'We' and 'They': Cross-Cultural Conversations on Identity

with Anindita N. Balslev, ""'We' and 'They'": Why Must We Engage in Cross-Cultural Conversation?"; Carolyn J. Love, "Complex Identity: Genes to God"; Andrew B. Newberg, "Identity and the Brain: The Biological Basis of Our Self"; and John Calvin Chatlos, "Adolescent Identity Formation versus Spiritual Transformation."

IDENTITY AND THE BRAIN: THE BIOLOGICAL BASIS OF OUR SELF

by Andrew B. Newberg

Abstract. This article reviews the neuroscientific understanding of the self and personal identity, focusing on various elements of inclusivity and exclusivity as well as engaging religious and spiritual perspectives. We will also consider how the identity is comprised of biological, social, and ideological or spiritual aspects, and how they are interconnected. We will consider how the brain helps us to construct and maintain our representation of the self and what happens when we have self-transcendent experiences. Such an evaluation will have implications for understanding the intersection between consciousness and the self. This information will be helpful from both the psychological and spiritual perspective for understanding human identity.

Keywords: brain; consciousness; exclusivity; identity; inclusivity; neurotheology; self; spirituality

---

Introduction

The biological basis of the self has important implications for understanding ourselves, our personal identity, how we connect with other people and the universe, and how we engage various beliefs, particularly religious and spiritual. In fact, the self and the identification of what is included and excluded in that self refer not only to human beings, but to all animals, and even to belief systems.

For example, throughout history, one of the defining characteristics of religions has been a paradoxical sense of exclusivity and inclusivity. On

Andrew B. Newberg is Professor and Director of Research, Marcus Institute of Integrated Health, Thomas Jefferson University and Hospital, Villanova, PA, USA; e-mail: aAndrew.newberg@jefferson.edu.

one hand, it might be argued that any religion worth following should view itself as having an exclusive on various divine and ontological issues. As history has also demonstrated, this exclusivity goes beyond the positive affirmation of the doctrines of a particular religion and often is expressed as an animosity against those individuals that hold other belief systems. This has resulted in perhaps millions of lives being lost through wars, battles, inquisitions, and genocide. On the other hand, religions frequently provide a deep sense of identity and inclusivity among its participants, and religious doctrines often ask followers to view others, even nonbelievers with compassion.

There appears to be a substantial emotional, cognitive, and behavioral elements that support both the exclusive and inclusive aspects of individual identity, as well as the various beliefs, religious or otherwise, that an individual holds. One might even go further to suggest that the battle between exclusivity and inclusivity in religion is merely a reflection of a more fundamental battle that originates in the human brain and the identity of the self. If this is the case, feelings of exclusivity or inclusivity in religious beliefs derive from universal characteristic of human beings, which are then placed on religion rather than religion itself placing exclusive or inclusive concepts into the minds of human beings.

When considering inclusivity and exclusivity within human beings, we would identify three different domains—biological, social, and ideological. Each of these domains has an important impact on human beings and our personal identity. These domains also can manifest separately or in conjunction with the other domains.

There is likely a balance that exists between exclusivity and inclusivity in all of these domains. Thus, there is a continuum of exclusivity and inclusivity that defines the self biologically, socially, and ideologically. This exclusive/inclusive continuum can refer to each domain and can be used to help consider various attitudes, beliefs, and behaviors in relation to each other. In this way, one would argue, as we have in previous works (d'Aquili and Newberg 1999), that a state of absolute unity would be associated with complete inclusivity and no exclusivity. However, this state is unlikely and every other state from baseline reality to mystical experiences have some degree of inclusivity and exclusivity. Further, there are states that might be associated with fundamentalism in which there is a high preponderance of exclusivity and minimal inclusivity. We have also previously argued that this continuum is related directly to the brain's functions and may be specifically associated with alterations in the parts of the brain that establish the distinction between self and other (Newberg, d'Aquili and Rause 2001). For example, the parietal lobe, in conjunction with several other parts of the brain, may be very relevant to this notion of exclusivity and inclusivity since diminished activity in this area appears to be associated with greater experiences of unity and

inclusiveness (Newberg, Alavi and Baime 2001; Newberg, Pourdehnad and Alavi 2003).

Given the three basic domains of inclusivity and exclusivity, we can explore the phenomenology and associated physiology related to these aspects. This will provide support for developing a better understanding of the self, consciousness, and religious and spiritual phenomena.

Biological Beginnings of the Self

Overview of Biological Exclusivity and Inclusivity

The biological self is determined by what is included and what is excluded in the self. And the first domain of identity, which is, in some sense, the most fundamental, is biological. In considering the human person, we cannot deny the barrier that exists between our own body and the rest of the world. Our body and brain are physically separated from everything else and everyone else in the world (although as we will describe there is a great deal of interaction between our self and the rest of the world). This sense of personal identity and exclusivity is critical to survival. We must be able to identify our self and distinguish that self from the rest of the world. We must also distinguish where our body is in relation to other objects so that we do not walk in front of a train or off a cliff. Thus, we cannot be so exclusive as to ignore the external world since this can be equally detrimental.

This physical boundary isolates our sensory perceptions of the world, our thought processes, and our outward behaviors. For example, any sensory perception that has an impact on our body is typically viewed as though it is "coming from outside." If we touch a table, hear another person's voice, smell a pleasant odor, or taste something sweet, these perceptions are registered in the brain as originating from outside. With this information, the brain constructs as clear and coherent rendition of the external world as it can. Thus, sound waves coming from various objects help us localize where that object is in a three-dimensional space in which the body can move (King 1993; Middlebrooks 2000). However, all of this sensory stimulation ultimately requires inclusion by the sensory reception areas of the brain. In other words, the light waves hitting our retina from the outside is incorporated into the workings of the brain by causing certain chemical changes in the rods and cones, sending neuronal signals to the primary visual cortex, and then ultimately being constructed into a vivid three-dimensional color image. This integration of sensory information is perceived consciously as a unified flow of experience.

Once a biological sense of an exclusive self has been identified, we must find ways of establishing various degrees of inclusivity in a biological,

social, and ultimately ideological way. We do this through a variety of mechanisms. For example, we interact and communicate with others, exchange work, form cooperative alliances, and sexually commune with others—all of which are variations of inclusivity. Likewise, we ingest food, which is a way of integrating outside nutrients into our internal self. As various substances are ingested, the body determines which components should be incorporated or included into the body and which are not of use and ultimately excluded by excretion. Thus, biologically we are built for a balance between exclusivity and inclusivity, one that we must continuously measure and evaluate every moment of every day.

It has been relatively well established that within the human brain, there exist mechanisms by which we can distinguish between self and other and determine things which we should feel inclusive toward and things which we should feel exclusive toward (d'Aquili and Newberg 1999). However, our own sensory perceptions force us to recognize that the experiences we have pertain to ourselves rather than another. This can sometimes be distorted in various neurological or psychiatric conditions in which the individual's self is experienced as external to the self such as out of body experiences, part of something else or where something else is perceived to become part of the self (Spence 2002; Blanke and Arzy 2005; Lenggenhager, Smith and Blanke 2006; Giummarra, Gibson and Georgiou-Karistianis 2007). It occurs frequently in disorders such as schizophrenia, but it can also occur in other psychopathologies and even other "normal" conditions as we will describe later. Another example is the phantom limb phenomenon in which a limb is removed and yet the brain continues to react as if the limb is still attached.

Genetic and Neurological Aspects of Identity

A sense of biological identity, along with its inclusivity and exclusivity, is built into our genetic and neurological makeup. On virtually every cell in the human body, there is something called the major histocompatibility complex (MHC) that enables the body to identify that which is part of the body and determine which other objects or lifeforms such as bacteria and viruses are not part of the body (Goldsby, Kindt and Osborne 2000). It is this particular genetic, and therefore cellular, component that establishes identity in a way that helps the body deal with external invaders. However, excluding things that are nonself can be problematic for the medical field. For example, in transplant medicine, the ability of the body to distinguish between self and other must be circumvented so that a particular organ transplant is not rejected by the recipient's body. Alternatively, when bone marrow is transplanted into a recipient, the external bone marrow cells can attack the recipient's body in what is called "Graft vs host" disease (Goldsby, Kindt and Osborne 2000).

But genetics is not all about exclusivity. Our genes allow for a comprehensive connectivity between cells, with permeable membranes that allow for an exchange of nutrients, hormones, neurotransmitters, and other biochemical interactions. The interconnectivity of brain cells exemplifies an extraordinary degree of cooperative interchange, governed by both genetic and environmental stimuli (Campbell and Reece 2002).

Neurologically our brain presents us with the perception of a clear boundary between our own self and the rest of the world (Lynch 1980; Gallace and Spence 2014; Cherry 2022). This physical boundary isolates our sensory perceptions of the world, our thought processes, and our outward behaviors. Thus, all sensory stimulation ultimately requires inclusion by the sensory reception areas of the brain.

The parietal lobe is involved in processing sensory information by creating a spatial representation of the self and world. The parietal lobe takes our sensory information and helps us to determine where our self is spatially and how it relates to other objects and other people in the world. The parietal lobe has been particularly involved in intense spiritual experiences that are associated with a loss of the sense of self and a sense of oneness or connectedness with other people, the universe, or God (Newberg 2018). Decreased parietal lobe function appears to be associated with the loss of the sense of self and a sense of connectedness or oneness (Newberg and Iversen 2003). It is also interesting that the MHC is upregulated on cell surfaces during stressful events and hence might be downregulated during spiritual practices that reduce stress, in this way paralleling the loss of the sense of self in the brain (Household, Peterson and Mills 2017).

Sensory stimuli make up the basic elements of our sense of self. But we have higher level neurological correlates of the self in many of our cortical brain regions that support the beliefs that comprise our self (Newberg and Waldman 2006). For example, the frontal lobes are involved in executive processes and attention. Executive processes help direct the self through our everyday activities. Executive processes help us to determine when to go to work or school, how to balance our checkbook, went to pick up our children, and what to make for dinner. All of these executive processes come together in forming our sense of self in terms of what our self needs to do and how our self interacts with other people and objects around us.

The frontal lobe also initiates language and other behaviors (Newberg and Waldman 2009). In this way, the frontal lobe creates our self-projection into the world. Our self speaks to other people through the language production of the frontal lobes. Our behaviors identify our self in contrast to other human beings and also enable other human beings to recognize us as our unique self. If we smile a lot, people recognize us as someone who is typically happy. And along those lines, the frontal

lobes also regulate our emotional responses helping us to create an emotional self. We may be anxious, relaxed, happy, or sad. Our frontal lobes help us to modulate those emotional responses that create our sense of self.

The limbic system, comprised of structures such as the amygdala and hippocampus, is primarily involved in emotional processing. Thus, the limbic system is what makes our emotional self. These emotions help us to identify things that are happening in the external environment with respect to our self, particularly whether they are good or bad. When we see a friend, we feel warm and happy inside because they are specifically and positively connected to our self. And when we see a stranger who may be dangerous to us, we feel fear and anxiety. This helps protect our self and foster survival.

Our emotions are also deeply connected with the memory processes of the temporal lobes. This makes sense as our brain wants to remember things that are emotionally salient to us. We want to remember places where good things happened to us like finding good food or friends. And we also want to remember places where bad things happened to us like finding poisons or dangerous predators. Importantly, our memory processes are essential in establishing our self. We remember our own history from childhood through adolescence through adulthood. All of the things that happened to our self are what are written into our memory banks. This narrative memory becomes the autobiography that defines the self.

These higher order processes, perhaps in conjunction with basic sensory and emotional processes, ultimately help to create our self-consciousness (Newberg and Waldman 2016). Consciousness is a complex phenomenon that we will consider in more detail below. Some in the medical field equate consciousness with simply being awake. However, in most philosophical and theological domains, consciousness refers to awareness. We do not just smell the flowers, we are aware that there are flowers there to be smelled. And in human beings, we develop an even higher level of reflexive self-consciousness so that we are not only aware that the flowers are there, but we are aware of our own self smelling the flowers.

Although the sensory stimuli are integrated into the brain, the brain itself helps us to make the distinction between that which is coming from outside our body and that which originates inside. The brain thus maintains a certain degree of exclusivity of the human person within the external environment but also recognizes the importance of including the self in the context of that external environment. This balance between exclusivity and inclusivity is critical for determining which objects in the environment to avoid and which to not. Furthermore, it would be ludicrous if we were to begin to eat our own hand should we become hungry because that hand represents our own self. There are inherent aspects of

behavior such as eating that force us to eat something external that is separate from the body. As various substances are ingested, the body determines which components should be incorporated or included into the body and which are not of use and ultimately excluded by excretion. Thus, biologically we are built for a balance between exclusivity and inclusivity that ultimately helps define the self and extends into our social and spiritual self.

Social Identity Is Related to Exclusivity and Inclusivity

Overview of Social Exclusivity and Inclusivity

In the domain of social identity, inclusivity refers to an individual considering himself or herself to be part of one particular group, regardless of ideological notions, while exclusivity refers to setting that group apart from other groups. In this way, social and behavioral interactions define the self through exclusivity and inclusivity rather than specific belief systems. A good example is athletic competition, in which an individual or group of individuals will support the "home team" while demonstrating animosity against other teams. This is not so much an ideological difference as it is a social or group difference. There is no difference ideologically between one football team and another other than they represent the home city of a given individual. As we will later describe, this notion of exclusivity is something that appears to be inherent in human beings and other animals.

Social exclusivity and inclusivity also can revolve around ideological concepts (see below), which is often the case with political or religious systems. Initially, individuals may feel that they are part of the Republican or Democratic Party because that particular party matches their ideals. They thus begin to feel inclusive because of a coherence of ideas. They then view the other party as incorrect and thus worthy of rejection. Eventually, though, they may reject the other party simply because it is the other party and not on ideological grounds. Thus, the concept of social exclusivity or inclusivity refers more to an extrinsic acceptance or rejection of other groups vis-à-vis the social group rather than specifically the ideological aspects. As just mentioned though, there is going to be some degree of overlap, depending on the circumstances.

Social exclusivity and inclusivity usually begins on a small scale, often without the same degree of fervor or animosity seen on the national or religious level. Thus, social exclusivity and inclusivity begin with individual families, where the nuclear family represents a specific nonidealogical group of inclusion. This can be considered an exclusive biological (or even genetic) group, distinguishing one family from another. Within the family, members identify with each other, celebrate together, share resources, and cooperate to obtain needed resources for maintenance and survival. In most cases, there is minimal animosity perceived between family members

or between different families within the same social, political, or cultural group. Thus, on the family level, inclusivity appears to be the overriding factor in society and we do not typically reject other families other than merely recognize that they are not our own.

Families are organized into larger groups, which usually represent neighborhoods or communities. Again, in these cases, there is an inherent sense of social inclusiveness. There is also a feeling of exclusiveness toward outside groups. In returning to our example of various athletic events, we might feel that the community or high school football team is the team we root for and feel that other communities' or high schools' teams are not as good, and thus we root against them. However, all of these families may feel a sense of inclusiveness for a larger, city-wide football team. Expanding this one step further, those individuals supporting city-wide teams, while rejecting teams from other cities, may ultimately feel inclusive toward a national team (that includes all cities) that participates in a world competition. In this case, there is a much larger sense of inclusiveness rather than exclusiveness.

We can see similar occurrences in politics in which political factions of a country may at one time or another extend a feeling of inclusiveness or exclusiveness, depending on the circumstances and depending on what is required to enable the country to function in a political manner. There may be a great deal of infighting between small factions within a country because they each have a strong sense of exclusivity against their neighboring communities. However, should that country be attacked by a foreign invader, the individual communities might regroup and rearrange their inclusive and exclusive behaviors so that they may, as a group, fight together against the external invader. Thus, intergroup competition enhances intragroup cohesiveness and cooperation (Tajfel and Turner 1979). History has also demonstrated that such cohesion in a moment of external invasion deteriorates quickly once the external invader is vanquished and the individual factions must once again deal with themselves internally (Neusner 1990). We can clearly see this in the recent outbreaks of civil war in Iraq and Palestine. Social exclusiveness and inclusiveness can easily change depending on the environmental and personal influences that occur at a given point in time.

Social Exclusivity and Inclusivity in Animals

The notion of social exclusivity and inclusivity can be found throughout the evolution of living organisms. In primate species, such as orangutan and chimpanzee societies, there is a sense of cohesiveness, the sense that one particular troop represents the close group, and some degree of rejection or even animosity toward other social groups (Lickel, Miller and Stenstrom 2006; Riek, Mania and Gaertner 2006). Within any given

social group, there is a sense of hierarchy with various individuals taking a different standing within the group (Sapolsky 2005). This hierarchical structure is maintained over long periods of time and, for the most part, with relatively minor changes. However, there are times when there can be major shifts in control of this hierarchy. Even among nonprimate species, there tends to be some degree of social exclusivity, at least with regard to other animal species, but often with regard to other small groups within a particular species. This natural separation of various animal groups from other groups is most likely essential for survival. Some separations are more obvious than others. It clearly makes sense that a group of animals would avoid, almost at all cost, close contact with their predators. Close group adhesion helps avoid predators through alarm signals and vocalizations, and perhaps even the ability to mount some larger defense against a predator. Thus, these groups can all be of value in enabling a species to survive. Since there is an absence of substantially higher cortical functioning in the brain of most animals, it seems likely that such separation is something that is (1) biologically and genetically driven and (2) related to relatively primitive structures in the brain.

As far as basic brain functions and structures go, this sense of exclusivity and inclusivity may have originally developed in animals from the responses of the autonomic nervous system which mediate the "fight or flight" response. In such a circumstance, any outside animal, almost regardless of whether it is truly a threat or not, is viewed as a threat. The autonomic nervous system, in conjunction with the hypothalamus and limbic structures, regulates the body's functions in order to evaluate the situation quickly and respond by either ignoring the external stimulus of the other animal or responding by fleeing or attempting to fight. In this way at a very basic level, one can see the origins of exclusivity arising from a fear response which then sets up either a drive to remove oneself from the situation or to stay and fight it out.

Several fMRI studies demonstrated just this issue in which subjects were shown pictures of people of different races (Hart, Whalen and Shin 2000; Lieberman, Hariri and Jarcho 2005). When viewing a person from another race, there is an initial increase of activity in the amygdala relative to the response to a person of the same race. However, studies have also found evidence that this amygdalar response could be enhanced or attenuated through social mechanisms since faces of well-known people of other races does not cause the same response. Thus, the ability of human beings to add in higher cognitive processes typically attenuates the response, but there continue to be various behaviors that help in this regard. Greeting gestures such as a handshake are likely responsible for helping to diminish feelings of animosity for individuals that are either unknown or belong to an out-group relative to the one individual by helping to better assess the personality and intentions of another (Chaplin, Phillips

and Brown 2000). This greeting ritual helps to reduce anxieties among participants and enables individuals to come together whether for social or ideological purposes. On the other hand, many groups will establish other greeting rituals that clearly identify members of that group relative to members of an out-group. This relatively mild ritual can have strong consequences in eliciting various behavioral responses depending on whether a given individual does or does not know how to participate in that ritual.

There is another aspect to the autonomic nervous system function that may relate to exclusivity and inclusivity as well: the ability of various ritual behaviors, such a mating ritual, to break down some elements of exclusivity in order to enable two or more animals to come together in either a social or mating process. As described above, the original work by Dr. Eugene D'Aquili focused on animal rituals suggesting that rhythmic stimuli such as dances, vocalizations, or other related behaviors as they entrain the autonomic nervous system to support these rhythms and begin to blur the boundary between the animal's self and another animal (d'Aquil, Laughlin and McManus 1979). These mating rituals not only break down the self-other dichotomy to allow mating to occur, but also help to support the identification of another conspecific such that that animal mates with another appropriate other animal. Thus, ritual helps identify other animals as the same species (i.e., to be considered inclusive in the group) and also helps foster a deeper sense of inclusivity between two or more animals (Dal Pesco and Fischer 2020). If the mating ritual is unsuccessful, then the animal rejects the external animal, either from a mating perspective or a social perspective. If it occurs within a context of mating, the ultimate behavioral response may be to walk away. However, if these responses occur in a predatory environment, the response may be to leave or fight. These initial elements of animal inclusiveness and exclusiveness appear to be related to changes in the autonomic nervous system and the hypothalamus. In more evolutionarily advanced animals, the limbic system, particularly the amygdala, is implicated because of its involvement in the fear response.

Human Social Exclusivity and Inclusivity

When considering human social exclusiveness and inclusiveness, there is phenomenological evidence of a built-in mechanism for maintaining a within-group connection while rejecting external groups. Some of the original work performed by Tajfel and his colleagues demonstrated that human beings randomly assigned to various groups often view their "in-group" more strongly and more positively than the "out-group" even though there were no specific reasons to be inclusive or exclusive. Studies illustrated that groups assigned by irrelevant classifications (i.e., a preference for abstract painter Kandinsky or Klee) cause people to choose

maximum profit distinction between the two groups as opposed to maximum benefit for both (Tajfel, Billig and Brundy 1971). Social psychologists Henri Tajfel and John Turner explain, " … the more intense is an intergroup conflict, the more likely it is that the individuals who are members of the opposing groups will behave toward each other as a function of their respective group memberships, rather than in terms of their individual characteristics or interindividual relationships" (Tajfel and Turner 1979). The data on human group inclusive and exclusive behavior suggest that there are in-born mechanisms by which the brain clearly decides that the in-group is more favorable than the out-group regardless of whether there are any clear connections or not. Of course, when this is combined with specific connections, whether they are biological, community-based, or ideological, it strengthens the sense of in-group inclusiveness and out-group exclusiveness to a much greater degree (Tajfel and Billig 1974). More recent work has mapped out some of the brain areas involved in this in-group versus out-group bias implicating areas such as the frontal lobes, anterior cingulate cortex, and insula, which are all involved in our sense of self identity and sense of empathy (Molenberghs and Louis 2018).

However, various ritual behaviors can help modulate the exclusive self-other social behavior and bring about more inclusive behaviors. Human beings often exhibit a wide range of ritualistic behaviors in a social context that help aid in a sense of inclusiveness and can also lead to greater animosity and exclusiveness toward those of an out-group. Such rituals appear in many different social contexts such as community celebrations, athletic events, ceremonies such as graduations, and holidays on a national level. By having established rituals that help to create a sense of inclusivity among participants, humans engender a sense of exclusivity toward those who are not participants (Newberg, d'Aquili and Rause 2001). Incorporating these behaviors into a larger ideological context makes such rituals very powerful mechanisms for dealing with social exclusivity.

Family Bonds and Oxytocin

Regarding neurochemical changes associated with social interaction, oxytocin release appears to be an important mediator of inclusive behaviors by fostering social bonds. To expand upon this, we can consider several examples in which oxytocin does, in fact, stimulate social bonds. One of the striking findings physiologically that occurs at childbirth is the substantial release of oxytocin by the mother (Heffner 2001). Oxytocin levels are also elevated throughout the early months of infancy in order to maintain breastfeeding. Interestingly, oxytocin also has the ability to create affiliative behaviors among individuals. Oxytocin itself is also released at the height of sexual experience during orgasm. It has been suggested that oxytocin receptors in the brain enable individuals to break down

the self-other dichotomy and allow the intense closeness or connection between the self and other individuals involved at the time of oxytocin release (Kirsch 2005; Bartz and Hollander 2006). For example, mice bred without the oxytocin gene did not develop social memory, as evidenced by the absence of social behaviors including mate guarding and parental care (Ferguson et al. 2000). Substantial bonds are established between individuals when there is a concomitant release of oxytocin (Pedersen, Ascher and Monroe 1982; Bartz and Hollander 2006; Lim and Young 2006).

The importance of oxytocin in creating feelings of inclusivity also finds support in animal studies. One of the most striking studies that supports this comes from an animal model of two species of rodents—prairie voles and montane voles (Insel and Shapiro 1992). The prairie vole species is observed to be monogamous for life and has a very structured social hierarchy. The montane species is highly promiscuous and has a poorly defined social structure. The primary neurophysiological difference is that the monogamous group has a high concentration of oxytocin receptors in their brain while the other group has very few. The promiscuous group has a preponderance of vasopressin receptors. Vasopressin is another hormone released from a similar area in the pituitary that is more involved in aggression and partner preference selection (Winslow et al. 1993). Studies have also shown that administering oxytocin stimulates formation of partner preference in female prairie voles (Williams et al. 1994).

In a human study of romantic love, researchers scanned subjects' brains when viewing objects of their attachment, either children or significant others. The brain scans depicted activated regions that coincided with areas known to contain high densities of oxytocin and vasopressin receptors, thereby supporting the hypothesized evolutionarily conserved pathways for parental and romantic love (Bartels and Zeki 2004). Oxytocin may also be an important mediator in feelings of trustworthiness, which is clearly an important element when considering feelings of inclusiveness or exclusiveness (Zak, Kurzban and Matzner 2005).

In considering the macro level of the brain, there are a number of changes in brain function that might be associated with altering feelings of social inclusivity and exclusivity. This begins in the early development of the individual. An important study evaluated oxytocin responses in children who had been neglected and found that a failure to receive typical parental care as infants disrupts the normal development of the oxytocin system in young children (Fries, Ziegler and Kurian 2005). The authors suggested that this abnormal development may interfere with the calming and comforting effects that are usually expressed by children. This study also noted that while more stable care helps attenuate some of the effects of infant neglect, it does not do so completely.

In older individuals, there are also a number of brain changes that occur as the result of mating and other social rituals (Storm and Tecott 2005). Human beings, similar to other animals, require the ability to break down the self-other dichotomy so that mating and other social behaviors can occur. This break down of the self-other dichotomy usually requires rituals in much the same way animals require rituals, however in a much more complex manner. Thus, whether we consider oxytocin effects or ritual effects, it seems that the brain is set up to be able to support both exclusive social behavior as well as inclusive behaviors.

Ideological Exclusivity and Inclusivity

Overview of Ideological Exclusivity and Inclusivity

A third type of exclusivity and inclusivity is ideological and refers to ideas or thoughts that have either an exclusive or inclusive element to them. This can occur for an ideology or ideologies that define a particular individual, or group of individuals. For example, a political system might state that only certain rules should apply and thus those who do not follow the rules be excluded from society. Even a scientist may feel that he or she has established a theory that is correct in describing some physical phenomenon that is substantially better than any other theory describing the same phenomenon. This is a sense of ideological exclusivity. Such exclusivity can be observed in a number of disciplines including religion, but also are pervasive throughout politics, society, and even the sciences and academia. Ideological inclusivity is often found in approaches that are multidisciplinary and, as such, seek to integrate other views into a more global perspective. However, this sometimes can create a problem when paradoxical views must be considered. It is generally easier in such a circumstance to exclude discordant views.

The religious version might also be considered "doctrinal" exclusivity or inclusivity. Doctrinal exclusivity involves specific references in religious texts that indicate that the particular religion is the only one with the true knowledge of God or ultimate reality. Individuals following this doctrine might be considered "special" people and the ideas in the text support the notion that their beliefs alone, are associated with the true reality. For example, in Deuteronomy, 14:2, "For you are a holy people to Hashem your G-d, and G-d has chosen you to be his treasured people from all the nations that are on the face of the earth." Most religious belief systems specifically state the uniqueness of the doctrine and the exclusion of other approaches (also see examples below).

This notion of exclusivity, whether religious or otherwise, is also supported by the further incorporation of information or data that support the primary idea and refutes others. Suffice it to say, the human mind will

frequently attempt to uphold its own personal belief system over those of others in a fairly aggressive manner. The primary belief system is often supported regardless of evidence to the contrary and evidence to the contrary is often dismissed as being irrelevant or erroneous. On one hand, this is important for defining the individual and the system of beliefs that make up at that individual. But if upholding a prevailing belief system becomes too strong, or too violent, it can have destructive outcomes for both the individual and society.

In terms of religious doctrine, most ancient texts refer to their particular perspective on God or ultimate reality as representing the true perspective. In many circumstances, other belief systems are referred to as being erroneous or faulty. In this way, the religious doctrine itself supports a notion of exclusivity by claiming itself to be the only valid truth point. Thus, the ancient texts and doctrines will support a sense of animosity toward or rejection of other belief systems in support of the primary one. The following examples from the Jewish, Christian, and Islamic sacred texts are examples of ideological exclusivity.

> So I have said to you: You yourselves will possess their land and I myself will give it to you for a possession, a land flowing with milk and honey. I am the Lord your God who has set you apart from the other peoples. Leviticus 20:24

> Jesus saith unto him, I am the way, the truth, and the life: no man cometh unto the Father, but by me. John 14:6

> O YOU who have attained to faith! Do not take the Jews and the Christians for your allies: they are but allies of one another and whoever of you allies himself with them becomes, verily, one of them; behold, God does not guide such evildoers. 5:51 Quran Al-Ma'idah (The Table Spread)

Thus, each purports their own belief system as the one that is correct and set apart from others. At times, the ideological exclusivity also describes certain behaviors and feelings that should be expressed toward those of alternate belief systems. We read frequently in ancient texts that members of another religious belief system should either be killed or sent to Hell in order to substantiate or uphold the belief system.

Exclusivity within Belief Systems

When considering the basic elements of ideological exclusivity, we must begin with the overall approach to various belief systems that human beings hold. There is substantial evidence to suggest that any belief system that is held by an individual is typically held with a great deal of strength (Newberg and Waldman 2006). To that end, the individual human mind or brain will make substantial efforts to uphold a particular belief system that entails not only finding means for supporting a specific system but

also rejecting opposing systems. This is a typical pattern of brain function. Whenever the brain focuses on a particular object or task, there are two mechanisms functioning together. The first mechanism is to support the task itself. This is often mediated by the frontal lobes, which have the major functions of focusing the mind, coordinating and producing behaviors, and also have been described as representing "the seat of the will" (Frith, Friston and Liddle 1991; Price 2005). The frontal lobes also work in conjunction with other structures such as the thalamus to gate or inhibit other neural behavior including sensory, emotional, and cognitive, so that irrelevant information is excluded (Carter 1998). This enables a clear task focus for the individual so that the person may perform that task with efficiency and without distraction. The second function is to screen out or reject irrelevant or useless information. From a brain function perspective, activity is increased in the frontal lobes while other areas are inhibited. In addition, neuronal connections that support the task are strengthened while those that do not support the task are weakened.

From the ideological perspective, there is an analogous function in the brain such that the current state of a belief system is upheld by the brain while other, what are deemed to be irrelevant beliefs and ideas, are dismissed or rejected. There is interesting evidence of this type of behavior and thinking when one analyzes thought processes in various individuals under certain circumstances. Such studies evaluated various elements of critical thinking in various individuals with a focus on religious beliefs and their impact on various logical approaches to problems. In a study assessing the abilities of religious and nonreligious students' abilities to discern proreligious and antireligious logic as correct or incorrect, the experimenters presented each group with the same 36 syllogisms. The proreligious students were more likely to judge the illogical proreligious syllogisms as correct, whereas the antireligious students were predisposed to believe the incorrect antireligious ones (Feather 1964). When the experimenters conducted a similar study, they gathered similar results (Feather 1967). Thus, the results suggest that whichever belief systems are held by an individual, whether they be related to religious or nonreligious belief, affect our ability to think rationally and logically because our brain is has a "preference for consistency" within our own belief system (Feather 1964).

There are other examples that also demonstrate the desire to create a consistent belief system and to maintain that system. Even within the scientific community, what has been the case is that leading scientists will select a principle theory or idea based on original data that they feel explains some phenomenon. As greater and greater data are observed to support that theory, then that theory becomes the standard within that particular scientific paradigm. When conflicting data begin to emerge, the usual initial response is a rejection of that data as being "poor science." It is not until a substantial amount of conflicting data develops in order to convince

key scientists that begin to shift the paradigm and rearrange the existing theory into a new paradigm.

This notion of paradigm shifts is a fascinating one that Thomas Kuhn (1996) first developed approximately 30 years ago. These paradigm shifts are similar to ideas of ideological exclusivity in that a paradigm shift is often very difficult to come by. The prevailing paradigm is something that is held onto very tightly by the existing group of scientists in such a way that any other approach to science is often deemed as quackery or simply incorrect. However, as we just mentioned, when both sufficient data and a sufficient "critical mass" of scientists come to recognize that the prevailing theory is incorrect then a paradigm shift may occur and new data begin to support the new paradigm.

Science is not the only field in which paradigm shifts occur, we also observe paradigm shifts in communities, morality, political systems, economic systems, and ultimately religious systems. In fact, it should be noted, that even within a specific belief system, such as Christianity, there can be substantial paradigm shifts. Christianity today looks very different from Christianity 400 years ago, 800 years ago, and 2000 years ago. It is not necessarily that the foundational myth of that religion has been altered, but the approach, analysis, and implementation are ultimately altered throughout time. However, as with any other paradigm shift, religious paradigm shifts occur with a great deal of trepidation, caution, and often animosity.

Inclusivity within Belief Systems

Inclusivity is also prevalent in belief systems and is what ultimately defines the belief system in general as well as for the individuals that adhere to that system. In other words, all of the ideas and concepts that are included in the belief system constitute that belief system. The inclusiveness could relate only to those specific concepts or can actually extend to incorporate and integrate other points of view. Such philosophical or religious belief systems tend to be considered more holistic and unifying. One example in religion is the belief system espoused by Unitarians who often do not fully support even the primary tenets of Christianity, even though that tends to be the foundation. However, Unitarians are highly tolerant of other belief systems. Other groups and ideologies also can be accepting of different belief systems, even those that run counter to their own. Examples include the Church of Religious Science (which openly embraces all religious beliefs while rejecting any formal doctrine), the Unity Church (which endorses a broad Christian theology, mixed with elements of Eastern religion), and the Self Realization Fellowship (which blends Eastern and Western religious beliefs). Other esoteric sects, such as the India-based Sufi groups, reflect a more inclusive humanistic stance, as did the Deists of

the eighteenth century, who rejected the doctrines of organized religious institutions.

From a ritual perspective, it is interesting to note that inclusivity in rituals is related in part to the participating group. Thus, the larger and more divergent the group, the more inclusive is the ritual. For example, Thanksgiving in the United States is highly inclusive since it supports no specific religious belief system and merely asks that we be thankful for the things we have. There is nothing about this that could be rejected from most other belief systems. So, everyone in the United States can participate and the ritual becomes very universal. However, even if there is a small group of individuals participating in a ritual, if the doctrine or ideology supporting that ritual still focuses on a global sense of inclusivity (i.e., all human beings even those not participating in the ritual), then the overall result can be holistic and integrating rather than exclusive. On the other hand, if the ritual of a small group supports only the group and rejects other groups or doctrines, then the result becomes exclusive.

As stated, the inclusive ideologies tend to be more holistic in their orientation and this may be directly related to the parietal lobe function related to the self-other dichotomy. This may also be related to more right hemisphere function that tends to be more creative and holistic. Such functions also may be associated with concomitant limbic functions that support positive emotions and the release of neurotransmitters such as dopamine and oxytocin further fostering feelings of inclusivity. As experiences of inclusivity become more profound, they appear to be associated with altered states of consciousness. These states may be referred to as spiritual or mystical experiences. Such states are also an extension of the notion of the self and self-consciousness.

Identity and Self-Consciousness

Levels of Conscious Awareness

In previous work, my colleagues and I have described a hierarchical system of multiple levels of conscious awareness (Newberg and Waldman 2016). The base level that connects us with the external environment is referred to as instinctual awareness, which takes in basic sensory stimuli and responses. This involves core structures such as the brain stem, thalamus, basal ganglia, and limbic system, that are involved in sensory reception and response. The next level is habitual responsiveness that does require some memory processes and learning but is still quite basic in its responses involving core areas of the brain plus the cerebellum and possibly primary processing cortical areas (areas that do initial processing of sensory input such as interpreting lines and colors in the visual system). This is followed by intentional decision making. This becomes more relevant in the

context of human thought processes in which we are able to use our frontal lobes, particularly the prefrontal cortex, and temporal lobes to develop language and thought as we consider various ways of personally interacting with the world. In humans, the next level is creative imagination. Creative imagination includes mind wandering, daydreaming, free association, and ultimately purposeful creative processes through art, music, and literature. These creative processes incorporate multiple brain areas and networks including both higher cognitive processes in both hemispheres, as well as important emotional and sensory processes.

The highest levels of consciousness are typically self-reflective awareness in which we are aware of our self and how our self is represented in our mind and in the world. Self-reflective awareness probably incorporates areas of the brain such as the anterior cingulate, insula, and precuneus, as well as parts of the frontal, temporal, and parietal lobes. It is also this level of consciousness that helps us to develop compassion and empathy for other individuals, recognizing that they too have a sense of self-consciousness.

The highest level of consciousness might be referred to as transformational awareness, which is essentially the kind of experiences described above. This typically refers to spiritual and religious experiences that change the self and change the person's perspective of the self. A common element is the loss of the sense of self and the connection or unity of the self with something greater such as the universe or God.

The study of self-consciousness is quite complex and challenging. Of course, the greatest challenge of all is what is referred to as the "hard problem" of consciousness which has to do with where consciousness arises in the first place. Can we say that the biological brain itself produces consciousness—that somewhere in our neurons, electrical firings, and neurotransmitters arises the subjective experience of consciousness? Or is it possible that consciousness produces the brain?

But before we can even get to the hard problem, we can study self-consciousness through a number of potential avenues. They all have the capability to provide relevant data for understanding self-consciousness.

The Study of Consciousness

There are a number of ways of studying self-consciousness. Each approach has intriguing implications for understanding the specific circumstances by which consciousness comes about, is manifested, and is altered. Below are five avenues of investigation that are not meant to be complete, but rather provide an overview of the many possibilities available.

The first approach, which has been a primary focus of much of my own research over the past 30 years, has been the study of consciousness in religious and spiritual individuals (Newberg 2018). Studying spiritual

practices such as meditation and prayer helps to understand how the use of various mental tasks, that is, cognitive, emotional, and motor, can result in a variety of altered states of consciousness. Evaluating various spiritual and mystical experiences, particularly those that are the most intense, helps us to understand the phenomenal characteristics of consciousness as well as the brain correlates.

A related set of studies explores near-death experiences (NDEs) that are frequently described as religious or spiritual, but have unique characteristics (Greyson 2021). For one, NDEs occur typically when a person is near to death physiologically. They also have a core set of components including a life review, the sense of traveling through a tunnel, and entering into the realm of light. Perhaps most important in the context of consciousness is that there is frequently the experience of leaving one's body and observing the world from a different spatial perspective. These experiences offer a potentially unique opportunity to assess whether consciousness actually can migrate beyond the brain, and studies are ongoing to explore this (Parnia 2014).

There has also been a resurgence in the study of psychedelic experiences. While popular in the 1960s, the use of various psychedelic compounds dates back thousands of years in shamanic cultures. More recently, scientific studies have explored the impact of various psychedelic compounds such as psilocybin and have observed that the experiences people have while under their influence are frequently described as intense spiritual states (Yaden, Nguyen and Kern 2016). Since these altered states of consciousness are associated with specific psychedelic compounds, we can also study the various neurotransmitters involved in these altered states of consciousness such as the serotonin or dopamine systems.

The second approach is to study consciousness in individuals with various pathological conditions. For example, patients with different neurological conditions such as seizures, strokes, or tumors can be evaluated to assess how such conditions affect their consciousness. Seizures are clearly associated with an altered state of consciousness, but interestingly have sometimes been linked with intense spiritual experiences. Areas of the brain such as the temporal lobe are frequently implicated, but more research is needed to understand that relationship. Other studies have explored neurodegenerative diseases such as Alzheimer's or Parkinson's disease as these also can affect a person's consciousness in addition to their sense of religious or spiritual beliefs. Studies evaluating the brains of neurological patients have led some investigators to find other areas of the brain, such as the periaqueductal gray in the brain stem, to be particularly involved in spiritual states. Psychiatric disorders such as schizophrenia and mania have also been associated with unusual religious and spiritual experiences and beliefs. These disorders also affect consciousness in either minor

or major ways, and hence, represent an important target for research in this area.

The third broad option for studying consciousness is through personal self-reflection and contemplation. In many ways, this is an approach that has existed for thousands of years. Using prayer and meditation, people have explored their own sense of consciousness and how that consciousness extends into the universe or even into a perceived universal consciousness. While such a self-exploration is not specifically scientific in its orientation, consciousness, due to its subjective nature, may require subjective as well as objective approaches of investigation.

The last two methods for studying consciousness involve exploring consciousness in things other than human beings. Certain animals, particularly higher primates and dolphins, have been shown to have evidence of self-consciousness. A dolphin will spend more time looking at itself in the mirror if certain marks are placed on its head (Loth, Güntürkün and von Fersen 2022). Of course, the communication barrier is a challenging problem, but it might be possible to observe whether animals appear to have consciousness in some form as better methodologies are developed. And last, the world of computers and artificial intelligence continues to advance with the hopes of creating a complex machine that is capable of incorporating consciousness. While still the stuff of science fiction, the possibility of consciousness in a computer raises fascinating issues in terms of how consciousness itself actually works.

Implications for Religious and Spiritual Experiences

Our recent studies of intense spiritual experiences have revealed a set of core components that appear to particularly affect consciousness and lead to self-transformation. The characteristics of these experiences include a profound sense of intensity, clarity, and unity. In addition, these experiences are associated with a sense of surrender or letting go, and ultimately a feeling of transformation of the self.

It is likely that intense experiences are part of what defines the altered state of consciousness that are frequently associated with a sense of surrender since the individual feels that their own consciousness is not driving the experience but responding to it. These experiences are associated with intense emotional responses that are likely associated with the limbic system, which also alters memory processes.

What is not known is how a relatively momentary experience can lead to such a dramatic transformative change for a given individual. It is unclear whether the brain itself becomes completely "rewired" during that time, whether existing neural connections now become activated, or whether there is some other mechanism. Regardless, study of these kinds of experiences will likely be very important in helping us elucidate the nature

of consciousness itself as well as how the sense of self is altered by these experiences.

The impact of intense spiritual experiences on the self also is directly related to the sense of inclusivity and exclusivity. Whether the spiritual experience is included or excluded from the person's prevailing belief system, and vice versa, is an important part of the process. Furthermore, when considering the concept of transformation, we are basically talking about including new ideas into a person's mindset and excluding old ones. This has broader implications for understanding the nature of religious and spiritual beliefs, as well as our overall understanding of reality (Newberg 2018).

Conclusions

This article reviewed issues related to self-identity, the sense of inclusivity and exclusivity that pertains to the self, self-consciousness, the social self, and the ideological self. The self and self-consciousness is one of the most mysterious aspects of the human being. On one hand, we all feel as if we have self-consciousness, but on the other hand, we can never really prove it. In particular, it is almost impossible for any of us to prove that someone or something else has consciousness since we can never get into the subjective mind of the other person. However, there are so many opportunities to explore consciousness, the self, and religious and spiritual experiences as they interact with each other and the brain. There are many challenging possibilities in terms of developing methods for studying these phenomena. And great care must be taken to determine what conclusions can be drawn from these investigations.

At the moment, we can recognize that to some degree we are trapped within our brain, and within our consciousness. This represents our own identity from which we can explore that consciousness through self-exploration as well as through various scientific and spiritual pursuits. In fact, such a combination occurs within the emerging field of neurotheology, that seeks to understand the link between the brain and spiritual phenomena (Newberg 2018). Within this field, the study of consciousness and the self plays a prominent role. And perhaps, by exploring the interrelationship between these various aspects of the self—biological, social, ideological, and spiritual—we will come to a greater understanding of the true nature of reality and how our self identifies and relates to reality itself.

Acknowledgment

A version of this article was presented at the Sixty-Seventh Annual Summer Conference of the Institute on Religion in an Age of Science (IRAS) entitled "'We' & 'They': Cross-Cultural Conversations on Identity," held at Star Island, New Hampshire, from June 26 to July 3, 2022.

References

Bartels, A., and S. Zeki. 2004. "The Neural Correlates of Maternal and Romantic Love." *Neuroimage* 21:1155–66.

Bartz, J. A., and E. Hollander. 2006. "The Neuroscience of Affiliation: Forging Links Between Basic and Clinical Research on Neuropeptides and Social Behavior." *Hormones and Behavior* 50:518–28.

Blanke, O., and S. Arzy. 2005. "The Out-of-Body Experience: Disturbed Self-Processing at the Temporo-Parietal Junction." *The Neuroscientist* 11:16–24.

Campbell, N., and J. Reece. 2002. *Biology*, 6th Edition. San Francisco: Benjamin Cummings.

Carter, R. 1998. *Mapping the Mind*. Berkeley, CA: University of California Press.

Chaplin, W. F., J. B. Phillips, J. D. Brown, et al. 2000. "Handshaking, Gender, Personality, and First Impressions." *Journal of Personality Social Psychology* 79:110–17.

Cherry, K. 2022. What is Perception? Recognizing Environmental Stimuli Through the Five Senses. *VeryWellMind Online*.

d'Aquili, E. G., C. D. Laughlin, and J. McManus. 1979. *The Spectrum of Ritual*. New York: Columbia University Press.

d'Aquili, E. G., and A. B. Newberg. 1999. *The Mystical Mind: Probing the Biology of Religious Experience*. Minneapolis, MN: Fortress Press.

Dal Pesco, F., and J. Fischer. 2020. "On The Evolution of Baboon Greeting Rituals." *Philosophical Transactions of the Royal Society of London. Series B, Biological sciences* 375 (1805): 20190420.

Feather, N. T. 1964. "Acceptance and Rejection of Arguments in Relation to Attitude Strength, Critical Ability, and Intolerance of Inconsistency." *Journal of Abnormal Social Psychology* 69:127–36.

———. 1967. "Evaluation of Religious and Neutral Arguments in Religious and Atheist Student Groups." *Australian Journal of Psychology* 19:3–11.

Ferguson, J. N., L. J. Young, E. F. Matzuk, et al. 2000. "Social Amnesia in Mice Lacking the Oxytocin Gene." *Nature Genetics* 25 (3): 284–8.

Fries, A. B., T. E. Ziegler, J. R. Kurian, et al. 2005. "Early Experience in Humans Is Associated with Changes in Neuropeptides Critical for Regulating Social Behavior." *Proceedings of the National Academy of Sciences, USA* 102:17237–40.

Frith, C. D., K. Friston, P. F. Liddle, et al. 1991. "Willed Action and the Prefrontal Cortex in Man: A Study with PET." *Proceedings in Biological Science* 244:241–46.

Gallace, A., and C. Spence. 2014. *In Touch with the Future: The Sense of Touch from Cognitive Neuroscience to Virtual Reality*. Oxford: Oxford University Press.

Giummarra, M. J., S. J. Gibson, N. Georgiou-Karistianis, et al. 2007. "Central Mechanisms in Phantom Limb Perception: The Past, Present and Future." *Brain Research Reviews* 54:219–32.

Goldsby, R. A, T. J. Kindt, and B. A. Osborne. 2000. *Kuby Immunology*. New York: W.H. Freeman and Company.

Greyson, B. 2021. *After: A Doctor Explores What Near-Death Experiences Reveal about Life and Beyond*. New York: St. Martin's Essentials.

Hart, A. J., P. J. Whalen, L. M. Shin, et al. 2000. "Differential Response in the Human Amygdala to Racial Outgroup vs Ingroup Face Stimuli." *Neuroreport* 11:2351–55.

Heffner, L. J. 2001. *Human Reproduction at a Glance*. Malden, MA: Blackwell Science Limited.

Househam, A. M., C. T. Peterson, P. J. Mills, et al. 2017. "The Effects of Stress and Meditation on the Immune System, Human Microbiota, and Epigenetics." *Advances in Mind-Body Medicine* 31 (4): 10–25.

Insel, T. R., and L. E. Shapiro. 1992. "Oxytocin Receptor Distribution Reflects Social Organization in Monogamous and Polygamous Voles." *Proceedings of the National Academy of Sciences of the United States of America* 89(13): 5981–85.

King, A. J. 1993. "The Wellcome Prize Lecture. A Map of Auditory Space in the Mammalian Brain: Neural Computation and Development." *Experimental Physiology* 78:559–90.

Kirsch, P., C. Esslinger, Q. Chen, et al. 2005. "Oxytocin Modulates Neural Circuitry for Social Cognition and Fear in Humans." *The Journal of Neuroscience: The Official Journal of the Society for Neuroscience* 25 (49): 11489–93.

Kuhn, T. S. 1996. *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press.

Lenggenhager, B., S. T. Smith, and O. Blanke. 2006. "Functional and Neural Mechanisms of Embodiment: Importance of the Vestibular System and the Temporal Parietal Junction." *Reviews in Neuroscience* 17:643–57.

Lickel, B., N. Miller, D. M. Stenstrom, et al. 2006. "Vicarious Retribution: The Role of Collective Blame in Intergroup Aggression." *Personality and Social Psychology Review* 10:372–90.

Lieberman, M. D., A. Hariri, J. M. Jarcho, et al. 2005. "An fMRI Investigation of Race-Related Amygdala Activity in African-American and Caucasian-American Individuals." *Nature Neuroscience* 8:720–22.

Lim, M. M., and L. Young. 2006. "Neuropeptidergic Regulation of Affiliative Behavior and Social Bonding in Animals." *Hormones and Behavior* 50:506–17.

Loth, A., O. Güntürkün, L. von Fersen, et al. 2022. "Through the Looking Glass: How Do Marked Dolphins Use Mirrors and What Does It Mean?" *Animal Cognition* 25 (5): 1151–60.

Lynch, J. C. 1980. "The Functional Organization of Posterior Parietal Association Cortex." *Behavioral Brain Sciences* 3:485–99.

Middlebrooks, J. C. 2000. "Cortical Representations of Auditory Space." In *The New Cognitive Neurosciences*, edited by M. S. Gazzaniga. Cambridge, MA: MIT Press.

Molenberghs, P., and W. R. Louis. 2018. "Insights From fMRI Studies Into Ingroup Bias." *Frontiers in Psychology* 9:1868.

Neusner, J. 1990. "Thinking about "The Other" in Religion: It Is Necessary, but Is It Possible?" *Modern Theology* 6:273–85.

Newberg, A. B. 2018. *Neurotheology: How Science Can Enlighten Us about Spirituality*. New York: Columbia University Press.

Newberg, A. B., and M. R. Waldman. 2006. *Why We Believe What We Believe: Uncovering Our Biological Need for Meaning, Spirituality, and Truth*. New York: Free Press.

———. 2009. *How God Changes Your Brain: Breakthrough Findings from a Leading Neuroscientist*. New York: Ballantine Books.

———. 2016. *How Enlightenment Changes Your Brain: The New Science of Transformation*. New York: Penguin Random House.

Newberg, A. B., A. Alavi, M. Baime, et al. 2001. "The Measurement of Regional Cerebral Blood Flow During the Complex Cognitive Task of Meditation: A Preliminary SPECT Study." *Psychiatry Research: Neuroimaging* 106:113–22.

Newberg, A. B., E. G. d'Aquili, and V. P. Rause. 2001. *Why God Won't Go Away: Brain Science and the Biology of Belief*. New York: Ballantine Publishing Group.

Newberg, A., M. Pourdehnad, A. Alavi, et al. 2003. "Cerebral Blood Flow During Meditative Prayer: Preliminary Findings and Methodological Issues." *Perceptual and Motor Skills* 97:625–30.

Newberg, A. B., and J. Iversen. 2003. "The Neural Basis of the Complex Mental Task of Meditation: Neurotransmitter and Neurochemical Considerations." *Medical Hypothesis* 61:282–91.

Parnia, S. 2014. "Death and Consciousness: An Overview of the Mental and Cognitive Experience of Death." *Annals of the New York Academy of Sciences* 1330:75–93.

Pedersen, C. A., J. A. Ascher, Y. L. Monroe, et al. 1982. "Oxytocin Induces Maternal Behavior in Virgin Female Rats." *Science* 216:648–50.

Price, J. L. 2005. "Free Will versus Survival: Brain Systems That Underlie Intrinsic Constraints on Behavior." *Journal of Comparative Neurology* 493:132–39.

Riek, B. M., E. W. Mania, and S. L. Gaertner. 2006. "Intergroup Threat and Outgroup Attitudes: A Meta-Analytic Review." *Personality and Social Psychology Review* 10:336–53.

Sapolsky, R. M. 2005. "The Influence of Social Hierarchy on Primate Health." *Science* 308:648–52.

Spence, S. A. 2002. "Alien Motor Phenomena: A Window on to Agency." *Cognitive Neuropsychiatry* 7:211–20.

Storm, E. E., and L. H. Tecott. 2005. "Social Circuits: Peptidergic Regulation of Mammalian Social Behavior." *Neuron* 47:483–86.

Tajfel, H., and J. Turner. 1979. *An Integrative Theory of Intergroup Conflict The Social Psychology of Intergroup Relations*. Monterey, CA: Brooks/Cole Publishing Company.

Tajfel, H., M. G. Billig, R. P. Brundy, et al. 1971. "Social Categorization and Intergroup Behaviour." *European Journal of Socical Psychology* 1:149–78.
Tajfel, H., and M. Billig. 1974. "Familiarity and Categorization in Intergroup Behavior." *Journal of Experimental Social Psychology* 10:159–70.
Williams, J. R., T. R. Inselt, C. R. Harbaugh, et al. 1994. "Oxytocin Administered Centrally Facilitates Formation of a Partner Preference in Female Prairie Voles." *Journal of Neuroendocrinology* 6:247–50.
Winslow, J. T., N. Hastings, C. S. Carter, et al. 1993. "A Role for Central Vasopressin in Pair Bonding in Monogamous Prairie Voles." *Nature* 365: 545–48.
Yaden, D. B., K. D. L. Nguyen, M. L. Kern, et al. 2016. "Of Roots and Fruits: A Comparison of Psychedelic and Non-Psychedelic Mystical Experiences." *Journal of Humanistic Psychology* 57 (4): 338–53.
Zak, P. J., R. Kurzban, and W. T. Matzner. 2005. "Oxytocin Is Associated with Human Trustworthiness." *Hormones and Behavior* 48:522–27.