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THE SYMBOLOSHERE AND NONPHYSICAL ASPECTS OF THE MIND

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Biosketch

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Abstract

This essay has two parts. Following on the Deacon (1997), the first section argues that human symbolic abilities, particularly as manifest in language, create an invisible, nonmaterial domain in which we live. This domain is called the symbolosphere, and it affects our lives as profoundly as do the physiosphere and biosphere. In the course of cultural evolution, technologies developed to amplify the symbolosphere (writing, print, radio, television, telephone, telegraph, fax, the Internet, etc.). The symbolosphere has downward causation on the human biological organisms from which it emerged. This causation is illustrated in examples from science, religion, psychotherapy, and linguistic phenomena such as blends. Finally, it is hypothesized that the symbolosphere is actually what has traditionally been thought of as mind.ⁱ The second part of the essay examines nonmaterial aspects of the mind and suggests some ways in which the brain generates these nonphysical entities.

Sign relationships

The symbolosphere¹ is the world of relationships among signs. In order to understand how it evolved and how it works, we have to begin with a short account of Peirsean sign theory. Charles Sanders Peirce (1992) developed a theory of mind based on a distinction among three types of signs: icons, indexes, and symbols.

Icons

We are born in an unlabeled world, and the first step in the evolution of signs involves carving up the world into distinct entities. Basic icons are categories that an organism discerns in the world (for example tokens of trees, rocks, other organisms, the sky, water). The second relationship maintained by icons is identity. A tree is a very good icon of that same tree. A similar tree could also serve as an icon of that tree. Thus category tokens, identity, and similarity can constitute iconic relationships. I say "can" because such relationships are only iconic if there is some interpretant (such as a person) who takes them to be iconic.

¹ Hoffmeyer (1996) makes a distinction between the semiosphere which includes icons, indexes, and symbols and the strictly symbolic world which he calls the symbolic semiosphere. Here I refer to the symbolic semiosphere as the symbolosphere.

Indexes

An indexical relationship is one involving reference, pointing, association, indicating, naming, or labeling. For example, smoke can be taken as an index of fire. For Pavlov's dog, a bell would be an index for food, and the dog's salivation would be an index to Pavlov that the dog had been successfully conditioned. Under conventions established for traffic lights, the color, yellow, indexes caution or danger. Words are frequently indexes referring to the things in the world--book, car, cell, magnesium, synapse etc. Thus, an index is something (i.e., a sign) that refers to something else, and is frequently associated with that thing temporally or spatially.

Figure 1 may help distinguish between icons and indexes. The figure comes from a pamphlet inside a box of chocolates that I bought in Paris. Each piece of chocolate in the box had a particular sign on it. Thus each picture of a piece of candy that you see in the figure is an icon. It is a representation (i.e. a sign) that closely resembles the chocolates themselves. If however, we take a sign that is on one of the pieces of chocolate and write it on the blackboard then it becomes a sign that is an index of a particular flavor of chocolate.

Place figure 1 here

Symbols

A symbolic relationship is one in which a sign refers to something else, but that something else is another sign. This is a very important distinction. Within the framework Peircean semiotics, symbols do not refer to physical things in the world; they refer to other sign relationships. I previously mentioned that a word could refer to something in the world. For example the word "book" can be taken to refer to a copy of *War and Peace*. But the word, book, also carries implicit reference to similar words, for example, manuscript, volume, tome, edition, pamphlet, textbook, magazine. A word is frequently interpreted to have a web of relationships with other words as is illustrated an entry in a thesarus (Deacon, 1997). However, all the examples in the "book" referential network are physical items in the world. Therefore, the word "book" can be seen as an indexical symbol -- it refers to something in the world, and it to refers to other words (signs). But consider the word, "motivation". This word has no physical referent in the world. We understand it largely via its relationship to other words, for example, intention, incentive, desire, goal, reward, approach, action tendency, wanting, emotion, arousal, valence.

Predication constitutes another kind of symbolic relationship. A predicate, however, must be grounded by an indexical reference. So in the utterance, "Fido is a dog," Fido is an index (it refers to a particular dog) about which a symbolic relationship (is a dog) is predicated. In the utterance, "The rose is red," "is red" is a symbolic predication referring to the index "rose" (the word) which refers to the rose itself, which of course then would be an icon by the relationship identity (Deacon, 2003).

More complicated forms of predication operate in the same way. Take for example the utterance: The Holy Spirit is the third person of the Trinity. Here the predicate "is the third person of the Trinity" is in a symbolic relationship with the words "Holy Spirit." However, as indicated above, the symbolic predicate must be grounded in an index. The index here is "Holy Spirit", but this term does not refer to some physical thing in the world, it refers to a religious concept that by consensus of believers has an unambiguous referent, but only to believers. Thus we see that some indexes have as their reference entities that may not be recognized by a other users of the symbolic system. Some indexes then have reference to nonphysical entities via convention and consensus brought about by socialization, enculturation and education.

In the study of second language acquisition, there is the concept of "integrative motivation" which is taken to mean the desire to learn of foreign language in order to interact with, get to know, and perhaps become like speakers of that language (Lambert & Gardner,1974; Gardner, 1985; Schumann, 1997). As previously mentioned, the word " motivation" has no physical referent in the world. It refers to other lexicalized concepts such as intention, goal, desire etc. It can be further elaborated by modifiers such as intrinsic, extrinsic, instrumental, integrative, value-expectancy, etc. Therefore, the term, "motivation," can only be indexicalized by consensus among individuals using the term, and anything that is symbolically predicated of that term, to be considered true, would have to conform to that consensus.

The Symbolosphere

In this paper, I take the position that oral language is an invisible, nonmaterial cultural artifact/technology (Lee & Schumann, 2003; Schumann, 2003). Words evolved with the concatenation of particulate sounds, and utterances evolved with the concatenation of words. When a sufficient number of hominid agents interacted with a set of sounds in order to make reference to the world, words emerged and those that were efficiently producible, comprehensible and learnable were retained. When words were strung together in utterances to make larger referential meanings, those sequences of words that were efficiently producible, comprehensible, and learnable were retained. By this process -- hominid agents interacting with each other with a set of sounds that can be combined into an infinite set of words which then can be combined into an infinite set of utterances -- language evolved, i.e. emerged (Christensen & Chater, 2016). But more than just a language emerged, what developed was a symbolosphere -- a set of relations among words that is as real as the inorganic physiosphere and the organic biosphere.

See figure 2.

Place figure 2 here

In the course of cultural evolution, various technologies developed that amplify the symbolosphere. The first was language itself. The second was writing which made physical what had previously been a nonphysical and invisible cultural creation (i.e. oral language). The symbolosphere was further amplified by print, later by broadcast media (radio, television etc.), telephone, telegraph, fax, the Internet. See Figure 3. Now the symbolosphere has been so amplified that what occurs in one part of the world is practically simultaneously broadcast to other parts of the world. Humans seem to crave technology which will enhance their ability to interact with conspecifics or to observe interaction among conspecifics. The adoption of cellphones everywhere they have been introduced is an example of this interactional instinct. Thus, the symbolosphere which began with oral language, now has material visual components (writing, print) and massive technological enhancers (visual and auditory). We live in this symbolosphere, and it affects us as powerfully as the biosphere. Metaphorically, we can see ourselves as having storms in the symbolosphere, droughts in the symbolosphere, and battles in the symbolosphere. The symbolosphere has such a powerful influence on our lives that we attempt to control it in the same way we might attempt to control and defend ourselves from the weather in the biosphere.

Finally, in the symbolosphere, where words refer not only to things but also to other words, it is possible to create a virtual world that has no physical reality but which we inhabit as profoundly as we do the physical biosphere. In Terence Deacon's (1997) words we are "the symbolic species," and the symbolosphere is our econiche.

Downward Causation

Religion

We have argued that symbolic relationships form a sphere of existence which humans inhabit. And just as the biosphere influences our lives so does this symbolosphere. A simple example demonstrates how the use of a word to name something can produce a sensory experience. Once my cousin, a wine auctioneer, gave me a glass of cabernet, asked me to taste it and then inquired what flavors I detected in it. To me it just tasted like wine. But then he suggested that the wine might have the taste of green peppers. As soon as he said that, I could taste green peppers. There were no green peppers in the wine. And therefore, for me, the taste was a product of the downward influence of indexical symbol, the word "green peppers."

Religion provides a powerful example of the symbolosphere's downward causality. This can be illustrated by choosing a religion in which you do not believe and examining its symbolic constructs to see how they affect people's daily lives. Let's take Roman Catholicism for example. In this religion, the words "ego te baptisto" (in Latin or any

other language) when spoken by a priest making the sign of the cross on an infant's forehead will ensure that infant will become a member of the body of Christ, and if the child were to die, he or she would be united with God in heaven. In fact, if the child is in danger of death, those words may be said by a layman with the same effect. This was particularly crucial at the time when the Catholic Church maintained the symbolic construct of limbo. Were the child to die without being baptized, he or she would be unable to enter heaven and would remain eternally in limbo. Now whether one is a Catholic or not, one can see how limbo existed only in the symbolic world as a product of Catholic teaching and belief in the notion by the faithful. The fact that the Catholic Church has abandoned the notion of limbo is also evidence of its symbolic character. However, when limbo was still a matter of Catholic belief, it affected the believers' lives because they would make every effort to have the child baptized early, or in the case of an ill child, to have it baptized immediately. Here we see people's lives being affected by something that does not exist except in the symbolosphere.

Catholics also believe that having confessed their sins to a priest, his words "ego te absolvo" (in Latin or any other language) brings forgiveness for those sins from God himself. The sacrament of confession requires the concept of sin, and people are expected to behave such that they do not commit sin. When they do, they must make efforts to get to confession and receive forgiveness in order that, in the case of mortal sin, death would not bring them an eternity in hell. At one time, eating meat on Friday

was considered a mortal sin, and if one were to commit this sin and die without forgiveness, eternal damnation would ensue.

In the Catholic mass, the words "Hoc est enim corpus meum," are believed to be part of transubstantiation by which bread and wine become the actual body and blood of Christ. The body and blood of Christ is then consumed by the faithful as communion. But in order to be worthy of communion, one must not have committed a mortal sin or must have confessed it and received forgiveness and must have performed the penance given by the priest. Once again, to the nonbeliever, the construct, transubstantiation, only exists in the symbolosphere, but it nevertheless controls the lives of the faithful.

Now I have used the eyes of the non-Catholic (a more generally someone who does not believe in the Catholic religion) to illustrate how constructs in the symbolosphere have downward causal influence on our lives. However, we have to remember that, for the believing Catholic, what we have described as strictly symbolic relationships, are actually indexical truths.

Mourning practices also provide a view of the symbolosphere's influence on human lives. Our belief in the necessity to show sorrow and respect for the dead (which is linked to notions of heaven and the afterlife) also takes on strong social obligations. Behaviors of those in mourning are illustrated in the following excerpt from Edith Wharton's (1925, 1986), *The Mother's Recompense*.

"Inwardly, Kate was recalling the inexorable laws which had governed family affliction in the New York to which she had come as a bride: three crape-walled years for a parent, two for sister or brother, at least twelve solid months of black for a grandparent or aunt, half a year (to the full) for cousins, even if you counted them by the dozens... As for the weeds of widowhood, they were supposed to be measured only by the extent to the survivor's affliction, and *that* was expected to last as long, and proclaim itself as unmistakably in crape and seclusion, as the most intolerant censor in the family decreed -- unless you are prepared to flout the whole clan, and could bear to be severely reminded that your veil was a quarter of a yard shorter than cousin Julia's, though her bereavement antedated yours by six months" (p. 49).

Psychotherapy

Psychotherapy, the talking cure, to the extent that it is successful results from the symbolic (i.e., linguistic) interaction between the patient and the therapist. This symbolic work can generate a therapeutic relationship in which unproductive behavior and thought patterns can be identified, worked through, and ultimately be changed. The words used in the therapy as well as other symbolic behaviors can actually alter the patient's nervous system.

Blends

Fauconnier & Turner (2002) have studied the how elements from the linguistic symbolosphere can be blended to create nonexistent events. One of their classic examples, involves a virtual regatta. In 1853 a clipper ship sailed from San Francisco to New York in 76 days, 8 hours. In 1993 a catamaran made the same voyage. Toward the end of the catamaran's trip, it was reported that it was 4.5 days ahead of the clipper ship. In this way, a race was created that never took place. Because the symbolosphere is, to a large extent nonmaterial, virtual worlds can be created in which people can engage. Conceivably, it would have been possible to make wagers on which vessel would win. Money could be won or lost. Lives could change.

The recreational virtual regatta is a playful example, but other blends are more serious. In the November 12, 2003 *International Herald Tribune* vice president Dick Cheney is quoted as saying on October 17th, " 'Since Sept. 11th, the terrorists have continued their attacks in Riyadh, Casablanca, Mombassa, Bali, Jakarta, Najaf, and Baghdad. Against that kind of determined, organized, ruthless enemy, America requires a new strategy -- not merely to prosecute a series of crimes, but to conduct a global campaign against the terror network' "(p. 4). Here Cheney blends Al Qaeda activities with both Saddam Hussein's activities in Baghdad prior to the American invasion and Iraqi insurgent activities after the invasion. This blending is one part of the battle that took place in the symbolosphere of American domestic and foreign policy. The association between Al Qaeda and Iraq was the issue in this symbolic battle. If Cheney and like-minded

colleagues could convince a sufficient number of Americans of the association, then the administration will be given a warrant for military action abroad and for domestic security activities that would be difficult, if not impossible, to implement if majority were unconvinced.

Mind

There appears to be a tendency for even the most convinced reductionists to slide towards dualism. Scientists who believe that the mind is the brain, nevertheless, frequently talk about the mind as though it exists in some way beyond the brain. I frequently hear biological psychiatrists, for example, who are grounded thoroughly in neuroanatomy and neurophysiology, talk about the mind when they are not referring specifically to the brain. At one level, we might see this reference to the mind as simply a fall back on earlier conceptions of mental life, but in fact, I would like to suggest that reference to the mind continues because there is implicit recognition that aspects of mental life take place, not only in the physical brain, but also in some nonphysical medium. Could this mind actually be the symbolosphere?

Emmanuel Schegloff, the famous conversational analyst, once said that people have brains and what occurs between those brains in conversational interaction constitutes mind. Now what exists in conversation is symbolic reference among individuals. It is indeed the symbolosphere. Mind then may exist, at its primordial level, in symbolic interactions between and among brains.

We all have the experience of solving a problem, getting ideas, or, being able to think in different ways as a product of conversations or discussions with others. We also have the experience of solving problems, getting new ideas, and making associations when we have internal dialogues, i.e., when we have conversations with ourselves. In these cases, cognitive work is taking place in symbolic exchanges in which words refer to the world and also refer to other words. We are using, in these instances, the nonmaterial and invisible elements of the symbolosphere to think. Beyond that, we may use other technologies of this symbolosphere to amplify those thought processes. For example, we often find that when writing, we produce ideas that we did not think we had prior to the writing. Additionally, having written something, it exists in the physical form as an external memory which can be referred to later and then further manipulated in dialogue or monologue to elaborate thought. Mind, then, is the amplification of cognition via manipulations of symbolic reference within the symbolosphere. From this perspective, there is mind beyond the brain.

Nonphysical aspects of mind

I have suggested that the symbolosphere may constitute, at least, part of the mind. There is general agreement that the brain is complex and far from fully understood. Therefore, it is mysterious, and it will require decades to unravel its structure, processes, and functions. On the other hand, there seems to be less mystery about the mind. The term is often used without any attempt to describe it. But whereas we know

where the brain is, and we can point to it, where would we point if we wanted to indicate the location of the mind? I have colleagues who believe that the mind is the brain, so they would simply point to the head. But this wouldn't work for scholars who believe that the mind is not just what's inside the skull, but that it also extends to the body and the environment, including interaction with other brains via a powerful symbolic communication system, language. In other words, the mind is at least, the physical brain, body, physiosphere, biosphere, and the symbolosphere.

The distinction between mind and brain is far from settled. A larger number of cognitive scientists now maintain that the brain is embodied and thus works in conjunction with the body through the autonomic nervous system, the musculoskeletal system, the endocrine system, the digestive system etc. In addition, this embodied brain is embedded in the world such that it functions in conjunction with aspects of the physiosphere, the biosphere, and the symbolosphere. In this paper, I propose that the human brain can create and process nonmaterial entities, and these entities are symbolic relationships in which signs (words) get their meaning from their relationship with other signs.

Extended Mind and the Bounded Brain

The hypothesis of the extended mind (EM) (Clark and Chalmers, 1998) was developed as an antidote to the notion of the Bounded Brain (BB). This adjustment has required justification of the notion of "extended". The concept of the extended mind perhaps comes from making the implicit equation of the mind with the brain and then having to go beyond the brain. The problem might be ameliorated by making "MIND" the superordinate entity and then specifying its components. I would suggest that the mind is composed of the brain, the body, the parts of the inorganic physical world (the physiosphere), parts of the organic biological world, the (biosphere), non-material

aspects of the symbolic world (the symbolosphere), and the material entities (e.g. artifacts, technologies) that have come out of this symbolic world. Now nothing has been extended. This mereological move creates one thing with several parts.

The extended mind seems to be the mind as embedded in the brain and then extended from it. Making the brain part of the mind eliminates the need for extension. The external components of the mind are mind; and an internal component of mind is the brain. But as my colleague Leon Somes says "no brain, no mind." Actually because of our symbolic abilities, the mind supervenes on the brain, but it remains true that if there is no brain there is no mind.

Robert Logan (2010) has done some very important work on the relationship between mind and language. He conceptualizes mind as Brain + Language. Following McLuhan (1962), he distinguishes between percepts and concepts. In Logan's program, humans were initially only capable of percepts which are impressions of objects and events in the world made through the senses (vision, audition, olfaction, touch, and taste). The percepts are of concrete physical entities in the external world.

But as hominid life became more complex, percept-based cognition was inadequate, and there was a shift to conceptual thinking. This form of ideation allowed the formation of superordinate categories for classes of percepts. Concepts developed that were abstractions over classes of perceptual entities and the relations among them.

Logan argues that concepts and language evolved simultaneously under pressure for a vehicle to express and share the concepts. Words were such vehicles and grammar emerged from efforts to combine words into larger meaning bearing utterances.

An important aspect of Logan's work is his framing of language evolution within a dynamic systems perspective. He sees the split between percept and concept thinking as a bifurcation resulting from punctuated equilibrium. Words become attractor states; indeed, they constitute strange attractors because the meanings of the words can differ in different contexts. Words have, "multiple, even ambiguous meanings, or multiple simultaneous perspectives" (p. 85). Mathematics tries to avoid such ambiguity by developing precise definitions and such mathematically-based scientific terms approach fixed-point attractors where much ambiguity is avoided, but not completely; a degree of fuzziness always remains. But word-based meanings used in the context of the social sciences and in the humanities have much greater fuzziness by their very nature.

Logan argues that language and conceptual thought emerged as an autocatalytic process. In other words, they self-organized as their interaction "catalyzed each other's existence" (p.83). Because of the processes involved in complex systems (autocatalysis, self-organization, emergence), Logan argues that it is not necessary to postulate an innate basis for syntax.

It would appear that a remarkable thing about the human brain is that it is a physical organ that, in interaction with other human brains, can create a nonphysical environment, the symbolosphere, consisting of ideas, ideologies, idealizations, concepts, conceptualizations, theories, and unreal worlds. Some of these are nonexistent entities or fictions, but they are symbolic constructions as described in the symbolosphere, and they have effects on the physical brain and on the behavior of humans.

Thus, one of the characteristics of the physical human brain is that it has the ability to produce and process nonphysical entities. Words such as obedience, convenience, dominance, patience, temperance, suspense, indifference, offense, are both abstract and refer to nonphysical concepts. These concepts seem to be abstract categories under

which many different entities may fall. It would appear then that abstract nonphysical entities would not exist without language. One way the brain, working with the language, generates nonphysical things is by naming individual entities, which may be physical or nonphysical, producing a label for a superordinate category that refers to all of them. It then, of course, becomes possible to create labels for categories of categories. So, the physical brain produces something nonphysical by abstracting from tokens of things to types of things. And as soon as we get to these abstractions we can leave the material world. Another way is to imagine nonexistent things and to label them (e.g. zombies, unicorns, ghosts, spirits, gods, dragons, and events such as mythical worlds, lands, life after death, superstitions, etc).

It might be argued that, if it is the physical brain that creates and processes these entities, then those productions are physical. I would suggest that the brain physicalizes the entities, but that does not make them physical. Word forms and meanings will be nonmaterial, but when they are spoken, they are processed as articulatory gestures in the physical vocal tract that have been processed previously in the physical brain and then processed in the brain of a hearer. This constitutes extensive physicalizing of the word and its meaning. But if the word does not have a physical referent in the world (i.e., it is a nonphysical conceptualization which is frequently modified and passed from brain to brain), it is continually physicalized but never becomes physical.

The nonphysical conceptualization is maintained in some form in spite of its extensive physicalizing (i.e. processed in physical brains). The physicalizing is a constraint on the nonphysical word meaning and provides it with some stability (unlike a dream), but still allows the meaning to evolve.

Non-reductive Physicalism

Does the notion of the symbolosphere that can be nonphysical and exist with the brain that is physical constitute dualism? In some circles, it would appear the dualism is equivalent to an intellectual and moral deficit. I myself am not troubled by the idea (see

Logan & Schumann, 2005) because you can't have the symbolosphere without the biosphere and the brain. But when the brain developed the capacity for symbolic reference and could produce nonmaterial entities, the change may have been one aspect of the human spark, one aspect of humanity that makes us strikingly different from our primate relatives.

The philosophical concept, non-reductive physicalism, offers a way for us to understand how nonmaterial entities can have physical sources while at the same time not be reducible to physical structures (Murphy, 2013). The mind is composed of the brain, the body, the physiosphere (including the biosphere), and the symbolosphere. Life (the biosphere) came out of the physiosphere and the symbolosphere emerged from the biosphere when we became capable of symbolic reference and language (Deacon, 1997). The symbolosphere is, at least in part, composed of nonphysical concepts, conceptualizations, ideas, ideologies, and idealizations, and it can exert downward influence that affects physical and biological processes. Thus, the emergent structures of the symbolosphere can influence which physical processes will apply in a particular situation (Murphy, 2013).

An important aspect of non-reductive physicalism is the notion of complexity. As Diane Larsen Freeman (2017) has pointed out, complex systems can generate emergent properties with the ability to have downward influence on the physical structures from which they come. We've argued that the symbolosphere emerged from the physiosphere and the biosphere when humans developed the ability for symbolic reference and language. And as was argued in the first part of this discussion, the symbolic abilities allowed nonphysical entities to have descending influence on the brain and the body. So, the mind can have nonphysical components that emerge from the physical but are not reducible to the physical. This framework is then philosophically situated within the school of non-reductive physicalism (Murphy, 2013). Thus, to understand the mind, we have to move from notions of mechanisms and aggregates to

relational properties of complex systems which can influence the physical components of the mind---the brain and the body (Murphy, 2013).

Mental institutions

Another reason that the mind extends beyond the brain and cannot be reduced to the brain is that brains interact with other brains creating conceptualizations that cannot be assigned to an individual brain let alone to any area or circuit that brain. For example, suppose a scientist, scholar, or comedian came up with the new concept, "loshpost", and a neuroscientist was able to demonstrate that that word was processed in X area or Y circuit in the brain. Does that mean the concept came from X the Y parts of the brain? It actually might mean the opposite. The concept may have become subserved by reusing a part of the brain which was previously the substrate for other entities. The concept may actually have gone into the brain rather than out of it.

Would the fact that this symbolic concept is processed by the brain make the concept physical? Is the firing of some neurons in X and/or Y the actual concept or is it the physical response of the brain to an environmental stimulus? Brains process all relevant features of their environments, and the human brain will respond to abstract nonphysical entities in the human's environment. One reason for this is that humans have language and can express symbolic relationships in an acoustic form to which related areas/circuits of the brain will respond. One might say that the responses in X and/or Y are physical vehicles for the concept, but not the concept itself (See, Favareau below).

In an important extension of this idea, Gallagher (2013) argues that the extended mind is instantiated in various "mental institutions" (p.3). These are social/cultural institutions such as legal systems, educational systems, museums, and libraries. Gallagher focuses on legal systems where interacting brains of many individuals develop principles that

govern what is contained in various kinds of legal contracts. I would argue that the contract, typed and consigned, constitutes a physical entity. But the principles on which it is based are not physical. They are ideas/concepts that have been generated by multiple brains acting orally and in writing, often over generations. The contracts produced place constraints on how we can behave in relation to each other. These constraints emerge from many brains, and they influence the behaviors of many people.

The legal principles also constrain the ways our brains make judgments and decisions. Gallagher (2013) observes, "a judgment made in such contexts [a legal system] is a form of cognition that supervenes on a large and complex system without which it could not happen. Indeed, it's a cognitive practice that in principle could not happen just in the head" (p. 6). In terms of the position taken in this paper, the judgment is based on the "large and complex system" (p. 6) of legal principles that are not in the head and therefore not physical.

Intentionals, Absentials, Constraints

Terrence Deacon, in two very important books, *The Symbolic Species* (1997) and *Incomplete Nature* (2012, 2013), characterizes how sign-sign relationships allow the construction of non-physical symbolic entities (Deacon, 1997), how the inorganic physical world produced the conditions for the organic biological world (life), and how the nonphysical aspects of mind emerged from these physical entities. In this work, he has introduced several concepts: intentional phenomena, absential phenomena, and constraints. The word "intentional" is derived from but is also distinct from the word "intentional". He defines "intentional" as a generic adjective to describe all phenomena that are intrinsically incomplete in the sense of being in relationship to, constituted by, or organized to achieve something non-intrinsic" (27). It constitutes "a fundamental

relationship to something absent"(27). The following list includes the sorts of entities that Deacon would consider absentials:

"A state of things not yet realized, a specific separate object of representation, a general type of property that may or may not exist, an abstract quality, an experience, and so forth – just not that which *is* actually present, an experience, a purpose not yet actualized, a quality of feeling, a functional value just discovered (3), meanings, purposes, consciousness, value [having emotional or motivational significance] (2), function, something-not-there that permeates and organizes what is physically present (9), intended goal, any intentional and teleological properties (10), absent referents, unrealized goal, abstract values (11), something not-quite-realized, something not-quite-actual (19), a final cause, motivations (21, 22), something that is 'four-the-sake of' something else, desires, beliefs, sentience, reference, design, self, subjective experience, attributes often associated with mental states (38)".

A good example of Deacon's notion of absential is the concept "zero". Its meaning, "nothing," refers to a nonphysical entity. That entity can be physicalized by the numeral "0" or the word, "zero", but neither 0 nor the word is the concept, zero. The concept is nonmaterial, nonphysical. Another entity that is nonphysical is a unicorn. The unicorn is nonphysical because no such thing exists, but it can be physicalized by a drawing of a horse or a statue of a horse with a single horn in the middle of its forehead. All the gods of the Greek pantheon are nonphysical because they didn't/don't exist, but they did have influence on how people thought and how they behaved. Indeed, for atheists God is nonmaterial because for them no such entity exists. Even among believers, God (the Father) is a nonphysical spirit, but believers think and behave according to what they think God demands.

Word meanings are nonmaterial although they may refer to material entities. For example, the word "shovel" refers to something physical but its meaning as captured in

the dictionary definition of "shovel" is not physical (Deacon 2012, 2013) although the words in the definition have been physicalized in the printed words of the dictionary definition in the dictionary. A picture of a shovel is a physical representation of that tool, but it is not a shovel. Interestingly the definition of a shovel in the Webster's Seventh New Collegiate Dictionary (1972) is accompanied by pictures of shovels, probably with the realization that the words in the non-physical definition of shovel would not make it clear what a shovel is.

A very clear case for the non-physicality of meanings comes from abstract words. For example, the concept "duty" is not material/physical. To understand the meaning, one may need many examples in many contexts or a definition that would be in words that refer to other words. These words are not "duty"; they are a set of signs that are necessary to explain the nonphysical concept. The same is true for other abstract words such as "dignity," "interest," "salience," "freedom," etc. In Campbell (2012), Deacon explains that words can influence people's thinking and behavior, but "it's not because of anything physically or energetically there in words. It's actually about stuff that's not there. What will have an influence in the world is the meaning, the significance, the surprise value; all of these features that come with our talk, our words, our concepts, our thoughts (14)." "I also don't think that thoughts are in the head. I think that neural activity is in the head, but I don't think that thoughts are, in the sense that there is some stuff or energy there. It's like words on a page; the words on a page are not what matters, the words on the page *convey* [my emphasis] what matters. (14)." He continues, "what matters is not something physical, chemical, energetic. What's so surprising is that, despite the fact that these kinds of things don't have the physical characteristics that should, according to our current theories, cause things to happen – they don't have those attributes – nevertheless they're remarkably powerful and important, once you get living and mental processes in the world (14)."

Scholars studying the lexicon make the distinction between concrete and abstract words. They see concrete words as referencing physical entities in the world that can be perceived by the senses. Abstract words are understood by their association with other words. Therefore, abstract words may refer to things that are real but that don't have physical referents. This distinction corresponds roughly to the distinction between indexes and symbols. but the situation can be a little more complicated. Abstract entities can have physical referents. For example, the superordinate category "furniture" refers to physical things, but one can't point to furniture in general. One can point to instances of furniture (table chair Ottoman), but these instances do not constitute the whole category. but other abstract words refer to entities that are not physical (law, education, love, communism, duty, mediocrity). So, the human brain is capable of generating and processing abstract words that have physical reference and abstract words that refer to nonphysical entities. Without making the distinction between physical abstractions and nonphysical abstractions, it becomes difficult to identify the nonphysical elements of the symbolosphere and thus the nonphysical elements of the mind.

Symbol Grounding.

The biosemiotician, Donald Favareau (2015), further investigates the notion of symbol. He explains that icons that get associated with other icons become indexes indicating things in the world. For example, smoke can index fire, war, cigarettes, a dirty engine, cooking, or incense etc. Smoke as an index of fire can become an index of hell which gets its meaning from abstract concepts such as God, eternal damnation, punishment, suffering, and hell becomes a symbol.

Favareau notes that icons and indexes relate to material objects in the world. Symbols relate to nonmaterial imputations: words that refer to other words for their meaning. For example, "motivation imputes (i.e., lays responsibility for, credits, attributes to, credits by transfer, grounds in) goals, motives, drives, rewards etc.

Favreau citing Deely (1990, 2001, 2015) notes that animals interpret objects and situations as desirable, undesirable, or safely ignored. But abstract symbols such as marriage or capitalism are "always simultaneously imputed to be desirable, undesirable and safely ignored all at the same time." (p. 251). Thus, symbolic relations are grounded in imputation, indexes are grounded in association, and icons relate to qualities of an object.

Icons and indexes have their grounding in the physical qualities and facts of the world outside the brain, but symbols do not have a purely physical grounding. Human symbols are grounded in human interaction and are maintained by a community/culture. Individuals may vary in what they impute to a symbolic term. Let's take "communism". It is an abstract symbolic term that can take numerous different attributions. Favreau argues, "such is the case with almost all of our culturally embedded symbols: "God", "mind", "similarity", "friendship", "trust", "science", "beauty", "justice", "self", "good", "wrong", "again", "nothing", "being", "time" – all of which we can talk about with one another reasonably enough, without ever being able to converge upon a single predicated definition that captures their essential meaning, or ground." (p. 252). Thus, "the 'ground' of symbolic reference in a sense *depends* on such symbols never unilaterally resolving into a single, fixed, intellectual entity or concept." (253). A symbol points to web of sign relations, not to an external referent.

The ground or grounding for a symbol is not a concrete entity from which the symbol develops. Symbols are in the minds of their interpretants in the form of propositions. Arguments about the propositions arise in communities of interpretants, and they have a history. Brains interacting with other brains ,elaborate the symbol propositions, develop them, and carve them to fit different conceptualizations. This process allows symbols to grow into symbolplexes with the different understandings being maintained at one time (synchronically) and overtime periods (diachronically). This historical

dimension permits symbols to develop and to potentially create new knowledge. But an ultimate interpretant may never emerge and indeed should never be expected. Final answers and final understandings are possible in the physiosphere and the biosphere, but they are not characteristic of the symbolosphere.

Conceptual metaphors

Returning to the issue of physicalization, the question we have to understand is how the physical brain can produce nonphysical concepts. George Lakoff (2014) offers insight into this question with his examination of Conceptual Metaphors (referred to above). He argues that bodily experience in the world allows the production and understanding of conceptual metaphors. Love is an abstract entity. The brain construes it by associating it with physical aspects of the world. Following Lakoff, Evans (2015) discusses this in terms of primitive conceptual metaphors and complex conceptual metaphors that humans derive by way of our embodied brains' experience in the physical world. The "love" concept is understood in terms of three metaphors: the physical container metaphor (He is in love. Mary fell out of love.), the physical force metaphor (She couldn't resist his love. She refused his love.), and the physical journey metaphor (We're at a crossroads. We're stuck in a rut. Their relationship is on the rocks).

Lakoff (2014) argues, "the division between concrete and abstract thought is based on what can be observed from the outside. Physical entities, properties, and activities are "concrete." What is not visible is called "abstract:" emotions, purposes, ideas, and understandings of other non-visible things (freedom, time, social organization, systems of thought, and so on). From the perspective of the brain, each of these abstractions are (sic) physical, because all thought and understanding is physical, carried out by neural circuitry. That puts 'concrete' and 'abstract' ideas on the same basis in the brain. " (p. 7).

So love is an abstract entity. The brain construes it by associating it with physical aspects of the world (container, force, journey). Humans derive these metaphors by way of our embodied brains' experience in the world. And the metaphors are produced and processed on neural circuitry. But does processing something on neural circuitry make that thing physical? As discussed above, another way of looking at the issue might be that the physical human brain creates, processes, and uses non-physical entities by physicalizing them, i.e. by construing them in terms of experience in the physical environment. When a nonphysical entity becomes physicalized, it does not mean that it has become physical; it has merely been redescribed or restructured using mental concepts that are metaphorically derived from the physical world. It would appear that language is required for this physicalization. By virtue of processing by the human brain which is integrated with a symbolic system, language, a nonphysical abstract entity becomes understood through the physical (love becomes a container, a journey, a force). Or a physical entity becomes an abstract nonphysical entity. Many mental states which we experience physically get classified under a superordinate abstract word. For example, fear, happiness, depression, love, jealousy, envy, and passion, longing, are collectively labeled emotions.

Evans (2015) presents an illustrative vignette about the frustrations of a computer user. The computer is physical. The user is physical. But the qualia of this frustration (an emotion), and the concept of "frustration" itself, are felt by the biophysical body and brain, the concept itself is not physical. If the user recognizes that the feeling is what his society calls frustration, then he is processing an abstract construct which is derived from his physical experience, conceptualized by a culture, encoded in language. It is thus a nonphysical entity that is underpinned at every step of the way by a physical body and brain, but not reducible to the physical.

One might argue, that the entity/phenomenon discussed here is so dependent on the physical world, why don't we simply consider it physical? Well, if we want to

understand how humans are different from other animal species, including our closest relatives, the apes, then the human ability to derive nonphysical entities from the physical brain, body, and world may be one of the dozens of ways that we differ from animals. Understanding our brain's ability to produce and to process nonphysical entities may help us understand humanity, and it may help us understand (rather than dismiss) the humanities and the arts that make up so much of the human world.

How does the brain produce nonphysical entities?

Neural Reuse

A candidate theory for how the brain produces nonphysical entities comes from the notions of neural reuse. Neural reuse theory (Anderson, 2010, 2015) maintains that regions and networks in the brain are reused, redeployed, recycled, exploited, and colonized to subserve new functions. These processes lead to massive interconnection and overlap of neural structures. Reuse continues even after the original and subsequent functions are established, and the result is that one-to-one mapping between neural structure and function is rare. Anderson (2010) argues that there is overwhelming evidence that neural reuse is a characteristic of brain structure, but how the reuse is actually implemented in the brain is still very much an open question. One possibility might be that when the brain needs an abstract structure, say a higher order superordinate term, it searches itself for a region or network that serves a related function and then exploits that network by redeploying it to support the more abstract entity. To put it in reentrant selection terms, the original network selects the concept, and the new concept selects the original network. As Anderson (2010, 2015) points out (see below), a highly abstract concept (e.g. love) may later become grounded (i.e., physicalized) metaphorically (Love is a journey.). Thus, as discussed above, conceptual metaphors allow us to reground a concept in physical terms. One important function of

conceptual metaphors is to take abstract concepts and reformulate them in physical terms, i.e., to physicalize them, but, of course, physicalizing them does not make them physical.

It is the general case that neurons communicate at synapses. But another form of neural communication involves volume transmission (VT), also known as non-synaptic neurotransmission. In this process, neurochemicals are released into extracellular space. Depending on the particular chemical milieu, the VT signal can be up regulated or down regulated, and then this signal can up or down regulate the synapse and alter the action of a circuit without connecting two cells via a synapse. In this way, a single circuit or network can produce several outputs. The neurochemicals can diffuse in different directions (anisotropy) depending on the structures they encounter. The chemicals can easily affect glial cells which operate via extra synaptic communication.

Anderson (2014) suggests that VT may facilitate the search process that occurs when an environment presents a challenge for the brain to find candidate networks for possible reuse to subserve a new function. He also suggests that VT might potentiate learning by the formation of "temporary coalitions of neural partnerships" (69).

Another process that may contribute to neural reuse is through axonal-dendritic overlap (Ascoli, 2015). Ascoli argues that the Hebbian adage that neurons that fire together wire together may be implemented where an axon of a neuron is in close proximity to the dendrite of another neuron and the functions of the two neurons are related, a connection may form between the axon and the dendrite. The area of overlap is called a potential synapse. Ascoli, who is interested in the neurobiology of learning, notes that such overlaps are very common and constitute an efficient way of forming new connections. He suggests that the overlap constitutes background knowledge that facilitates learning, and the synapse formation produces the actual learning. I would suggest that perhaps the overlap could also facilitate reuse. One can imagine that extracellular neurochemicals in the region of an axonal-dendritic overlap might produce

a non-synaptic communication between the neurons at the overlap thus creating a "neural partnership" (69) that could subserve reuse.

The neural basis for word meanings

Friedemann Pulvermuller (2013) and his colleagues have been exploring the neural basis of word meanings. In general, they will found that there is a strong tendency for the words to be processed in areas of the brain related to the word's semantic reference: actions, objects, sounds, the numbers, number concepts, color, form and the motion. Pulvermuller suggests that concrete words like "hand" and "eye" have clear embodied referents, but many abstract words maintain a much less direct connection to the body and its action. For example, the abstract words "perception" and "infinity" are only weakly tied to action in the body, and therefore are disembodied abstract words. Abstract words may become detached (or be unattached) from bodily schemas, and therefore, rather than activating body-related circuits, they may link to multimodal prefrontal parietal and temporal convergence zones. In addition, it might be imagined that some words have embodied and/or embedded links at one time in their history, but these links may become weakened overtime. Then the words may have to be learned via dictionary meanings and etymologies. This would be a classic case of Deaconian symbolic reference whereby words get their meanings by association with other words.

Pulvermuller also argues that the association between the abstract concept of an emotion (e.g. sad) and the abstract word /saed/ is acquired through language socialization in which adults identify for the child the appropriate behaviors (i.e., emotion-expressing actions) associated with an internal state of sadness. This position parallels Barrett's (2009) notion that emotions, as we have named them, are psychological constructions or, from a semiotic perspective, they would be considered symbolic constructions.

Nonphysical entities and imagination

Since nonphysical entities are frequently products of what we refer to as human imagination, the neurobiology of imagination is an important candidate for the physical systems that support the generation of nonphysical/nonmaterial entities.

Kaag suggests four processes that may underlie the human ability for imagination: plasticity, experiential selection, reentry, and degeneracy. With respect to plasticity, he notes that brain areas that respond to bodily and spatial orientations also respond to linguistic cues that refer to these orientations. This indicates that abstract grammatical concepts carried by linguistic elements such as prepositions, articles, particles, and other forms conveying grammatical information can be adapted to areas and circuits that subserve bodily actions.

Kaag cites Edelman's (1987, 1989, 1992, see also Schumann et al, 2004) notions of developmental selection and experiential selection as contributors to neural plasticity. Edelman explained that genes do not specify the targets of all neurons. Instead, they control the expression of adhesion molecules that cause cells to bind together and move along certain trajectories. These processes are largely stochastic and depend on the local mechanicochemical milieu in the embryo. A cell's ultimate location and connectivity are thus the result of the activity of the adhesion molecules and the chemical influences on the cell's history. This activity, called developmental selection, leads to brains that are similar in overall construction but which vary considerably at the level of microstructure (i.e. circuitry formed among neurons, axons and dendrites).

A third source of variation is experiential selection. Developmental selection establishes a "primary repertoire" which consists of neuronal groups whose connections, and thus basic circuitry, are formed by the activity of adhesion molecules during embryology. Postnatally, as the infant interacts with the environment, certain of these circuits match or resonate with the environmental input, and their synapses become strengthened. So,

in a very real sense, in the process of experiential selection, the environment selects the neural circuits in the brain that will subserve a particular signal or set of signals. Because each individual's environmental experience is different, experiential selection operating on the variation in the primary repertoire generates brains that, at the level of microanatomy, are even more different from one another. (The material in this section is reproduced from Schumann et al, 2004).

It is my sense that Kaag is arguing that plasticity in the life of the individual and the species operates, at least in part, through forms of experiential selection. When the species acquires a new trait such as oral language and when an individual learns a new skill such as reading, the trait or the skill selects regions or networks with which it resonates and then the substrate which evolved for other reasons is reused for the new knowledge. (See the discussion of neural reuse above).

Kaag argues that the selection process involves the Hebbian notion that neurons that fire together form synaptic connections. In the light of experiential selection, the environmental inputs to various parts of the brain become associated as they reuse previously formed circuits to support the new task or skill. Thus, new circuits are constructed by borrowing neural structures that have the plasticity to become the neural basis for the new knowledge. In other words, the plasticity provided by Hebbian synapses facilitates neural reuse for new environmental inputs.

Reentry is a characteristic of neural structure in which reciprocal/bidirectional connections between neural maps allows the selection and correlation of different areas and thus mediates the " 'emergence of complex sensory and conceptual meanings.' " (p. 8). These reentrant connections are heteromodal and coordinate many functional maps allowing processes such as categorization, abstract concept formation, and feelings that are not reducible to the neural activity that generates them. Reentry allows creative imagination by integrating separate neural maps that bring different information

together in new patterns; thus past patterns integrate with novel current activations coordinating the past with the present.

Kaag suggests that additional contributors to the neural basis of imagination are mirror neuron systems. When a person performs an action, certain neurons fire, and when a person watches someone else perform that action, neurons of the mirror neuron system also fire. Indeed, these neurons become active when the individual simply hears an action performed or only observes a small part of the action. The alignment and intersubjectivity that may be fostered by these systems may also underlie the ability to imagine.

Degeneracy, once again, refers to the situation in which to structurally different areas or networks in the brain can produce the same or similar outputs. Kaag argues that this ability provides flexibility to produce more adaptations. In sum, if my understanding is correct, Kaag suggests that these four processes (plasticity, reentry, mirror neurons, and degeneracy) each and together support the creativity the processes of imagination.

Agnati et al. (2013) propose a possible neural substrate for imagination. They begin by distinguishing between imagery and imagination. Imagery involves recovering from memory representations (images) of entities previously experienced visually, auditory, or motorically, but that are not currently present. Imagination is the ability to create images of objects, actions, and events that have not previously been experienced. It includes unreal scenarios, plans and visions for the future, nonexistent worlds, hypothetical constructs, ideas etc. These entities are constructed from stored images and created images, and they are not necessarily tied to the material-physical world. Both imagery and imagined entities can affect the brain and the body in the same way that the external physical environment does.

Agnati et al. (2013) suggest that even the brain has imagery neuron systems (INS) that have been exapted from extant systems (e.g., mirror neuron systems) that are put to a new use. This process, they argue, is compatible with notions of reuse or redeployment (Anderson et al., 2012) made possible by the interaction-dominant dynamics of the neural systems that generate plasticity by massive interconnections among neural areas. (It is this interconnection and interaction that, as we argued, make it difficult to assign unique functions to regions). The authors hypothesize that imagination was exapted from pre-existing neural circuits for imagery and self-awareness that we may also share with other animals, especially apes. The system they propose consists of a hierarchy of nested functional modules (FM) (as in Russian dolls) that exist at the network, synaptic cluster, synaptic, and molecular levels. The FMs can assemble as needed and communicate with each other either via wiring transmission with actual physical connections or via volume transmission in which interaction is achieved through the expression of neurotransmitters into extracellular space (ECS) where they also interact with astrocytes and help to define the boundaries of the FMs and facilitate the construction of synaptic clusters within them. The researchers speculate that there may be modifiers between the signal from the environment and its target within the FM and between FMs. The modifiers operate in either a pass mode or an interrupt mode, which open or close the pathways through the ECS. The authors suggest that this structure creates opportunities for a large number of transient integrative processes that could subservise creative reuse of circuits and regions that evolved for other purposes.

The authors then suggest that the imagination system (INS) may operate within the Default Mode Network that "includes ventral-medial prefrontal cortex (VMPFC), posterior cingulate cortex (PCC), lateral parietal cortices, and the hippocampal/parahippocampal cortices." (p. 11). This network is hypothesized to create

and control the pathways through the volume transmission of the neurochemicals in the ECS.

WHY

When I share these ideas about the nonphysical aspects of the mind with colleagues, I generally get two types of reactions. The first is that they say they always have assumed that the world contained nonphysical entities and wondered why I felt it necessary to point this out. Some of these people were comfortable because their religious beliefs included entities such as the "Holy Spirit", "Grace", and "heaven". But others had always assumed that ideas, concepts, and thoughts were nonmaterial, but that they were generated and supported by physical brains.

Why is it important to understand the brain's ability to create and process non-physical entities. In the following section, I will discuss this issue from the perspective of the importance of the nonmaterial symbolic world and the importance of the uncertainty that it creates. An enormous amount of the symbolosphere consists of fictional stories, novels, movies, and plays. These are objects of study in the humanities, and as Siri Hustvedt (2016) notes, "examining the dynamic brain processes involved in fictional experience is important, and if the right questions are asked, it may lead to further understanding of the ways in which fictions of all kinds are related, the ones we read in books, but also of the fictional aspects of memory and imagination in general." (451).

Some years ago, when I told my daughter who is now an author and a professor of creative writing about the unreal worlds of the symbolosphere, she said, "I get it dad, it's what we call fiction." She often writes within the framework of magical realism in which characters inhabit a "physical world", but neither the characters nor the world is constrained by the laws of physics. These worlds are nonmaterial, and they are described in physical terms but at the same time, they are not limited by the laws of the physical world.

Harari (2015) along with other scholars, suggests that about 70,000 years ago there was a change in the way Homo sapiens could conceptualize. Unlike other apes, they began to cooperate in large numbers. Harari proposes that what made this possible was their ability to produce fiction. "Large numbers of strangers can cooperate by believing in common myths." (27). The general idea is that the beliefs in the same myths, religions, laws, customs and behavior (i.e., the symbolosphere) mediate and facilitate cooperation beyond family and kin. But this cooperation required the ability for symbolic reference (sign-sign relationships) and a powerful communication system (language) to communicate the fictions that motivate cooperation. Further, we needed the symbolic abilities to create fictional (irrealis) worlds in order to eventually invent science and to understand the physical world. Harari refers to this as the cognitive revolution, but in terms developed in this paper, we could understand it as the revolution of symbolic reference or the symbolic revolution. Harari believes that since this revolution occurred, humans have been living in a dual reality – the material reality of the physiosphere and biosphere and the nonmaterial symbolic reality which we have called, the symbolosphere (religions, constitutions, nations, philosophies etc.). He states, "the ability to create an imagined reality out of words enabled large numbers of strangers to cooperate effectively," (32) in other words our ability for symbolic construction. He suggests that "without an ability to compose fiction, Neanderthals were unable to cooperate effectively in large numbers, nor could they adapt their social behavior to rapidly changing challenges." (34) The human ability for symbolic reference allowed us to produce nonmaterial entities that gave us minds that go beyond biology while remaining integrated with it. With a shared mythology, large numbers of people could unite behind gods, totems, spirits, rituals, and, in general, shared beliefs (even if they were only in fictional entities) and thus to cooperate with individuals beyond the immediate family. This provided a platform for the creation of "imagined orders" (102ff) which were formalized in documents such as the Code of Hammurabi and the American

Declaration of Independence. People believed in the tenets of these documents and cooperated to achieve them. Dissenters, of course, existed, but there were always enforcer institutions (armies, police forces etc.) where individuals cooperated to convince or silence the dissenters. If these institutions were unsuccessful, new orders were always possible. For example, the ideas that "all men are created equal, that they are endowed by their Creator With certain unalienable rights, that among these are life, liberty, and the pursuit of happiness," constitute fictional symbolic conceptualizations that generations of Americans have decided to believe in. Such imagined orders are intersubjective and are shared in the brains of members of a society. (117)

Fictions of all kinds served to establish and maintain hominid life; they engaged the nonphysical, unreal and imagined entities. But as chronicled in *Literary Wonderlands: A Journey through the Greatest Fictional Worlds Ever Created*, the imagined, the unreal, and the nonphysical continue to profoundly engage our species (Miller, ed., 2016). Miller's survey covers works of Ancient Myth and Legend (up to 1700) such as *The Epic of Gilgamesh* (c 1750 BC) with imaginary landscapes in exotic places, works of Science and Romanticism such as Jonathan Swift's *Gulliver's Travels* (1726) which portrays the 6 inch high inhabitants of Lilliput, the 70 foot high people of Brobdingnag, and the struldbrugs of the kingdom Luggnagg who are immortal but senile, and the intelligent horses and uneducatable Yahoos encountered on his fourth voyage, the stories of the Golden Age of Fantasy (1901-1945) is such as J. M. Barrie's, *Peter Pan in Kensington Gardens* (1906) and *Peter Pan, or the Boy Who Wouldn't Grow Up* (1904), books of the New World Order (1946-1980) such as the great dystopia of George Orwell, *Nineteen Eighty-four* (1949) which is being invoked even today to anticipate where we may be headed in the age of Trump, and books of The Computer Age (1981-Present) such as Stephen King's *The Dark Tower* series (1982-2012) and which Miller describes as "one of the largest fantasy worlds ever created" (p. 238).

The nonphysical symbolosphere and the nonphysical ideas and concepts that it maintains have become our environmental niche, and like all niches, they have impacts on the brains that inhabit them. They can change these brains and the brains of whole groups of people. Because they are nonphysical and depend on the use of symbolic relations, as Favareau (2015) points out, they may never have a final interpretant, interpretation, or answer. They are always subject to revision, and unlike the entities in the physiosphere and the biosphere, they may defy closure. As a result, an epistemology and methodology for the natural sciences may not always be appropriate for the symbolosphere – it might be like trying to describe a rock's DNA. The considerations for empirical rigor in the natural sciences may be wasted in the nonphysical world, and the hope for clear ultimate understandings may be sadly misplaced.

In the book, *The Existentialist Café*, the author (Blakewell, 2016) notes how Sartre never seemed to finish his projects. He never came to final conclusions about ethics in *Being and Nothingness* or freedom in *Road of Freedom*. The author argues that this tendency was not because of loss of interest in the issue; it was because he was always changing his mind about these issues.

From the point of view of this paper, I would suggest that a deeper reason is that the symbolosphere where one works with nonmaterial concepts, there is very little room for finality on issues such as ethics and freedom. The political, economic, and social milieu after World War II and the occupation of France (all of which were part of the symbolosphere for the existentialists), interacted with symbolic conceptions of freedom and ethics and caused Sartre's thinking to shift, to recalibrate, and perhaps in some cases start over. But I would suggest that we should expect these changes of mind in our symbolic world.

My colleague, Robert Logan, has been writing extensively over the last several years about the symbolosphere and has made valuable proposals that develop the notion. In a book entitled, "What is information?" – *Propagating Organized in the Biosphere, the Symbolosphere, the Technosphere and the Econosphere*, in chapter 5, Logan (2014) examines technology, science, governance, and economy as aspects of the symbolosphere. He does so from the perspectives of complex adaptive systems, the extended mind, language and culture as symbolic organisms that have evolved and continue to evolve through the processes of abiotic natural selection, emergence, the propagation of organization, catalytic closure, and the adjacent possible. In another paper (Neo-dualism and the bifurcation of the symbolosphere into the mediasphere and the human mind, Logan (2006, 229) proposes that the mind "consists of the human mind and its abstract symbolic thoughts, language, culture, concepts and memes." He suggests that the mediasphere be considered "those products of abstract thought that are instantiated or mediated in the physiosphere ... and [that] would include all expressions of spoken and written language, mathematics, science, computing, the Internet and its contents, tools, technology, buildings and structures, all forms of visual art, music, dance and any human artifact or physical expression of culture all of which is a product of abstract thought." (1,2). Logan sums up this conceptualization of the symbolic or with the formula: symbolosphere = Mind and mediasphere.

In the future, I would expect that live there will be many other suggestions for how to cleave the symbolosphere. From my perspective, the question is not which is the correct cleaving, but rather is the cleaving useful for the person who does it and perhaps others as well?

I would suggest, there will never be a final conceptualization of the mind. The mind is not an iconic or an indexical entity. This is because the symbolosphere is a major feature

of the mind and the symbolosphere is largely composed of nonphysical/nonmaterial symbolic entities that are malleable, with fuzzy boundaries that inevitably generate ambiguity and uncertainty. These symbolic constructs then are necessarily and importantly amenable to subjectivity, interpretation, and revision. As new mental concepts, conceptualizations, ideas, idealizations, ideologies and research technologies are developed, new perspectives on mental life will cause the mind to be depicted differently. We cannot hold the mind in some indexical relationship in which one could point to it; it is essentially a symbolic notion with no material essence, and even though it involves the brain.

Lisa Feldman Barrett (2006, 2009, 2012, 2015) and colleagues have developed a perspective on emotion called Psychological Construction Theory (PCT). They consider emotions to be psychological constructions, not biological entities. They argue that the brain has several domain general core systems for functions such as memory, affect, attention, categorization, and language. They consider these core systems to be the basic ingredients of human emotions. From the perspective of PCT, emotions do not have dedicated neural regions or networks. They are not observer independent entities such as things in the physical and biological worlds (e.g., trees, water, rocks, soil, plants, animals, humans). Emotions exist only when observed and thus are observer dependent. In technical terms they are not natural kinds, that is they don't exist independently in the world. Nor are our emotions the changes that take place in the body (in the autonomic nervous system, endocrine system, and musculoskeletal system) when an emotion is experienced. Different emotions may have the same bodily changes, and in different individuals, the same emotion may be associated with different bodily systems. In addition, there is no one-to-one relationship between an emotion and behavior. Every emotion category (happiness, sadness, fear, disgust, etc) is composed of instances that vary in their physical characteristic. The emotion we call "fear" may be experienced as "worry, concern, panic, distress" etc. Emotion category

labels are generated by society/culture, and children are socialized to them through the language that conspecifics use to identify emotion categories in themselves and in others. According to Barrett, an emotion is highly dependent on context such that emotions are category labels for particular states of the body in relation to the current states of the world that the individual is experiencing.

From the perspective developed in this paper, we might consider psychological constructions to be one type of symbolic construction. An emotional category then would be a nonmaterial symbolic element of meaning which is used to associate a particular body state with the current context/situation in one's physical and symbolic world. To explain human emotions then, we have to understand how the human minds (i.e., brains, bodies, and the physical and symbolic worlds) create nonphysical ontologically subjective categories. This is extremely important. If the physical human brain can create nonphysical entities (symbolic constructions) then the mind is, in part, nonmaterial, whereas the brain is entirely physical.

In the first part of this paper, we discussed motivation. I would consider motivations to be conceptual acts and symbolic constructions. Whereas emotion categories are generated by society/culture and are acquired through socialization, enculturation and education, motivational categories are developed among researchers interested in motivation. Children are not socialized to recognize various motivations (instrumental, integrative, etc.).

Psychology is a field created by conceptual acts. The categories that constitute a cognitive/psychological ontology are the result of categorizations made by psychologists attempting to understand mental processes and mental states. They are conceptualizations; they are not natural kinds or perceiver independent entities; they are not dedicated regions or networks in the brain. They are nonphysical/nonmaterial symbolic constructions, but they are real and cannot be reduced to biological entities. Thus, Barrett's notion of psychological constructions appears to fall within the framework of non-reductive physicalism. Her idea of psychological constructions that are real but not biological (and therefore not physical) illustrates the wonderful

"betweenness" of psychology's physical/biological roots and its symbolic formulations, without conflating the two or dismissing the biological.

EPISTEMOLOGICAL ISSUES

The central issue in this perspective is the extent to which we can get certainty and finality in our investigations of the nonphysical/nonmaterial aspects of the symbolosphere. I suggest that because symbolic reference involves sign-sign/word-word relationships, and the phenomena that are constructed in this way are inherently ambiguous, interdependent, interrelated, and difficult to isolate. Symbolic reference produces categories, abstractions, idealizations and conceptualizations that have no necessary physical referent in the world and no unique areas or networks in the brain. Our brain is capable of producing these nonphysical entities via symbolic reference; therefore, the symbolic constructs are real. I suggest that this situation is certainly characteristic of the humanities, but perhaps is also of the social sciences. Below I will use motivation in second language acquisition (a social science) to illustrate a particular characteristic of nonphysical symbolic entities.

Motivation

Several years ago, at a conference, I asked a major motivation researcher when he thought his research on motivation in SLA would be finished. This is part of a bigger question. When will we have sufficient knowledge of L2 motivation so that we can say our work is done? When will it no longer be necessary to do research on L2 motivation? Will we ever have the answer, and if not, why not?

The study of motivation and SLA has a 60-year history which is accessible in an article entitled "60 years of language motivation research: looking back and looking forward," Al-Hoorie (2017) describes an early social-psychological period, a cognitive-situation

period, and the current period. In that history, there is no hint that we are closing in on a final understanding of motivation and SLA. One important reason that the end is not near is that among symbolic phenomena there may be no end; there may be no final answer, no inevitable teleology.

SOME COMPONENTS OF THE MOTIVATIONAL WORD WEB:

intention, incentive, desire, goal, reward, approach, action tendency, wanting, liking, emotion, affect, arousal, valence, appraisal, reward, motivating source, force, stimulus, stimulation, inspiration, inducement, spur, reason, drive, ambition, initiative, determination, enterprise, enthusiasm, commitment, persistence, investment, engagement.

The above list is designed to give a sense of the symbolic word web that the term, motivation, occupies. It is real, but it is a nonphysical entity that accrues meaning from its relationship with all these other words. In many cases, other words in this list can be substituted for "motivation" because they are synonyms. They are structurally different entities that generate meanings that are similar to the meaning of "motivation". The list below presents some of the motivational constructs that have been studied in SLA research.

TYPES OF MOTIVATION:

Integrative motivation, instrumental motivation, self-determination, attribution theory, goal theories, situated motivation, task motivation, willingness to communicate, skill-challenge, value expectancy, L2 motivation self-system, identity theory, investment theory.

I would suggest that each of these perspectives offers a characterization of motivation that captures some aspect of the phenomenon, but none of them are complete or final. Additionally, it may be the case that finality will never be achieved when we are dealing with nonmaterial symbolic phenomena.

The natural sciences, are much more grounded in physical/material world. In scientific inquiry where words unambiguously index entities in the environment that can be verified by the senses or the senses plus some amplifying technology (e.g., the electron microscope), certainly can more easily be achieved.

However, if a social scientist were to hypothesize that integrative motivation is associated with high proficiency in second language acquisition, confirmation or disconfirmation of the hypothesis would involve several levels of symbolic relationships. The first step would be to operationalize the definition of integrative motivation in a series of questions that second language learners could respond to on a Likert scale. For example,

PROBES FOR INTEGRATIVE MOTIVATION:

1. Studying French can be important to me because it will allow me to be more at ease with fellow Canadians who speak French.
2. Studying French can be important to me because it will allow me to meet the converse with more varied people.
3. Studying French can be important to me because it will enable me to better understand and appreciate French Canadian art and literature.
4. Studying French can be important to me because I will be able to participate more freely in the activities of other cultural groups.

(Gardner, 1985, p. 179)

Now disagreements could enter at any level of the analysis -- from the initial definition of integrative motivation, to the questionnaire probes designed to elicit information about that motivation. Such studies are unlikely to generate closure. Where they have been conducted, there have always been other researchers who would prefer to use different definitions of motivation or to examine different kinds of motivation or to examine them in different settings or to examine them with different instruments in different populations. As a result, in fact, over the past 60 years there have been literally hundreds of such studies, and the question of motivation in second language acquisition is still not settled. Because the notion of motivation can only be interpreted by reference to other concepts, closure may never occur. Operationalizing definitions is the social scientists' attempt to get a clear referent for the concept under investigation, but because reference of this sort can only be achieved by consensus, there is always room to disagree with the consensus and an effort to establish a different one.

Summary

The symbolosphere is another level of human existence in addition to the physiosphere and the biosphere. The mind consists of the brain, the body, our current and past experiences in the environment, and the symbolosphere which contains nonphysical entities that influence our behavior. As a species, we interpret nonphysical entities by associating them with physical entities (e.g., via conceptual metaphors, abstractions, absentials, symbolic grounding). This physicalizing process does NOT make these entities physical. Some neural processes that may subserve the generation of nonphysical entities are reuse, axonal-dendritic overlap, abstract words that become detached from body schemas, and neural systems subserving the human imagination.

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Figures

Figure 1. Examples of icons and indexes.

IMPÉRIALE : De grands crus de cacao, des saveurs corsées, des associations inédites et subtiles ...

<p>Les Intemporels</p> <p> Teocali Ganache au chocolat noir amer</p> <p> Tolteca Ganache nature lait</p> <p> Zochil Ganache au chocolat noir parfumée à la vanille</p> <p> Pajara Ganache noire au café</p>	<p>Toci Ganache au chocolat noir parfumée à la mangue et aux fruits de la passion</p> <p> Naranjo Fine lamelle d'écorce d'orange enrobée de chocolat noir</p>	<p>Les Alcoolisés</p> <p> Calchi Mousse aux deux chocolats lait et noir parfumée au Rhum</p> <p> Quetzal Ganache noire parfumée à la Tequila et au citron</p>
<p>Les Fruités</p> <p> Chapas Ganache au chocolat noir parfumée à la framboise</p> <p> Papachu Ganache noire parfumée aux agrumes enrobée de chocolat au lait</p>	<p>Les Epicés</p> <p> Palenque Ganache noire parfumée au gingembre</p> <p> Zaquan Ganache noire parfumée d'une infusion de clous de girofle</p> <p> Zope Ganache noire parfumée au miel et au piment de Cayenne</p>	<p>Les Pralinés</p> <p> Nopalli Gianduja noisettes et amandes enrobé de chocolat au lait</p> <p> Tzitzin Sous une couverture lait, un onctueux praliné aux amandes</p> <p> Tepolan Délicieuse plaque de chocolat noir ou au lait parsemée de fruits secs et confits</p>

Caco et Chocolate, 29 rue de Buci-- 75006 Paris

Figure 1. Examples of icons and indexes

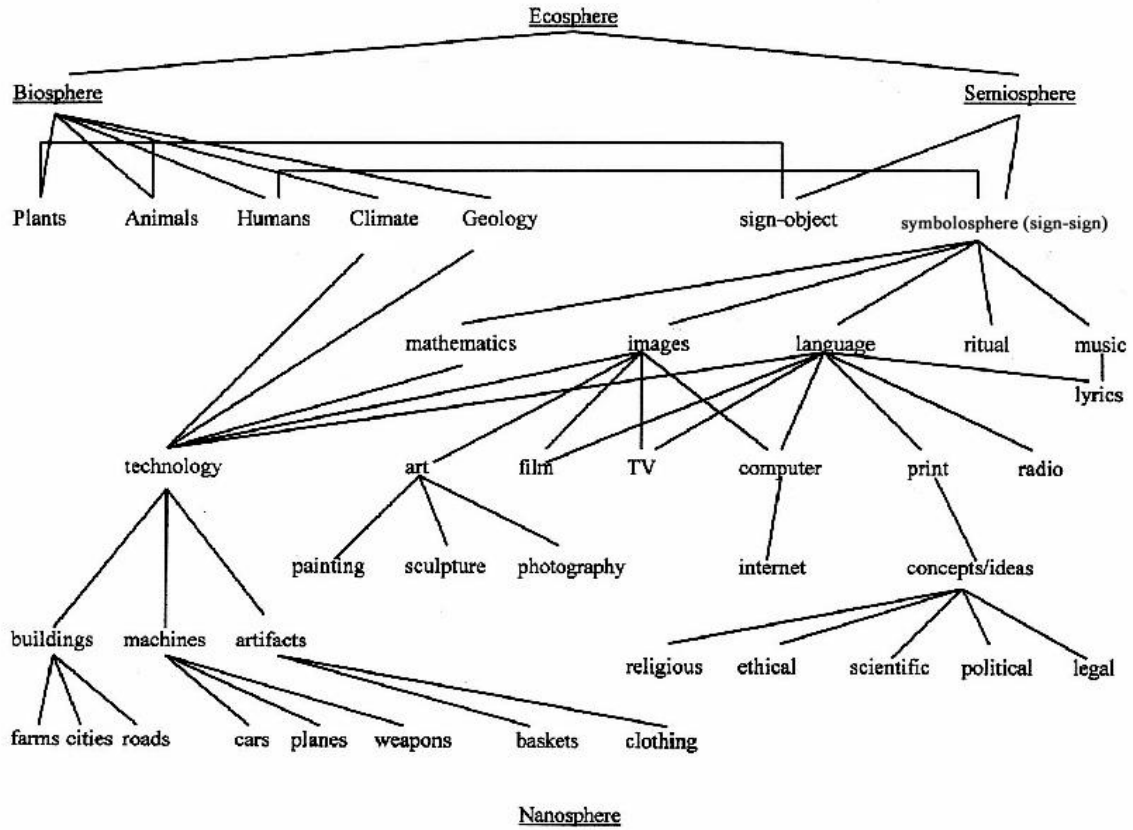


Figure 2. Products of the symbolosphere, including media that amplify it.