would be found lower down in the priority hierarchy and receive no attention. Should the situation change and new information or information of low importance suddenly becomes of high importance, an automatic reassignment of relative activity-coded importance would occur. This notion of a structured *contents of consciousness* in which some of the contents receive attention and much does not receive attention broadens the structure of the *contents of con-*

sciousness in such a way that it includes both *conscious* and *subconscious* information. This broader concept is envisioned for the TAM model.

In the TAM model, an attentional process is assumed that occurs in the brain which operates automatically in a neural network based cognitive system. The brain output signal in this system is a stream of neurological information. Subject to a restructuring of relative activity by an attention process, this neurological information interacts with pure awareness energy and enters the *mind* as EC-information. Once in "pure information" format, it is enhanced with qualia, which are bound into the information cluster, which is rendered in consciousness. The conscious awareness of the *contents of consciousness* in the *brain-mind* is seen as a nonlocal phenomenon that exists outside of space and time, in a timeless and spaceless *information region* of the *expanse of consciousness hologram.* It cannot be found between the ears of the perceiver. This idea of an individual's consciousness being outside of spacetime has been expressed by Chopra (Stillness Speaks, 2017), Bohm (the nonphysical Implicate Order), Maharaj (the nonphysical *expanse of consciousness*), and others.

The information resources In the EC can be conceptualized as a multi-user information management system in which everyone's *contents of consciousness* is a changing collection of information. The EC hosts the *information input/output (I/O) data stream of every brain,* providing subjectively experienced conscious information to each *user*, as well as providing nonlocal information under appropriate conditions. If there is a pain to be felt in one part of the body, the nonconscious neurological information generated in the brain becomes EC-information in the *mind*, and the specified pain is felt as specified for the specified body location. When any thought occurs to an individual, that thought is assumed to be available throughout the *expanse of consciousness* (EC) where there is no effective distance between *minds*. This assumption follows logically from the position taken in the TAM model that every thought that every individual produces enters the contents of consciousness in the EC, and the EC is a shared domain of information among all conscious entities. Although it is clear from the data of psi experiments that at least some thoughts from some individuals can be assumed to become available in the EC, whether this is true for all thoughts, and how long different thoughts might persist in the EC, remains to be seen.

The qualia assumed to be resident in the EC can be understood as "subjective constants." A specific color quale is assumed to be accessed by the activation of a specific color-selective neuron in the visual system, relative to the other color selective neurons, which specifies that quale. It is reasonable to assume that any human with normal color vision that sees that color would activate the same color-analyzing neuron in the visual system which specifies the same quale, stored as a "subjective constant" in the EC. This suggests that all humans with normal color vision would experience the "redness of red" in the same universal way. A bee has different photopigments in the eye than humans, and bees can see ultraviolet. Whether a bee and a human experience the same color when viewing an environmental color that is in both of their color ranges would seem to be unknowable.

The *format* of information in the EC is universal, but the *content* of information specified in that universal format has a *scope of universality*. The *scope of universality* may be wide or narrow; in some cases, it extends across many species, and in other cases it is specific to a particular species or even more specific to a collection of individuals in a species. For example, *visual shape* content has very wide scope – a tree shape looks like a tree shape to all species with eyes. And all species with eyes can access this content item in the reception of visual psi information. But the color content of ultraviolet has a scope limited to animals capable of perceiving ultraviolet, such as bees, but not humans. All that may be said at this time about the format of information in the EC is that it is nonphysical, universal, and it is distributed like a hologram. The data of psi phenomena has made it clear that a vast amount of information is "out there;" it remains a challenge for science to understand the details of its representation and the details of its handling.

The User Interface and its User

Donald Hoffman (2010) proposed that perception be viewed in terms of a *user interface*. Using visual perception as an example, as discussed above, neural signals from the retinas go through enhancement and corrective computational processing in various brain centers of which there is no conscious awareness. This pre-processing of visual information, modulated by an attention process, results in the processed visual information which contributes to the *contents of consciousness*. The consciously perceived information is presented in an intuitive way, with the currently most important information receiving attention. This scheme simplifies the information a user needs to decide the best action to take next to maximize survivability. For example, without color constancy, it would be necessary to check the current color of ambient lighting and then use that knowledge to figure out what color that berry really is, and decide whether it is safe to eat. Our visual consciousness system gives us an accurate assessment of the true color of the berry by doing back-

ground processing in the brain to subtract out the color of the ambient lighting before presenting the scene to consciousness.

To survive in a complex environment, an individual *must have an environmental sensing interface which it uses to base decisions* as to what to do in order to avoid harm and sustain viability. What better way to accomplish this than to have feelings and a sufficiently veridical multi-sensory interface? These conscious experiences do not go on "in the dark" because they are an integral and intermediate part of a continuous processing loop in which the *contents of consciousness* is one step in the process of dynamic decision making and survival in an environment. Multisensory enhanced pre-processed consciousness provides a user interface highly optimized for survival. Other interfaces are possible, such as found in robots, in which processing occurs completely "in the dark," without consciousness.

What can be said about the *user* of the user interface of consciousness?

The Homunculus

In any model of consciousness, it is important to clarify exactly what element of the model is experiencing consciousness. Maharaj offers perspective on this point. He mentions the entity of the *personal self* (p.209), which is typically aware only of the ever-changing *contents of consciousness.* The *personal self,* which he also refers to as the *false self* (p.223), is distinguished from another entity, the "real you" which is "limitless" and "beyond consciousness" (Maharaj, 1981, p. 382). The "real you" is viewed as usually obscured from awareness because the "greedy mind," falsely identified with the physical body, is insecure (p. 305) and more or less constantly keeps the consciousness of the *personal self* occupied.

Maharaj emphasized repeatedly that the *personal self* is constructed "from mere suggestion or imagination" (Maharaj, 1981, p.295). "you imagine yourself to be a person" (p.366). "In reality there are no persons, only threads of memories and habits" (p.34). A child acquires its personality from parental examples, cultural cues, examples from peers, etc., and this accumulation of traits an individual views as the "person" they are is seen in Maharaj's view as "accidental:" "The image you have of yourself is made up from memories and is purely accidental" (p. 251). This notion that who we think we are is nothing more than "accidental" is difficult to accept. Certainly, some percentage is acceptable as "accidental." But following Maharaj's lead, and backed by ancient wisdom, in informational terms, the *user* will be considered in the TAM model as simply a *bounded belief system (which changes through experience)*. An appropriate term for the *user, person, personal self, false self, persona,* is "*homunculus*." In its original Latin meaning, "homunculus" means "little man" or "manikin." In the context of philosophy of mind, the term has been used in a critical way to refer to the idea of a central observer or director within the brain (Dennett, 1991). In the TAM framework, following Maharaj's perspective, it refers to the bounded information-defined component of a potentially limitless fully realized human being. Chopra (2016) expresses a similar view when he points out the "biological robot" in humans. Another entity is assumed to exist outside of that bounded belief system, termed *the real you*, which Maharaj viewed as "neither your body nor your mind, nor even your consciousness" (Maharaj, 1981, p. 382). "You are the changeless background, against which changes are perceived" (p. 246).

By viewing the *mind* as the *contents of consciousness* which can be described in terms of information and information processing, and viewing the recipient of consciousness in terms of a bounded belief system, ultimately describable in terms of mathematics and systems of artificial intelligence, the *mystical element*, the "real you" is pushed out of the way into the third aspect of reality, the ES, leaving space for making further inroads into understanding the hard problem of consciousness in terms of phenomena in the EM and the EC. In any framework with less than three aspects, the unexplainable "hardest part" of the problem of consciousness would be confounded with that which can be understood and explained, introducing a difficulty for scientific exploration of the phenomenon.

Experimental Validation

Test for the existence of a domain where biological information communication takes place outside of space-time. The validity of the TAM framework rests on confirming the existence of a nonphysical domain in which *information* plays a central role. If information transfer in the EC occurs outside of time and space and is best regarded as a correlation rather than a propagation, one prediction is that telepathic communication would be essentially instantaneous, like correlation in quantum entanglement (Caltech Science Exchange, 2022). Dean Radin pointed out that "It is not yet certain that psi is absolutely spacetime independent (2006, p.289)." It is, in principle, possible to measure the "speed of thought." Radin and other researchers have found that two people can show correlated peak brainwave responses when one, a "sender," sees an image flash on a screen (Radin, 2004, 2017; Richards et al., 2005). The delay between a peak EEG response in the sender and a correlated peak in

the receiver in Radin (2004) was about 64 milliseconds, attributable to normal neural processing time delays. Radin proposed an experiment to measure the "speed of thought," a difficult experiment which has not yet been carried out (Radin, personal communication, August 27, 2020). If the distance between sender and receiver were increased to the opposite ends of the earth, if the speed of thought is instantaneous, the delay between correlated brainwave peaks should remain about 64 milliseconds, instead of growing greater than 64 milliseconds if thought propagation were limited to the speed of light as found in all other physical communication paradigms. If such an experiment were to find that distance does not affect the *speed of thought*, this would support the idea that a conscious-related communication process occurs outside of, independent of, spacetime, and that consciousness itself has a nonphysical component.

DISCUSSION

Maharaj mentioned, "Awareness – mind – matter – they are one reality..." (p. 180). Even so, the three aspects Maharaj discusses are not ontologically at the same level. *Pure awareness* has special standing: "[we must] realise that immense ocean of pure awareness, which is both mind and matter and beyond both [...]" (p. 161). "[It is] entirely uncaused, independent, complete in itself, beyond time and space, mind and matter" (p. 36). In referring to the TAM model in terms of "three aspect monism," the ontological difference between the aspect of pure awareness and the other two aspects is not obvious. Maharaj associates the non-neutral term, "Supreme" with the aspect of the source, the source of pure awareness. He regards consciousness, a property of the *mind,* as a manifestation of pure awareness, and matter as a manifestation of consciousness (Maharaj, 1981, pp. 33-34, 161).

The Western scientific paradigm is currently wedded to one aspect: the physical. Acknowledging the existence of a second, nonphysical aspect would not subtract from what is already understood, but would add a way to approach the rising tide of experimentally verified phenomena which are anomalous within a single physical aspect paradigm. Bohm's powerful two-aspect theory of Implicate/Explicate Orders begs the question of how awareness or consciousness comes about. But Maharaj's three-aspect framework brings the resources (pure awareness) that help explain conscious experiences in a way that Bohm's more neutral monism framework cannot.

Many open questions fit within the framework of the three-aspect monism model. An important issue regards coming to a thorough understanding of the structure of the "*expanse of consciousness*." It is by now clear that a great deal of information is "out there." Where is "there?" What is its format? What is the range of its content? Maharaj claimed, "In the ocean of the [*expanse of consciousness / universal mind*] all knowledge is contained; it is yours on demand. Most of it you may never need to know–- but it is yours all the same (Maharaj, 1981, p. 285)."

By what process does information generated neurologically transform into EC-information with its universal format? Does it need a special physical interface to be transformed into EC-information, an identifiable physical structure in the brain such as microtubules (Hameroff & Penrose, 2014)? Or is no special physical interface involved? Relevant to this is the question of anesthesia: How does general anesthetic work to switch off consciousness? Does it turn off processing in an electro-chemically mediated EC interface (e.g., microtubules) (Hameroff & Penrose, 2014)? Does it disrupt processing selectively in the brain (Kelz & Mashour, 2019)?

The TAM model assumes that the "neurological information" generated internally in the neural networks of a *brain-mind* dissociates from the physical substrate by the action of *pure awareness energy,* which frees the information from the structure that generated it, and a *"pure information image"* is produced. Is that enough to register it into the EC, making the format of EC-information the same as format of "*pure information?"* Whatever the format, the most parsimonious assumption would be that it is *universal* in that all conscious entities can make use of it. The model asserts that upon entry into the EC, the neurally-specified information binds with qualia, which are assumed to be permanently encoded as "subjective constants" in the fabric of the EC. Where else could qualia be encoded? The cluster of pure neurological information bound together (enhanced) with qualia as specified, and content structured by importance in terms of relative activation of information, comprises the *contents of consciousness*, referred to as the *mind* of an individual, and understood to be a *region* of the EC.

There is the question of *what information gets encoded into the EC,* and what is its lifespan in the EC? Since much computational information processing in the brain operates unconsciously, is <u>all</u> brain-generated information, including information used in the regulation of heartbeat, digestion, etc., available in the EC? What about structural information about the configuration of the body? Experiments have shown that a body can be physically affected by remote intention (DMILS–- direct mental interactions with living systems), which is a special case of mind-matter interaction (MMI) phenomena. What do these phenomena imply about the *data-handling functionality* built into the EC? And how can instantaneous holographic-like

distribution of information to all regions be achieved?

It is straightforward to assume that in telepathy the EC-information associated with a thought in one *mind* can correlate with a thought in another *mind.* But what encoding of information and its processing takes place in the case of clairvoyance, where there is no obvious active thinker in the region of the environment that a clairvoyant is successfully able to visualize? How is visual shape environmental information encoded into the EC? Is pure awareness energy involved in that process? Is visual environmental EC-information permanently encoded in some way, or is it transiently encoded when requested by a clairvoyant?

What is the data-structure of the information in the EC? Is EC-information encoded in a form analogous to the LTM/STM nodal network used by the human brain? Is the nonphysical encoding based on "information vibrations?" Radin proposed a scheme based on entanglement: "Minds are entangled with the universe [...] "(Radin, 2006, p. 270). What can be understood about the storage and retrieval of information in the EC? Is a form of holographic processing involved? Is storage/retrieval based on a form of *resonance*, as suggested by Sheldrake in his concept of "morphic resonance" (Sheldrake, n.d.)?

How is time encoded, given that experimental evidence has shown that psi information can be acquired with equal ease from different times (Targ, 2012)? If nonphysical data items are encoded with what amounts to *time codes*, a psi retrieval process might access information from any time with some precision. But, data suggests that receivers of psi information may have difficulty specifying the time frame of information they receive (see, for example, Targ, 2012, pp. 61-62), which argues against time codes. In a participatory universe, the storage of information with or without time codes that will become manifest in the future would require some kind of predictive information processing capability. Or are past, present, and future already all encoded, removing a need for predictive information processing (and eliminating free will)?

What type of information is sent via telepathy? One type is certainly *sensory* information, which, as a form of *Shannon information* (Lombardi & Vanni, 2015), is devoid of meaning. For example, the *shape* of a tree. If *meaning* is also part of the message, what *meaning* is received–- that from the sender, that inserted by the receiver, or both? How does *emotion,* which makes for stronger effects, fit into this paradigm?

Is there a limit to *information capacity* of the *expanse of consciousness*? Maharaj noted, "There is enough space in a point for an infinity of universes. There is no lack of capacity" (Maharaj, 1981, p. 250). Did the *information handling capabilities* of the EC evolve? Does the EC also contain all information about itself? Is the *universal mind* of the EC conscious? Is it intelligent?

ACKNOWLEDGEMENTS

The author gratefully acknowledges and thanks the two anonymous peer reviewers for their valuable and constructive review comments that resulted in significant improvements to this article.

REFERENCES

Achterberg, J., Cooke, K., Richards T., Standish L.J., Kozak, L., Lake, J. (2005). Evidence for Correlations Between Distant Intentionality and Brain Function in Recipients: A Functional Magnetic Resonance Imaging Analysis. *The Journal Of Alternative And Complementary Medicine, 11*(6), 965–971. https://doi.org/10.1089/acm.2005.11.965

Amoroso, R.L., Kauffman, L.H. & Rowlands, P. (Eds.) (2013). World Scientific Publishing Co. Pte. Ltd.

Beloff, J. (1985). Parapsychology and radical dualism, *Journal of Religion and Psychical Research*, *8*, 3-10.

Bem, D., Tressoldi, P.E., Rabeyron, T., & Duggan, M. (2016). Feeling the future: A meta-analysis of 90 experiments on the anomalous anticipation of random future events [version 2]. *F1000Research* 2016, 4:1188 https://doi.org/10.12688/f1000research.7177.2

Bohm D. (1980). *Wholeness and the Implicate Order* (1980). Routledge & Kegan Paul. Edition published in the Taylor and Francis e-Library, 2005.http://www.gci.org.uk/Documents/David-Bohm-WholenessAndTheImplicateOrder.pdf

Bohm, D. (1985). *Unfolding meaning: A weekend of dialogue with David Bohm*. Routledge, London.

Bohm, D. (1990). A new theory of the relationship of mind and matter. *Philosophical Psychology*, *3*(2), 271–286. https://doi.org/10.1080/09515089008573004

Bohm, D. & Hiley, B. (1975). On the intuitive understanding of nonlocality as implied by quantum theory. *Foundations of Physics, 5*(1), 93-109. https://doi.org/10.1007/BF01100319

Bohm, D. & Hiley, B. (1993) *The Undivided Universe: An Ontological Interpretation of Quantum Theory.* London: Routledge. https://doi.org/10.4324/9780203980385

Caltech Science Exchange, (2022). What Is Entanglement and Why Is It Important? *Caltech science exchange*. https://scienceexchange.caltech.edu/topics/quantum-science-explained/entanglement

Campbell, J. (1982). *Grammatical Man: Information, Entropy, Language, and Life* Simon & Schuster.

Cardeña, E. (2018). The Experimental Evidence for Parapsychological Phenomena: A Review. *American Psychologist*, *73*(5), 663-677. https://doi.org/10.1037/amp0000236.https://ameribeiraopreto.files.wordpress.com/2018/12/The-Experimental-Evidence-for-Parapsychological-Phenomena.pdf

Carpenter, J.C. (2004). First Sight: Part one, A model of psi and the mind. *Journal of Parapsychology*, *68*(2), 217-254.

Carpenter, J.C. (2005). First Sight: Part two, Elaborations of a model of psi and the mind. *Journal of Parapsychology*, *69*(1), 63-112.

Carpenter, J.C. (2010). First sight: A model and a theory of psi. Mindfield, 2010, 2(3),1-3.https://www.parapsych.org/articles/16/20/mindfield_23_fall_2010.aspx

Chalmers, D. (1995a). Facing up to the problem of consciousness. *Journal of Consciousness Studies*, *2*(3), 200–219. https://doi.org/10.1093/acprof:oso/9780195311105.003.0001

Chalmers, D. (1995b, Dec) The Puzzle of Conscious Experience, *Scientific American*, *273*(6), 80-86. https://doi.org/10.1038/scientificamerican1295-80

Chen, J., Sperandio, I., Henry, M.J. & Goodale, M.A. (2019). Changing the Real Viewing Distance Reveals the Temporal Evolution of Size Constancy in Visual Cortex. *Current Biology*, *29*, 2237–2243. https://doi.org/10.1016/j.cub.2019.05.069

Chopra, (2016, April 5) *How To Stop Being A Biological Robot.* Deepak Chopra. https://www.deepakchopra.com/articles/how-to-stop-being-a-biological-robot

Conway, B. & Tsao, D. (2009). Color-tuned neurons are spatially clustered according to color preference within alert macaque posterior inferior temporal cortex. *Proceedings of the National Academy of Sciences of the United States of America, 106*(42),18034-18039. https://doi.org/10.1073/pnas.0810943106

Davies, P. (2019) *The Demon in the Machine How Hidden Webs of Information Are Solving the Mystery of Life.* The University of Chicago Press. https://www.essra.org.cn/upload/202008/The%20Demon%20in%20the%20Machine%EF%BC%88Paul%20Davies%202019%EF%BC%89.pdf

Dennett, D. (1991). *Consciousness Explained.* Back Bay Books.

Di Biase, F. (2009). A Holoinformational Model of the Physical Observer. *Quantum Biosystems*, *3*, 207-220. In R.L. Amoroso, L. H. Kauffman & P. Rowlands (Eds.), The Physics of Reality Space, *Time, Matter, Cosmos.* (pp. 490-503). World Scientific Publishing Co. Pte. Ltd. https://doi.org/10.1142/9789814504782_0050

Foster, D. H. (2011). Color constancy. *Vision Research, 51*, 674–700. https://doi.org/10.1016/j.visres.2010.09.006

Giroldini, W., Pederzoli, L., Bilucaglia, M., Caini, P., Ferrini, A., Melloni, S., Prati, E. & Tressoldi, P.E. (2016). EEG correlates of social interaction at distance. *F1000Research,* 4:457. https://dx.doi.org/10.12688%2Ff1000research.6755.5

Graboi, D. (2021). Unpublished data from telepathy experiment where sender was asked to focus attention on "something in the room."

Graboi, D. & Lisman, J. (2003). Recognition by top-down and bottom-up processing in cortex: the control of selective attention. *Journal of Neurophysiology, 90*(2), 798-810. https://doi.org/10.1152/jn.00777.2002

Hameroff, S. & Penrose, R. (2014). Consciousness in the universe A review of the 'Orch OR' theory. *Physics of Life Reviews 11*(1), 39-78. https://doi.org/10.1016/j.plrev.2013.08.002

Heisenberg, W. (2007). *Physics and Philosophy: The Revolution in Modern Science.* Harperperennial. (Original work published 1958).

Hiley, B. J. (2006). Non-Commutative Geometry: A Reappraisal of the Bohm Approach to Quantum Theory. In A. Elitzur, S. Dolev & N. Kolenda (Eds.) *Quo Vadis Quantum Mechanics?*. (pp.299-324). Springer. https://doi.org/10.1007/3-540-26669-0_16

Hoffman, Donald D. (2010). Sensory Experiences as Cryptic Symbols of a Multimodal User Interface. *Activitas Nervosa Superior, 52*(3), 95-104. https://doi.org/10.1007/BF03379572

Hwong, Y. (2017, Sept 22). *Attention in Artificial Intelligence Systems.* Cerenaut. https://cerenaut.ai/2017/09/22/attention-in-artificial-intelligence-systems/

Kak, Subhash (2016, October 23). *Understanding The Vedic Model Of The Mind*. Swarajya. https://swarajyamag.com/culture/understanding-the-vedic-model-of-the-mind

Karavasilis, E., Christidi, F., Platoni, K., Ferentinos, P., Kelekis, N.L., & Efstathopoulos, E.P. (2018) Functional Mri Study to Examine Possible Emotional Connectedness in Identical Twins: A Case Study. *Explore: The Journal of Science and Healing 14*(1), 86-91. http://dx.doi.org/10.1016/j.explore.2017.06.008

Kelz, M. & Mashour, G. (2019). The Biology of General Anesthesia from Paramecium to Primate. *Current Biology 29*(22), R1199–R1210. https://doi.org/10.1016/j.cub.2019.09.071

Komatsu H. (1998). Mechanisms of central color vision. Current Opinion in Neurobiology, 8(4), 503-508. https://doi.org/10.1016/S0959-4388(98)80038-X

Komatsu H., Ideura Y., Kaji S., & Yamane S. (1992). Color Selectivity of Neurons in the Inferior

Temporal Cortex of the Awake Macaque Monkey. *The Journal of Neuroscience, 12*(2), 408-424. https://doi.org/10.1523/JNEUROSCI.12-02-00408.1992

Levin, M. (1995). Interactionist substance-dualism and parapsychological phenomena, *The Journal of Religion and Psychical Research*, *18*, 25-31. https://www.newdualism.org/papers/M.Levin/Levin-Interactionism.pdf

Levin, M. (n.d.). *What is the Fundamental Nature of Consciousness? On the contribution of parapsychology to consciousness research.* New Dualism Archive. https://www.newdualism.org/papers/M.Levin/ijp2001b.htm

Lindsay, G. (2020). Attention in Psychology, Neuroscience, and Machine Learning. *Frontiers in Computational Neuroscience*, *14*: 29. Apr 16. https://doi.org/10.3389/fncom.2020.00029 https://www.frontiersin.org/articles/10.3389/fncom.2020.00029

Lombardi, O. and Vanni, L. (2015). What is Shannon Information? *Synthese,* (*193*), 1983–2012. https://doi.org/10.1007/s11229-015-0824-z

Maharaj, N. (1981)[1]. *I Am That Dialogues of Sri Nisargadatta Maharaj.* Chetana Pvt. Ltd. (S. S. Dikshit, Ed.), (M. Frydman, Trans.). First published as *I Am That Talks with Sri Nisargadatta Maharaj.* Chetana Pvt. Ltd., 1973. Online pdf: https://theblisscentre.org/more/ebooks/iAmThat.pdf

Marwaha, S. B., & May, E. C. (2015). The multiphasic model of precognition: The rationale. *Journal of Parapsychology*, *79*(1), 5–19. https://doi.org/10.1177/2158244015576056

Marwaha S. B. & May E. C. (2016). Precognition The Only Form of Psi? *Journal of Consciousness Studies, 23* (3-4), 76–100. https://www.academia.edu/29875455/Precognition_The_Only_Form_of_Psi

Mayer, E. L. (2007). *Extraordinary Knowing: Science, Skepticism, and the Inexplicable Powers of the Human Mind*. Bantam Books.

McCoy, H. (2011). *Power of Focused Mind Healing – A Guide Presented by Harold McCoy*. JTG Publishing.

Mishlove, J. (2016, May 12). *The Apports Of Amyr Amiden With Stanley Krippner* [Video]. YouTube. https://www.youtube.com/watch?v=RUTzjK_GvdA

Mossbridge, J., Tressoldi, P., & Utts, J. (2012). Predictive Physiological Anticipation Preceding Seemingly Unpredictable Stimuli: A Meta-Analysis. *Frontiers in Psychology* 2012;3:390. https://doi.org/10.3389/fpsyg.2012.00390

Paramarthananda, (n.i.) (n.d.). *Basics of Vedanta, Sub Module 7.4: Atma – The Self, Borrowed Consciousness, What Makes The 3 Bodies Look Sentient.* Explore Vedanta. http://explorevedanta.com/vbc-atma-the-self/

Peat, F.D. (1995). *Active Information, Meaning and Form*. fdavidpeat.com.https://fdavidpeat.com/bibliography/essays/fzmean.htm

Pribram, K. H. (1991). *Brain and Perception Holonomy and Structure in Figural Processing*. Psychology Press. https://doi.org/10.4324/9780203728390

Qian, J. & Yazdanbakhsh, A. (2015). A Neural Model of Distance-Dependent Percept of Object Size Constancy. *PloS ONE, 10*(7), e0129377. https://doi.org/10.1371/journal.pone.0129377

Radin, D. I. (2004). Event-Related Electroencephalographic Correlations Between Isolated Human Subjects. *The Journal of Alternative and Complementary Medicine*, *10*(2) 315–323. https://doi.org/10.1089/107555304323062301

Radin, D. (2006). *Entangled Minds: Extrasensory Experiences in a Quantum Reality*. Paraview.

Radin, D. (2017). Electrocortical correlations between pairs of isolated people: A reanalysis [version 1; peer review: 2 approved]. *F1000Research* 2017, 6:676. https://doi.org/10.12688/f1000research.11537.1

Radin, D. I. (2019). Yes, but what is new? *Zeitschrif für Anomalistik , 19* (2019), 67-69. https://www.anomalistik.de/images/pdf/zfa/zfa2019_12_052_marwaha_may_comments.pdf#page=16

Richards, T.L., Kozak, L., Johnson, L.C. & Standish, L.J. (2005). Replicable Functional Magnetic Resonance Imaging Evidence of Correlated Brain Signals Between Physically and Sensory Isolated Subjects. *The Journal of Alternative and Complementary Medicine, 11*(6), 955-963. https://doi.org/10.1089/acm.2005.11.955

Robles, E., Laurell, E. & Baier, H. (2014). The Retinal Projectome Reveals Brain-Area-Specific Visual Representations Generated by Ganglion Cell Diversity. *Current Biology*, *18*(22), 2085-2096. https://doi.org/10.1016/j.cub.2014.07.080

Rosenberg, B. (2021). Precognition. In Kelly, E.F. & Marshall, P., (Eds.), *Consciousness Unbound Liberating Mind from the Tyranny of Materialism* (pp. 89-138). Rowman & Littlefield.

Rosenthal, I., Ratnasingam, S., Haile T., Eastman, S., Fuller-Deets, J.& Conway, B.R. (2018). Color statistics of objects, and color tuning of object cortex in macaque monkey. *Journal of Vision*, *18*(1). https://doi.org/10.1167/18.11.1

Shahriar, S. (2003). *Ultrafast target recognition via super-parallel holography based correlator, ram, and associative memory.* Northwestern University. http://lapt.ece.northwestern.edu/projects/sphocprop/finalprop-julstart-v2.pdfhttps://doi.org/10.21236/

ada478785
Sheldrake, R. (n.d.). *Morphic Resonance and Morphic Fields an Introduction*. Rupert Sheldrake.
https://www.sheldrake.org/research/morphic-resonance/introduction
Stapp, H.P. (1999). Attention, intention, and will in quantum physics," Journal of Consciousness Studies, 6(8/9): 143–164. https://escholarship.org/uc/item/5xr366vq
Stapp, H.P. (2009). *Mind, Matter And Quantum Mechanics Third Edition.* Springer.
https://doi.org/10.1007/978-3-540-89654-8 http://online.kottakkalfarookcollege.edu.in:8001/jspui/bitstream/123456789/3497/1/Mind%2C%20Matter%20and%20Quantum%20Mechanics.pdf
Stillness Speaks (2017, May 24) *Deepak Chopra: The Human Universe.* https://www.stillnessspeaks.com/deepak-chopra-human-universe
Talbot, M. (1992). *The Holographic Universe: The Revolutionary Theory of Reality*. HarperPerennial.
Tart, C.T. (2009). *The End of Materialism: How Evidence of the Paranormal Is Bringing Science and Spirit Together.* New Harbinger Publications, Inc. https://doi.org/10.1080/00029157.2010.10404338
Targ, R. (2004). *Limitless Mind a guide to remote viewing and transformation of consciousness.* New World Library.
Targ, R. (2012). *The Reality of ESP: a physicist's proof of psychic abilities*. Quest Books, Theosophical Publishing House.
The Planetary Society (2020, Feb 19) *Life=Matter+Information: Paul Davies and the Demon in the Machine.* https://www.planetary.org/planetary-radio/0219-2020-paul-davies-demon-in-machine
Tononi, G., Boly, M., Massimini, M., and Koch, C. (2016). Integrated information theory: From consciousness to its physical substrate. *Nature Reviews Neuroscience, 17*(7), 450-461. https://doi.org/10.1038/nrn.2016.44
Utts, J. (2018). An Assessment of the Evidence for Psychic Functioning. *The Journal of parapsychology, 82*(3), 118-146. https://doi.org/10.30891/jopar.2018S.01.10
Weber, R. (1986) *Dialogues With Scientists And Sages: The Search for Unity.* Routledge & Kegan Paul.
Wheeler, J.A. (1989). Information, Physics, Quantum: The Search For Links. *Proc. 3rd Int. Symp. Foundations Of Quantum Mechanics, Tokyo, 1989,.354-368.* https://cqi.inf.usi.ch/qic/wheeler.pdf
Williams, G. (2013). Psi and the Problem of Consciousness. *The Journal of Mind and Behavior, 34*(3-4), 259-284. https://www.academia.edu/68383348/Psi_and_the_Problem_of_Consciousness
Williams, G. (2019). Quantum Mechanics, Metaphysics, and Bohm's Implicate Order. *Mind and Matter 17*(2): 155-186. https://philarchive.org/archive/WILQMM https://philarchive.org/go.pl?id=WILQMM&proxyId=&u=https%3A%2F%2Fphilpapers.org%2Farchive%2FWILQMM.pdf
Zaidi, Q. and Conway, B. (2019). Steps towards neural decoding of colors. *Current Opinion in Behavioral Sciences*, *30*, 169–177. https://doi.org/10.1016/j.cobeha.2019.10.011
Zaidi, Q., Marshall, J., Hanne, T. & Conway, B. (2014). Evolution of neural computations: Mantis shrimp and human color decoding. *Iperception*, *5*, 492–496. https://doi.org/10.1068/i0662sas
Zeki, S. & Marini, L. (1998). Three cortical stages of colour processing in the human brain. *Brain 121* (1669-1685). https://doi.org/10.1093/brain/121.9.1669

APPENDIX: MAIN ASSUMPTIONS OF THE TAM MODEL

1. **Three "Expanses:"** Reality consists of three *"expanses,"* the *"expanse of matter-energy"* (EM), the *"expanse of consciousness / universal mind"* (EC), and the *"expanse of the source"* (ES). These *expanses* are viewed as aspects of an organic whole. Hence the term, *"three-aspect monism* (TAM)."

2. **Experience is in The *Mind*:** The physical body is not capable of feeling. It is the *mind* alone that experiences. If there is a pain to be felt in one part of the body, this information is activated nonphysically in the *mind*, and the specific pain is felt in the specified body location.

3. **Contents of Consciousness:** The *contents of consciousness* is a product of (1) the operation of the brain in the physical *expanse of matter-energy* (EM), (2) the information structure of the total nonphysical *expanse of consciousness* (EC), which includes each individual *mind,* and (3) the energy of the source of awareness in the *expanse of the source* (ES). The result is the dynamic information structure of the *contents of consciousness,* also referred to as the *mind*, which contains qualia-enriched information from perception, information from thoughts, and nonlocal psi information. It is structured by an attention process into most relevant information, given the current contextual situation, and down in current importance to least relevant information, which receives no attention, and is considered the *subconscious* information portion of the *contents of consciousness. Consciousness* is *dimensionless*, existing outside of space and time. It is *informationally associated* with the body of an individual.

4. **Neurological Information:** *Brains* generate *neurally-encoded information* in the form of an *information specification for conscious experience.* Brain-generated information, termed *neurological information,* by itself is not conscious. When acted upon by *pure awareness energy,* the information present in neurological information is assumed to dissociate from the neural structure that generates it, becoming formatted as *pure information.* This information binds with qualia resident in the *expanse of consciousness* (EC) and updates the *contents of consciousness*.

5. **Qualia:** *The expanse of consciousness* (EC) contains information elements called *qualia* which are accessed by the expression of specific brain-generated *nonconscious information.* For example, the "redness of red" is a quale, stored as essentially a "subjective constant" in the EC, which is accessed by humans when looking at light whose frequency is approx. 4.6 THz. In vision, there are specific neurons in the brain that activate when detecting specific colors. Activation of these neurons generate the *neurological information* that specifies the presence of a specific color at a specific location in the visual field. When the *neurological information* dissociates and becomes *pure information,* the quale for the specific color is activated in the EC and becomes bound into the *contents of consciousness* in the *mind* of the individual.

6. **Attention:** Neurologically generated *nonconscious information* is produced by the *neural network activity profile* ranging from the subnetworks which are most active, most important and most relevant to the current situation to the subnetworks which are least active, least important and least relevant to the current situation. The most active subnetworks capture attention, which is a limited resource, while subnetworks with low activity are not attended. The process of attention can be described in terms of a neurophysiological mechanism.

7. **EC-Information** (EC="expanse of consciousness") The *expanse of consciousness / universal mind* (EC) is assumed to store and handle a large amount of nonphysical information. This information, termed EC-information, is accessible anywhere in physical spacetime by appropriately sensitive individuals. Although its format, referred to as "EC-information format," is unknown, it is theorized to be distributed in a way analogous to a hologram, where all the information is available in each small region. Since thought information originating in one brain-mind can be communicated to a different brain-mind, the format of EC-information is hypothesized to be universal and independent of the structure that generated it. The *content* represented by EC-information can have various *scopes of universality* ranging from highly universal as in the case of a geometric shape, to limited universality such as the case of the color ultraviolet which can be seen by some species but not others. Content can include *meaning*, whose scope of universality is relatively very limited, or it can be devoid of meaning. *Awareness energy* from the expanse of the source (ES) transforms information produced in the EM (expanse of matter-energy) into EC-information, which manifests as consciousness in the individual who produces the information, and it becomes a part of the *knowledge base* of the EC.

8. **Hologram Structure of the *Expanse of Consciousness*:** The *expanse of consciousness* (EC) projects holographically into the *expanse of matter-energy* (EM): Like a hologram, every small region of spacetime contains a representation of the totality of information in the EC, which is nonphysical and nonlocal. The EC is based on *information*, and shares many attributes of Bohm's notion of the "quantum potential" in the Implicate Order. This may be conceptualized as a non-electromagnetic field of information that does not change in intensity with distance or obstructions. The hologram may be conceptualized as a block that is everywhere and is full of information that has no discrete location, but is distributed throughout. Each small region of physical space supports instant read-write access to all the information in the hologram. Since all the information is in every piece of spacetime, a change in

one piece instantly affects the entire hologram.

9. **Low Power Information Correlation Events:** Spatial distance is not a factor in the nonphysical EC. Therefore, an energy-consuming physical carrier is not required for psi information correlation events. This allows for telepathic communication of psi information in the EC to require only the small amount of physical energy used to configure the activation profile of the neural networks in the brains of the sender and receiver. Information transfer in the EC is viewed in terms of "correlation," the term used to describe behavior of particles in entangled quantum mechanical systems, rather than "propagation."

10. **Noise-Free Information Correlation Events:** Psi Information correlation among elements is assumed to be noise free, as is the case in uncorrupted entanglement paradigms. Since psi information is rarely reported by a receiver to have high clarity, the loss of quality usually observed must be attributed to factors other than "a noisy channel" – e.g., ongoing information processing activity in the brain-mind.

11. **Bidirectional Correlation of Information:** There is *bidirectional correlation of information* between the brain of an individual in the physical domain (EM) and the information in the nonphysical *mind* of the individual in the nonphysical EC. Information generated in a brain appears nonphysically in the *expanse of consciousness*; and nonlocally acquired information can correlate with the activation of neural subnetworks which generate associated information. Bidirectional behavior is also seen with entangled particles.

12. **Pure Awareness Energy:** The *source of awareness,* originating in the *expanse of the source* (ES), is assumed to be *fundamental,* to operate universally, and to exist everywhere in spacetime. It makes consciousness possible.

13. **Homunculus:** Consciousness is experienced by the *user* (alternate terms: *personal self, person, false self, persona, homunculus*) as distinguished from the *real self*. The *user* of the user interface can be modeled as an information structure associated with a unique high-level context, a unique belief system, which can be fully described mathematically and/or modeled by a complex AI neural network-based system. The *real self* is assumed to be unbounded and indescribable, associated with the source of awareness energy.

14. **Multi-User Connectivity:** The information resources in the EC comprise a multi-user information storage and correlation system. Each individual represents a collection of information in this system, analogous to a URL on the Internet. The EC interfaces with the *information input/output (I/O) of every brain,* providing subjectively experienced conscious information to each *user*, as well as remote psi information under appropriate conditions. When a thought occurs to a *user*, that thought is assumed to be available throughout the EC.

15. **Information has Substance:** *Information* is, in some sense, real, a *substance* that has the ability to cause an effect in the universe, for example, to interact with matter-energy. *Information* has some physical purchase. *Information* joins the list of concepts like space and time originally thought to be intrinsically lacking a dynamics of their own.

16. **Two Components of Consciousness:**There can be no consciousness without awareness, but there can be awareness without consciousness. Awareness is absolute; consciousness is always of something. Consciousness is changeful, awareness is changeless, calm and silent. And it is the common matrix of every experience. Since it is awareness that makes consciousness possible, there is awareness in every state of consciousness (Maharaj, 1981, p.29). Therefore, *two components* are involved in the phenomenon of consciousness, one, the *contents,* can be defined in terms of information, the other, *awareness,* cannot.

17. **User Interface:** Consciousness provides an optimized *user interface.* The feelings and sensory interface provided by consciousness are the basis for decision-making as an integral part of a continuous information processing loop in which the *contents of consciousness* are one step in that loop.

18. **When One Thing Changes, Everything Changes:** Although reality is experienced in three distinct aspects, there is an unbroken wholeness of the entire universe. "Everything affects everything. In this universe, when one thing changes, everything changes" (Maharaj, 1981, p.360). This is the essence of a participatory universe.