LIVING IN A MINDFUL UNIVERSE

A NEUROSURGEON'S JOURNEY INTO THE HEART OF CONSCIOUSNESS

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imagination, especially when there is but one witness to it—the observer within. But there are ways to validate information received through psychic means, and scientific study of remote viewing, a method that allows such validation, has shown fruitful and encouraging results that suggest such effects are quite real.

By tapping into the Collective Mind, our conscious awareness can access many layers of the information substrate underlying physical reality. Some would call this substrate the quantum hologram, or Akashic field. We can access not only the information pertaining to our experience, but extended information across much broader swaths of space and time through methods such as remote viewing. Some readers are no doubt aware of the CIA's 23-year-long remote viewing or "psychic spy" program managed by nuclear physicist Ed May and laser physicists Hal Puthoff and Russell Targ, who were based at Stanford Research Institute. The intelligence arms of other governments (China, Russia, and Israel, among others) have hosted similar programs, especially given the fact that there does not seem to be any mode of defense against such mental probing techniques, necessitating active offensive programs.

Many of the more significant research findings of the American investigators have been published in such esteemed scientific journals as *Nature* and *Proceedings of the IEEE*. Widely known successes of remote viewing programs include the location of US hostages during the Iranian hostage crisis (and the prediction that one would be released because of poor health), discovery of crucial clues in solving the kidnapping of newspaper heiress Patty Hearst, identification of a top-secret Soviet weapons factory in Semipalatinsk, the location of a missing Soviet Tu-22 bomber in Zaire, and the viewing of the ring around the planet Jupiter prior to its official discovery by the *Voyager 1* spacecraft, among others.

The public perception of the program was besmirched by the 1995 American Institutes for Research report, which concluded that the information provided by remote viewing was "vague and ambiguous, making it difficult . . . for the technique to yield information of sufficient quality and accuracy for actionable intelligence." However, this assessment that the quality of information retrieved through remote viewing had no valid operational utility is quite different from realizing that the remote viewers *far exceeded chance* in their abilities to discern information.

Dr. Jessica Utts, the chief statistician for the study, stated, "Using the

APPENDIX A

FAILURE TO FIND MEMORY LOCALIZED IN THE BRAIN

Dr. Wilder Penfield, a renowned Canadian neurosurgeon, spent much of his career electrically stimulating the brain in awake patients to guide the removal of damaged brain that caused their seizures. Over three productive decades, he greatly expanded our knowledge of the function and anatomy of the neocortex, including some major revelations about memory.

Given that brain tissue feels no pain, he performed these procedures in awake patients, using local anesthesia in the scalp. Memories elicited through such precise electrical stimulation included movement, colors, emotions, dreams, smells, déjà vu, "strangeness," and visual and auditory experiences. He noted that these stimulated memories were much more distinct than usual memory, and often concerned material quite different from things remembered under ordinary circumstances. In some cases, repeat stimulation gave a replay of the same memory, although many locations offered no such reproducibility. In cases of repeat operation, he found that such stimulation points were not generally consistent over time intervals between operations.

Such a putative physical basis for memory was termed an engram. Penfield found that only by stimulating the temporal lobes (the parts of the brain directly underneath the ears) could he trigger meaningful recollections of memory—no other regions of neocortex were found to be related to such memories. In spite of his perfection of the technique, such memories could only be triggered in 5 percent of his surgical cases, and the memories only occurred during the passage of electrical current.

Dr. Penfield made many observations that are profoundly relevant to the mind-body discussion based on the experiences, perceptions, and memories engendered in his awake patients by such stimulation. Interestingly, he considered the main sensory lobe of the brain, the parietal lobe, to be silent in the face of such cortical stimulation. Only stimulation of the temporal lobes (which are generally viewed as more dispensable than

other lobes by neurosurgeons) involved an association with reported memories and perceptions, and this only in the setting of patients "whose temporal region may be said to have been conditioned by habitual local epileptic discharge"—patients without such epileptic conditioning failed to respond to stimulation over the temporal lobes.[1] He continued, "Such stimulation may produce in the patient an auditory experience as a buzzing sound, an equilibratory sensation of dizziness, or a rather complicated hallucination or dream."

Penfield noted that these stimulation points had "been somehow conditioned by years of electrical discharges from a neighbouring epileptogenic focus,"[2] suggesting that they were a pathological consequence of the abnormal region of brain causing their seizures.

So although occasionally such memories could be elicited through electrical stimulation, much more often no such locations could be found in a patient, and those identified were restricted to the area of brain abnormality.

Although in the early years, his research suggested the possibility of such localization of memory in the temporal neocortex, further investigation and reflection led him to believe that there was no such thing as local memory storage in the brain.

Barbara Milner disclosed her interactions with Penfield concerning memory in an article in the *Canadian Medical Association Journal* in 1977: "Of course this is not memory as you psychologists understand the term when you refer to the variability of memory, with its abstractions, generalizations, and distortions. In ordinary remembering we do not have direct access to the record of past experience in our brain," Penfield told Milner.

Milner went on to write: "Where was this record? For a time he [Penfield] toyed with the idea that it might be laid down bilaterally in the neocortex of the temporal lobes but he gave up this idea in his later writings and suggested that the record must be located somewhere in the higher brain stem. The lateral temporal cortex would then have what he called an interpretive function rather than being itself the storehouse of memory traces."[3]

Although his initial experience suggested that memory engrams could be found in the temporal neocortex, over the years he came to believe that memory was not stored in any localizable brain region, a finding that is consistent with the work of other neurosurgeons.

Short-term, or working, memory (less than a minute or so) involves connections between the dorsolateral prefrontal cortex (frontal lobes) and the parietal lobes, but the mechanism and location of long-term memory storage remains a complete mystery. Certain anatomic structures, notably the hippocampus and entorhinal cortex of the medial temporal lobes, are crucial for the consolidation of short-term into long-term memories. However, long-term memories are not actively stored in that region.

Neurosurgeons must proceed with great caution when operating near the medial temporal lobe due to long-term memory formation mechanisms that are intimately involved with the integrity of the hippocampus (small regions on the medial surface of the temporal lobes). Although significant damage to the dominant hippocampus or adjacent entorhinal cortex (and especially bilateral damage) leads to a shocking deficit in which the patient is unable to form new long-term memories, no other brain regions are so strongly involved in memory.

The general idea in conventional neuroscience is that memories are diffusely stored throughout the neocortex. Yet the overall experience of neurosurgeons who have resected large regions of neocortex from every lobe of the brain in countless patients over the last century for myriad pathological conditions (brain tumors, epilepsy, aneurysms, malformations of the brain's blood vessels, and infections, among others), without encountering patterns of broad swaths of memory loss in their patients, belies the notion of the general cortical storage of specific memories as false.

Current neuroscientific hypotheses about the possible biochemical nature of memory are all over the map, with nothing remotely resembling a consensus in sight. Recent viable hypotheses include primitive proteins known as prions,[4] specific chemical methylation of critical regions of DNA,[5] the interplay between a neuron's synaptic activity and its nuclear DNA transcription,[6] memory linkage through synaptic coclustering within the dendrites of common neurons,[7] and the possibility that quantum calculations in microtubules within neurons are involved (the Penrose-Hameroff Orchestrated OR hypothesis discussed further in Appendix B).[8]