In the last chapter, we learned how humans evolved as hunter-gatherers and how our genetic, mental, and behavioral nature was conditioned by and for this kind of life, even as we now live in a very different artificial environment created by agriculture, economic markets, and technology. We considered how evolution had shaped our predispositions for religion and what functions and dysfunctions religion might have played in our species's history. We were introduced to the idea that the human mind was modular, that there were instinctive dispositions that then developed in conjunction with social and environmental factors into various inference systems in our brains. Religion, we were told, could be understood as a potent combination of these different inference systems in our evolved brains—agency detection, ontological categories, intuitive physics, intuitive psychology, pollution-contagion templates, memory-recall patterns, and so forth, all assembled and accessed as independent mental modules. This was one of several evolutionary approaches to understanding religion.

In this chapter, we are going to examine the human brain directly to see how the cognitive neurosciences try to understand and explain religious and spiritual experiences. There has been a tremendous amount of new research and new insights into the working of the human brain in the last few decades. Powerful new tools also allow us to examine the function of healthy human brains, and these tools have recently been used to study the brain functions of Buddhist monks, Catholic nuns, Pentecostals speaking in tongues, and others.

**Inside the Brain**

If you look inside the human brain, you do not actually see these mental modules previously referred to. There is no piece of the brain that one could label the “agency-detection module” or the “pollution-contagion module.” In dissecting a human cadaver, we first see large-scale structures.
On the outside is the cerebral cortex, or neocortex, including areas labeled the frontal lobe, the parietal lobe, the occipital lobe, and the temporal lobe; and of course, these are divided into two hemispheres, right and left, with a broad band of nerve fibers known as the corpus callosum connecting the two halves. If we peel away the neocortex, we discover the mesocortex and subcortical structures in the limbic system, including the thalamus, the amygdala, the hippocampus, and the cerebellum, all connected to the brain stem and the spinal cord. This much you probably already know. Images of the human brain have become iconic in the modern world.

A lot of what we know about the specialized functions of different areas of the brain comes from observing survivors of traumatic brain injuries or stroke victims. In both cases, neuroscientists correlate the destruction of certain brain regions due to hemorrhaging or injury with the loss of particular mental functions, for instance, the loss of motor control, speech, or even particular parts of speech or sets of word concepts, the latter known as aphasia.

Curiously, memory seems to be distributed throughout the brain and is not located in any particular region. I recall a colleague at Oxford University, whom I visited in the hospital shortly after he had had a stroke. He could point to Paris or London on a map, but he could not say the word “Paris” or “London.” Nor could he speak the names of any number of other common items and places, though he certainly knew what they were and could directly point to any of them. When I said “wallet,” he reached into his back pocket, pulled out the wallet, but he just could not say the word. Our brains are strange indeed, though we take them for granted until something goes wrong. Fortunately, my friend was able to recover his speech fully but did so by training new regions of the brain to compensate for the loss of the one region destroyed by the stroke. This is an example of another curious characteristic of the brain called neuroplasticity, something that we progressively lose as we grow older. This neuroplasticity explains in part why young children can effortlessly learn foreign languages, while adults must struggle with the drudgery of repetition and memorization.

When we examine a brain under powerful microscopes, we see that it is made up of neurons. There are different types of neurons in the brain and throughout our central nervous system in the rest of the body, but they all share a basic structure. The cell body contains the nucleus and organelle. Extending out from the cell body are lots of dendrite “trees” and axon “arms.” These connect to other neurons. This maze of connections ends in synapses, linking each neuron with hundreds or thousands of others. The neurons fire electrical charges in the form of chemical ions, which are mediated by a variety of neurochemicals produced endogenously by the brain. The chemicals produced and present in different areas of the brain are very important to how the brain functions.

There are a lot of neurons in the human brain, estimated at $10^{11}$ (100 billion). Each neuron has on average about $7 \times 10^3$ (seven thousand) synaptic connections. A three-year-old child has about $10^{16}$ synapses (10