

# 13. The Deaf Brain

In a remarkable surgical procedure led by Dr. Eddie Chang, a neurosurgeon in San Francisco, a profound challenge unfolded when he operated on a middle-aged man with a brain tumor located near essential language regions. This delicate maneuver involved an awake craniotomy, where the patient was secured in a vice-like apparatus to ensure immobility. After an initial cut to remove a section of the skull, the patient was awakened from anesthesia, tasked with counting or reading from a screen while electrodes stimulated various sections of his brain. Crucially, this patient was profoundly deaf, relying on sign language instead of vocalization, a scenario Dr. Chang had never encountered before.

Historically, the exploration of language in the brain began with Pierre Paul Broca, who, in 1861, uncovered insights into language processing through the autopsy of a patient, nicknamed "Tan," who could only utter that single word despite being able to comprehend everything communicated to him. Broca's examination revealed extensive damage to a specific area in the left frontal lobe, now known as Broca's area, essential for speech production. Although Wernicke later identified another crucial area for language comprehension, Broca's findings laid the groundwork for neurosurgical practices concerning stroke and brain injury patients.

During the operation, Dr. Chang discovered that stimulating Broca's area caused the patient to cease signing, indicating a complex interconnection between sign language processing and traditional speech centers. This revelation considerably expanded the understanding of language within the brain, illustrating that communication pathways encompass both spoken and gestural languages. Five years post-surgery, Dr. Chang encountered similar results when operating on a musician, further cementing the theory of a generalized communication center within the brain.

The chapter also reflects on the historical misconceptions about sign language, once branded as primitive, tied to earlier scientific narratives equating sign language with lower evolutionary status. However, in the 1960s, scholars like William Stokoe championed the linguistic complexity of sign languages, paving the way for modern recognition of American Sign Language as equivalent to spoken languages. Other studies subsequently validated that the acquisition of language—be it through sound or sign—engaged similar neural pathways, challenging preconceived dichotomies of communication and fundamentally reshaping the understanding of human language. Today, American Sign Language is rightly acknowledged as a complex and essential aspect of deaf identity and human communication.