

Defining the Self

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Defining the Self: The Orientation Association Area

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The orientation association area, situated at the posterior section of the parietal lobe, receives sensory input from the sense of touch, as well as from other sensory modalities, especially vision and hearing. These give it the ability to create a three-dimensional sense of "body" and to orient that body in space.

Two of the orientation areas, one located in each hemisphere of the brain, perform related but distinct operations, as shown in numerous brain imaging studies. The left orientation area is responsible for creating the mental sensation of a limited, physically-defined body, while the right orientation area is associated with generating the sense of spatial co-ordinates that provides the matrix in which the body can be oriented. In simpler terms, the left orientation area creates the mind's spatial sense of self, while the right side creates the physical space in which that self can exist.

The process through which the mind might construct these fundamental categories of self and not-self are not clearly understood, though researchers have found some tantalizing clues. For example, we know that certain neurons in the left orientation area respond only to objects within arm's reach, while others respond only to objects just beyond. This fascinating finding has led some researchers to postulate that the distinction between self and other may have its roots in the ability of the left orientation area to judge between these two simple categories of reality--that which can be grasped and that which can't.

Whatever the origins of the orientation response might be, and however the brain supports it, the important point is that by working in concert, the two sides of the orientation association area are able to weave raw sensory data into the vivid, complex perception of a self and into a world in which that self can move.

The Seat of the Will: The Attention Association Area

The attention association area, called the pre-frontal cortex of the brain, plays a major role in governing complex, integrated bodily movements associated with attaining goals. For instance, this area helps the body organize the behaviors necessary for reaching for desired objects or moving toward some chosen destination. On an even more complex level, the attention area seems to be critically involved in organizing all goal-oriented behaviors and actions, even purposefully directed patterns of thought that are intended to focus the mind upon a particular object or idea.

This structure is so heavily involved in such intentional behavior, in fact, that a number of researchers think of the attention area as the neurological seat of the will....

The ability of the attention area to direct the mind to form intentions and act upon them is supported by research which shows that damage this area of the brain results in a loss of the ability to concentrate, plan future behavior, and carry out complex perceptual tasks that require sharp mental focus or sustained attention. Victims of such damage, for example, are often unable to complete long sentences or plan a schedule for the day. They also frequently exhibit emotional flatness, a lack of will, and a profound indifference to events in the environment. These findings, as well as brain imaging studies, indicate that the frontal lobes are involved in the processing and control of emotion, in association with the limbic system, with which it has multiple interconnections.

Over the last several decades, we have been working towards the development of a neuropsychological model of unitary experiences which would encompass ritual, meditation, and contemplation within one theoretical framework. This framework has been developed based on a number of research studies that have measured how specific areas of the brain function such as those described above. For example, a number of brain imaging studies using functional magnetic resonance imaging have demonstrated how this area is activated during tasks that require the manipulation of three dimensional space as well as how this area functions along with the attention association area for spatial memory (Cohen et al. 1996; d'Esposito et al 1998). Neuroscientist, Rhawn Joseph, was one of the first to consider the superior parietal lobe as integral for differentiating self from not-self.

It should be mentioned, however, that to fully identify the self probably requires other structures, particularly those in the subcortical areas that are involved in the basic maintenance of the self. It is likely that as the human brain evolved, this function became incorporated and enhanced by the function of the OAA so that we can experience a rich sense of the self. The prefrontal cortex actually has many different complex functions. However, for the purposes of our book, we explored its ability to help us focus attention. In terms of the attention association areas function, an early study (Ingvar, 1977) examined blood flow in the brain's of subjects moving their hand in a willful, rhythmic hand clenching movement and also when they were only imagining doing the same movement. The findings showed increased activity in the motor area in the first condition and increased activity in the attention association area in the second condition. When imaging the movement, there was no increase in activity in the motor area. A PET study by Frith (1991) showed that not only did willful acts cause an increase in the attention association area activity, but it also resulted in decreased activity in certain brain regions including the posterior temporal-parietal area during the sensorimotor task. This was also found to be the case with other areas involved in modality specific functions. Many other imaging studies have also demonstrated similar findings including those of Michael Posner (1990, 1994) and others (Pardo et al. 1991; and Frith et al. 1991).

It should be mentioned that the frontal lobes have also been found to be highly involved in emotions and intimately connected to the limbic system that controls most of our emotions. The frontal lobes are believed to be extremely important in initiating, controlling and monitoring emotions. People who have damage to the frontal lobes like the classic case of Phineus Gage

generally begin to lose their personality and eventually have problems controlling their emotions or have blunted emotions (Damasio 1994). If there is extensive damage to the frontal lobes, then usually the result is apathy, loss of emotional response, and loss of social interests (Damasio 1994; Kandell, Schwartz, and Jessell 2000). However, if only small areas are damaged, specifically those that control emotions, then the person can be disinhibited, hyperactive, euphoric, and emotionally labile. It is interesting to note that a PET study of murderers demonstrated decreased frontal lobe glucose metabolism (Raine, 1994).

In order to develop of comprehensive neurophysiological model of religious experience, we considered that ritual and meditation (in all of their tremendous variety) both can generate a number of states along a continuum of unitary states. We will call this the Unitary Continuum which refers to all states of human experience as they relate to a sense of unification or connection with other things. These states begin with the least holistic which for most people is essentially baseline, daily living. This includes our interactions with others, eating, sleeping, and working. However, in this state, we tend to approach each of these activities as if it is only ourselves performing the activity. There is very little sense of a greater organization of our reality. However, there may be other states that are even less holistic than baseline reality since even in our everyday reality, we have some sense of connectedness to a family or friends, or to a nation or community. However, there are those who may experience no sense of connectedness to anything. Such states may occur "normally" although they may be associated with pathological conditions such as depression. Finally, there are some states such as dissociative disorders (i.e. multiple personality disorder) in which even the self is perceived to be fragmented.

In states related to ceremonial ritual there is a sense of union with the others involved in the ritual. As we will describe, this allows for a sense of community or group unity which allows all members to experience a connection with the rest of the group. As we proceed along the Unitary Continuum, we can eventually find profound mystical states in which there is a sense of unity, not to others in a group, but to the universe as a whole, and even to apparently transcendent reality.

The Unitary Continuum goes from the roughly 50/50 diversity/unity perception of baseline reality, through states of ever increasing perception of unity over diversity, to the perception of absolute unity characteristic of what Gene d'Aquili and I referred to as Absolute Unitary Being (AUB). An example of some of the important nodal points along this continuum would be the following: baseline reality; aesthetic experiences such as the appreciation of a sunset or symphony; the intense feeling of romantic love in which "it's bigger than both of us"; the numinous experience of reality often through a dream or vision of a divine being or of a mandala; Cosmic Consciousness as described by Bucke in which there is a profound sense or "knowledge" of a deep unity underlying discrete reality, but with individual things being perceived as individual; various progressively intense trance states during which there is a blurring of the boundaries of individual things; all the way to the state where there is no perception of spatial or temporal boundaries whatsoever, accompanied by the experience of absolute unity, devoid of content and with even the self-other dichotomy obliterated.

AUB is a state that appears to be described in the religious literature of almost every tradition

and culture. Several quotes below allude to this universal state that people throughout time and across traditions have experienced:

Sufi master Husain Ibn Mansur, a resident of Medieval Iraq, described the intimate intermingling of the mystic and his Lord:

I am He Whom I love, and He whom I love is I:
We are two spirits dwelling in one body.
If thou seest me, thou seest Him,
And if thou seest Him, thou seest us both.

The medieval Catholic sage Meister Eckhart asked:

How then am I to love the Godhead?

Thou shalt not love him as he is: not as a God, not as a spirit, not as a Person, not as an image, but as sheer, pure One.
And into this One we are to sink from nothing to nothing, so help us God.

The theme of unity echoes in the Taoist wisdom of Lao-Tzu...

Ordinary men hate solitude.
But the Master makes use of it,
embracing his aloneness, realizing
he is one with the whole universe

...and in the plain-spoken insights of Black Elk, the Oglala mystic and shaman:

Peace comes within the souls of men
When they realize their oneness with the universe.

Thus, we might be able to consider religious and spiritual experiences from this neurophysiological perspective to see how the diverse variety of cultures and practices approach these states and ultimately incorporate them into the fundamentals of the particular tradition and into the person's life.

i. A number of brain imaging studies using functional magnetic resonance imaging have demonstrated how this area is activated during tasks that require the manipulation of three dimensional space as well as how this area functions along with the attention association area for spatial memory (Cohen et al. 1996; d'Esposito et al 1998). For a further detailed discussion of the Orientation Association Area, please see Joseph (1996). ii. Rhawn Joseph (1996) was one of the first neuroscientists to make reach this conclusion. It should be mentioned, however, that to fully identify the self probably requires other structures, particularly those in the subcortical areas that are involved in the basic maintenance of the self. It is likely that as the human brain evolved, this function became incorporated and enhanced by the function of the

OAA so that we can experience a rich sense of the self. iii. The prefrontal cortex actually has many different complex functions. However, for the purposes of this book, we will focus primarily on its ability to help us to focus attention. iv. In terms of the attention association areas function, an early study (Ingvar, 1977) examined blood flow in the brain's of subjects moving their hand in a willful, rhythmic hand clenching movement and also when they were only imagining doing the same movement. The findings showed increased activity in the motor area in the first condition and increased activity in the attention association area in the second condition. When imaging the movement, there was no increase in activity in the motor area. A PET study by Frith (1991) showed that not only did willful acts cause an increase in the attention association area activity, but it also resulted in decreased activity in certain brain regions including the posterior temporal-parietal area during the sensorimotor task. This was also found to be the case with other areas involved in modality specific functions. It should be mentioned here that imaging studies measure certain biological functions, but may not necessarily reflect accurately what is going on. For example, increased metabolic activity in inhibitory neurons will look the same on a PET scan as increased activity in excitatory neurons, but the cognitive results could be very different. The attention association area is also divided into various parts. And while we will not discuss the specific function of these various parts, it is important to keep in mind that the attention association area has many functions some of which are very subtle. Many other imaging studies have also demonstrated similar findings including those of Michael Posner (1990, 1994) and others (Pardo et al. 1991; and Frith et al. 1991). v. The frontal lobes have also been found to be highly involved in emotions and this structure has intimate connections with the limbic system. The frontal lobes are believed to be extremely important in initiating, controlling and monitoring emotions. Thus, it heavily interacts with the limbic system. People who have damage to the frontal lobes like the classic case of Phineus Gage generally begin to lose their personality and eventually have problems controlling their emotions or have blunted emotions (Damasio 1994). If there is extensive damage to the frontal lobes, then usually the result is apathy, loss of emotional response, and loss of social interests (Damasio 1994; Kandell, Schwartz, and Jessell 2000). However, if only small areas are damaged, specifically those that control emotions, then the person can be disinhibited, hyperactive, euphoric, and emotionally labile. It is interesting to note that a PET study of murderers demonstrated decreased frontal lobe glucose metabolism (Raine, 1994).