Phantom and Reality

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Touch and feeling are our most reliable and perhaps our most primitive measures of reality; yet we all know that they aren't necessarily reliable. If I put my finger in a flame, I feel the heat of it, the risk to my flesh, and I have not a single doubt in the world of the reality of the flame. When someone asks us a question, even in the most intellectually controlled situation, the initiation of our response comes from our feelings about the question. Feeling, emotion, and touch are complexly interrelated in ways we will continue to explore. As Charles Sanders Peirce showed, hypothetic inference is fueled by a feeling kind of knowing. Yet, a single word may trigger us to feel insulted or abandoned. Common experience reveals that these feelings are often not connected to external reality. Feeling bridges physical and emotional sensation, yet both are powerfully resident in our bodies. While we can trace this insight to Peirce, William James, Walt Whitman, and others in the nineteenth century, it has been but recently that neuroscience has confirmed the importance of emotions in their terms and, regretfully, the bulk of the balance of the academy and public have yet to even contemplate the matter.

V.S. Ramachandran studied many cases of feelings not supported by reality in the fascinating cases of phantom limbs.[1] There is a high incidence among amputees of continuing to feel the limb or body part that has been removed. Sometimes this is the bazaar situation of an amputee feeling that he or she can extend the arm and operate fingers to do such tasks as pick up a coffee cup. Other times it manifests in intense pain in the non-existent limb. Sometimes the feeling is of a limb, but one completely immobile. Physicians and researchers have been mostly mystified by this phenomenon. Ramachandran has made significant progress in both understanding and treating phantom limb syndrome and in doing so he has also revealed much about the workings of the brain in relation to the larger body.

However, even here I feel that Ramachandran's writing often passes too quickly over the bodied side of the issue suggesting that he may need to spend more time reading Whitman and James. So here is how I understand that Ramachandran was able to "amputate" an amputated limb. He uses his little mirror box toy in a bit of trickery. The person affected places his arms (one physically present, the other not) through holes in a box that apparently presses against the chest. There is a mirror positioned in the box that reflects the movements of the physical arm, but in such a way that it appears "to the eye" that it is the amputated arm actually moving. The results are the elimination of the sense of presence and more importantly pain in the amputated arm.

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[1] V. S. Ramachandran and Sandra Blakeslee, *Phantoms in the Brain: Probing the Mysteries of the Human Mind* (New York: Quill, 1998). I've been encountering numerous references to phantom limbs of late. Stephen King's novel *Duma Key* focuses on the phantom limb of his protagonist that seems to have a life of its own. In Jonah Lehrer's wonderful book Proust Was a Neuroscientist (Boston: Houghton Mifflin, 2007) discusses Walt Whitman's discussion of the syndrome based on his experience nursing many amputees in the context of the Civil War. Lehrer also notes that Hermann Melville referred to the syndrome even before Whitman related to Ahab's loss of a limb to Moby Dick.

The explanation is that the brain has mapped the movements (and in other brain maps, the pain) related to the missing arm. Because the brain does not receive any "feedback" from the arm to allow a remapping of the critical brain areas, these maps continue to function and are apparently triggered not by "feedback" information from the limb, but by movement in body parts mapped onto brain areas adjacent to those of the missing limb. To see the limb moving provides feedback and apparently allows the brain map to separate so that it isn't triggered by invading maps.

So Ramachandran, a neuroscientist after all, is interested primarily in the brain-in-the-skull part of the sensorimotor system and particularly with maps and mappings on the brain of the body. From his perspective then the body is in the brain and any difficulty must be resolved by attention to the brain. However, from my perspective which I fully admit is directed to the important of the interoceptive/proprioceptive/movement aspect of this sensorimotor loop, it seems to me that what is most interesting in Ramachandran's work is the essential nature of this self-movement proprioceptive input to sensorimotor neurology. Bodily hands and arms are important body loci for gesture and movement, the groping agentive tools by which we acquire the sensorimotor patterns (the maps) burned into the brain. The brain doesn't come with all these, but only with the general groping explorative gestural patternings. In the terms introduced by C. S. Peirce, the gesturing arm has a position of "firstness" related to brain mappings of limbs and their movement. The body comes into existence in the brain through its self-movement, its groping gestures, that send via proprioceptors, information to the brain to create maps of how hands and arms work in the environment of the particular person experiencing the movement. And also to create understandings of the environment. Ramachandran, to my reading, places this "firstness" in the brain, in the brain maps, of the missing limbs.[2]

Thus, it could be suggested that the brain comes minimally mapped to move the hand and arm to grope as a process of creating more refined maps of the gestural movement that give specificity to the world and to the mover. Thus one born without arms may still sense them because of this originating innate groping gestural program. However, for an amputee, the brain directs movement in the arm in terms of insinuated gestural patterns and continues to engage through accompanying connected maps the feelings that are associated with the habitual movement of the hand/arm. This, of course, indicates that once the body movement schemas are established the brain has a major role in initiating movement and can do so even without afferent or proprioceptive feedback.

The neurological amputation of a physically amputated limb seems to be possible only for phantom limbs that are experienced as frozen. It seems that the "sensed feelings" in a phantom are more or less related to the pre-amputation experience. It seems that a limb that seems to "feel like a dead weight" can be amputated when by means of the mirrored box the eye provides a visual substitute for proprioceptive information about the limb moving. This initiates a conflict between the central nervous

[2] There is the classical "Two Williams Debate" where Wilhelm Wundt held that our knowledge is based on apriori efferent information of a central origin, whereas William James defended the opposite opinion that all that we know about our movements is based on a posteriori information from sensory organs (see Jennerod 1983 and Jennerod 2006, p. 56). Apparently this debate has yet to be clearly resolved.

system's image of the limb as frozen and the "proprioceptive" information that is moves. Ramachandran then suggests that over time the brain finally just gives up the "frozen limb image" and eliminates altogether any sense that there is a limb. It is the conflict then between "proprioception" and image in the central nervous system that leads to change. This does not happen instantly, but only over time through repeated experience. Thus this is not a conscious and intellectual process, but one of high repetition and conflict. This is a huge insight about plasticity; it requires conflict and creative stress must be experienced repeatedly over a significant period.

There is another issue I have thought much about. How is it that amputees "feel" their missing limbs. Feeling, especially feeling of movement, is generally thought to be initiated in and most certainly involve the body parts where the feeling is experienced. This occurs through stimulation of exteroceptors and interoceptors of the part where the feeling takes place. Touch, feeling, sensation tend to be experienced locally. However, for an amputee to have the sensation of "feeling" in a phantom limb, indeed, for there to be a phantom limb at all, there must be some significant aspect of feeling and the motivation of feeling that occurs without dependence on the exteroceptors and interoceptors of the missing limb. One likelihood is that when specific sensory receptor connections in the brain are not used, the corresponding brain areas are taken over by adjacent body mapped areas. Thus the stimulus felt in a limb does not come from the receptors in that limb, but from the receptors in other body parts that now are interconnected with the "feeling" maps in the brain. There also may be the possibility that gestural patterns that are neurologically mapped are wired to feeling maps. As these maps continue to function, absent of the information that commands are no longer being executed in the muscles and joints, the feelings continue. All rather interesting and complicated.

There are a number of other provocative issues associated with phantom limb studies that are valuable for us to consider with respect to our seemingly distant interests in the study of religions and cultures.

First, how do we grasp the complexity of the brain? While we have faced this before, I feel it is essential to try yet again, in hopes that, with each iteration, we'll grasp the matter a bit fuller. Ramachandran put it this way:

> A piece of your brain the size of a grain of sand would contain one hundred thousand neurons, two million axons and one billion synapses, all "talking to" each other. Given these figures, it's been calculated that the number of possible brain states—the number of permutations and combinations of activity that are theoretically possible—exceeds the number of elementary particles in the universe. [3]

In 1913 Henry Poincare tried to mathematically model the relationship between three interacting objects in gravitational orbits only to determine that this is entirely incalculable. This was the introduction of chaos theory. There is an easy mathematical solution to two interacting objects, but three become impossible. Imagine a much greater number. It is not that synapses are bodies moving relative to one another in a gravitational field, but I think the analogy is significant. How can one grasp

[3] Ibid., p. 8.

such utter complexity presented by the brain? Brain scientists are not kidding when they tell us that they know next to nothing about the brain.

I suppose the down side of attempting to grasp all this complexity is that we have no hope whatsoever of actually understanding a significant amount of the physical bodied aspect of being human beings. Ramachandran keeps reminding of this fact. When we appreciate that we are bodies even as we are minds and spirits, the sheer order of complexity may seem so great as to emotionally shut us down. However, should we want to hold out any hope for retaining awe, mystery, wonder, what could possibly rival the appreciation of the complexity of brain/body/mind/spirit or movement? Clearly our fears should be relieved that to consider religion and culture from the perspective of the body is somehow reducing them to the merely mechanical, physical, or chemical. Indeed, it is to the very order of complexity that we find the basis for our freedom, for our individuality. I'll want to take this topic up in greater depth.

I am interested in the mapping aspect of Ramachandran's phantom limb studies. He, as have many before him, shows that the human body is mapped on the brain. He says that "the entire body surface is mapped on the brain"[4] and that there are many maps in the brain corresponding to body and bodily functions.[5] Thirty maps are known to be associated with vision alone.[6]

Since mapping is one of the principal metaphors that the study of religions and cultures use to help us understand what we are doing,[7] I want to reflect on what neuroscientists mean by maps. By maps they indicate that there is a physical representation in the brain of the terrain of the body. Yet, in this instance of mapping the relationship between the brain map and the body part is an actual neurological connection. Here stimulating an area of the brain map will result in a felt sensation or physical action in the corresponding body part and vice versa. We can certainly appreciate why the brain areas corresponding to body areas are called maps. There is a one-to-one relationship between the two and the physical area taken in the brain is a tiny fraction of the physical area of the body surface, thus there is a scale in the relationship between map and territory. However, unlike conventional maps, these brain areas corresponding with body features are neurologically connected. I think, in this instance, it would be better to adjust our understanding of the body and the brain to understand them as inseparable. The body surface is surely nothing but meat without the interconnection to the brain and the brain area is useless without connection to the body. Someone indicated that the skin is the outer surface of the brain. The body is the extension of the brain. This mapping is, at least in one sense (but only one sense), hardwired, genetic, generic to being human, or generic to having a brain.

Should we use this type of mapping as metaphorically reflecting some aspects of the study of religions and cultures, we would understand more fully the relationship between scholar and subject. As

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[4] Ibid., p. 27.
[5] Ibid., p. 29.
[6] Ibid., pp. 39 and 72.
[7] See for example Jonathan Z. Smith's "Map is not Territory" in *Map is Not Territory: Studies in the History of Religions* (Chicago: University of Chicago Press, 1998). See also Sam Gill, "Territory" In *Critical Terms for Religious Studies*. Edited by Mark C. Taylor (Chicago: University of Chicago Press, 1998), pp. 298-313.

scholars, particularly seeing ourselves as generally removed from society, the distance symbolized by the idyllic campuses on which we dwell, we seem to care not about our relationship to our subject. Only rarely would we think of ourselves as actually interconnected with them. We may occasionally encounter "them" in the field; we may occasionally invite one of "them" to come into our space; yet, we do not consider our mapping as anything beyond marks on pieces of paper.

A large amount of the research I have done on the study of religions and cultures has documented the actual and physical impact scholars have on their subjects. My book *Storytracking*[8] included a consideration of two of our most important and influential religion scholars—Mircea Eliade and Jonathan Smith—to show how both of them construct the subjects they use to document their understandings of religion and in doing so their subjects, actual people and cultures, have undergone significant change. The cases I have worked on are not isolated and unusual examples. Timothy Mitchell's book *Colonizing Egypt*[9] shows how nineteenth century European exhibits representing the city Cairo resulted eventually in physical changes in the city so that it would conform to European expectations. I could provide many examples. Certainly the academy is a colonial enterprise and we surely must know that we have changed the world as we have studied it. We insist that the world we observe conform to the expectations we have of it. Our study of something invariably transforms it, in itself, to correspond with our expectations projected on it.

The point here is that we need to think of ourselves as connected to our subjects in the same way as our bodies are connected to our brain maps, that is, they are connected and interdependent. Such a perspective demands that we be more sensitive and responsible scholars. And more powerful as well.

Another mapping that Ramachandran discusses is the sort involved in human perception. Ramachandran discusses this mapping in the context of his phantom limb studies. While the limb is physically absent, the brain creates and holds a map of the missing limb, often interwoven with other body areas reflecting powerful sensations like pain attributed to the missing limb. The absence of the interconnection between brain map area and corresponding body area is not known to the corresponding area of the brain. Ramachandran uses a mirror illusion to give visual feedback to the brain. [10] I'll consider the relationship between vision and touch shortly and in later sections of the course.

The most important principle underlying all perception, according the Ramachandran's research, is "that the mechanisms of perception are mainly involved in extracting statistical correlations from the world to create a model that is temporarily useful."[11] The sort of mapping that is involved with perception is more like our traditional understanding of mapping in that the map and territory are related, but separate. The brain has a symbolic representation of the external world. Perception is fundamentally an interpretive and representative enterprise, not one that objectively records the external reality. Nor is it a one-way process, that is, from external to internal, but rather an interactive oscillatory process, a

[8] Sam Gill, *Storytracking: Texts, Stories, Histories* (New York: Oxford University Press, 1998).
[9] Timothy Mitchell, *Colonizing Egypt* (Berkeley: University of California Press, 1991)
[10] Ramachandran, pp. 46-48.
[11] Ibid., p. 59.

comparative process, if you will. Perception is a process of creating symbolic images and patterns that our brains use to operate all the functions of the body, the body-mind. The process is creative in that it, like the interpreter functions of the left brain, seeks whole pictures, meaningful relationships, congruency, and sensibility.[12] Ramachandran includes a number of visual exercises with diagrams he includes to demonstrate how vision fills in (the blind spot, for example) and alters patterns.[13] His parlor games, as he calls them, demonstrate how our visual blind spot is filled in, in effect assuring gapless coherence of reality. Filling in, providing the missing pieces, is the way perception works. We have images of our bodies and the world that guide our perception and help fill in gaps in the raw data that we collect to conform to these images. Yet, our perceptions also serve to reinforce as well as modify and even radically change these images. In this understanding Ramachandran believes that nature is not opposed to nurture, but rather, as was demonstrated in the many studies of color, there is a complex interaction between them.[14] Yet it seems to me that Ramachandran misses something important in his statement "*Your own body is* a phantom, one that your brain has temporarily constructed purely for convenience."[15] Maybe this is likely to seem accurate for academics who never get up off their asses, but the whole point is that there is an interactive and interdependent relationship between the central nervous system (the brain in the skull) and the muscles and skeletal system which play an essential (its position of "firstness") role of this system.

To apply this information to our work, the stream of readings we are doing is hammering home the position that human beings are story-makers and storytellers. Our bodies, including our brains, are designed to fill in gaps, to make up stories, to reshape raw perceptual information to confirm resident images and schemas, to use held images and schemas to shape our perceptions, to engage in imaginative playful oscillatory creative processes. Gazzaniga showed this human quality in terms of brain hemispheric actions. Johnson demonstrated this with the sensorimotor patterns he calls image schemas and basic level categories and the very idea of categorization as developed by Lakoff. Ramachandran believes that in some senses our bodies are phantoms, fabrications of our brains. He argues this because he can show that our perceptual processes fill in gaps, shift lines, construct images based on unconscious best guesses. We must surely be impacted by this overwhelming realization that we are prone to creating fiction and we do not even know we are doing it. But we must also understand that without the exteroceptors, without the muscle/skeletal body, there would be no gaps even to fill in.

We may choose to be horrified by this information or to celebrate it, but we most certainly should not ignore it. As students of religion and culture we must not only recognize these processes in ourselves, but also in our subjects. We create ourselves and one another as we discover one another and ourselves. And we do all this through a tapestry of highly complex system where such simple divisions as brain and body are forced and artificial at best … likely the product of our specialization.

[12] In Lecture 13 I'll take up fit and coherence.
[13] Ramachandran, pp. 90-97.
[14] Ibid., p. 56.
[15] Ibid., p. 58.

Another aspect of Ramachandran's work that fascinates me is its implications for touch. I'm a big fan of touch as a foundational sense. Touch is a remarkably complex sense that involves sensation on the skin, the surface or outside, while at the same time touch or feeling occurs on the inside from the flesh below the skin. And there is also proprioceptive touch[16] which is how the body knows where it is in space, that is, the internal touch of the body by the body itself. How appropriate it is that touch is inseparable from feeling and emotion. Touch and feeling are, as I noted at the outset, a ground of our bodily being and the unquestioned measure of reality. Touch and vision are interconnected. We'll study this later as we consider Maurice Merleau-Ponty.[17] Ramachandran demonstrates the connection by his mirror trickery (visual information substitutes for proprioception) used with amputees, where vision provides a feedback loop to help revise brain mappings (the neurological type) of body parts, in this case, missing body parts. Touch is also the sense most associated with sensorimotor actions, that is, with self-directed and experienced bodily movement. Touch invariably invokes a sense of movement.

Were we to carefully contemplate the importance of touch to being human, we would surely revise in significant ways our approach to the study of religion and culture. The sensorimotor patterns, the basic level categories, set by repetition throughout the long history of our academic studies of religion exclude, almost totally, any of the implications of touch even its interdependence with vision.

Ramachandran shows, through a fascinating exercise that we may appear to feel in our own bodies someone touching a table.[18] The ease with which we are capable of incorporating, in a feeling way, in an experiential way, non-fleshy things into our bodies is quite remarkable. Ramachandran's demonstrations that we can feel stimulation to a plastic hand or even a table top, obviously and visually confirmed as inanimate and artificial, is most amazing. It is matter of course to embrace the idea that we may transcend the boundaries of our skin by touch. But we don't generally think that we can have feeling sensations from external and artificial objects in the same sense we feel with our bodied sense of touch. Again this ability to appropriate objects into our bodies is possible primarily through the sense of touch conditioned by even a remarkably brief period of sensorimotor patterning. Such insights take us back to the classic theories of magic presented by E. B. Tylor in the late nineteenth century. It opens many interesting possibilities for expanding our studies. It increases the sense of importance of repetitive patterned movement forms such as ritual and dancing. It increases the sense of importance of our relationship to objects and material culture. The objects and structures we surround ourselves with are extensions of ourselves and we come to actually feel the external world through the incorporation of these objects into our bodies. Think of our clothing, our transportation vehicles, our houses, our cities, our countries. Through routinized sensorimotor conditioning we feel in our bodies through these inanimate, non-sentient, and completely constructed things.

[16] I'll deal with this topic more fully in a later lecture.
[17] See Lecture 10
[18] Ramachandran, pp. 60-61