

Neuropsychol Rev (2010) 20:123–125  
DOI 10.1007/s11065-010-9135-9

COMMENTARY

## Are you Related to “*the Geschwind?*”

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Published online: 29 May 2010

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Norman Geschwind. Photograph from Damasio and Galaburda *Archives of Neurology* 1985.

Being a neurologist with the last name Geschwind can be daunting....So, when I was asked to write a biography of Norman Geschwind, my father's cousin, I was very hesitant about what to write. Numerous biographies and articles have been written about him and his remarkable contributions to the field of neurobehavior and neurology; most are written by those trained by him and who knew his work personally and far better than I could ever know it. I decided to focus on a more personal story about how I was affected and continue to be influenced by Norman's legacy.

Growing up I knew my father's cousin Norman was a physician, but I must admit, as a child I thought he was a family doctor—I don't even think I knew what a neurologist was at the time. My primary memory of him was as a great raconteur; I recall him sitting back and telling stories

at my Aunt Shirley's dining room table during one of the Jewish Holidays, but I had no clue about his contributions to the field of neurobehavior and neurology. During a psychology course sophomore year in college, I kept coming across the name Norman Geschwind in my textbooks; I called up my father to inquire if this person was the same as “our cousin Norman.” I was fascinated by his work in brain behavior relationships and cerebral lateralization. I was amazed to find that this was my cousin Norman. I started to read more of his writings. Although a solid-state experimental physicist, my father became fascinated by neuroscience in large part through the writings of his cousin; we would spend hours discussing Norman's papers on brain localization, function and behavior. Although I started out as a physics major, I eventually changed my major to neurobiology as I became increasingly drawn to studying the role of the brain in human behavior and function. I was home from college and had just had a conversation with my father about Norman's writings when we received the phone call from Pat, Norman's wife, about his sudden and tragic death. In addition to the tragedy of the loss of a family member, leaving behind his wife and three children, I also realized what a great loss his death would be to the medical community, particularly the field of neurobehavior. Influenced in some part by Norman's writings, I ended up majoring in neurobiology and writing my senior thesis on cerebral lateralization.

Although I left science for several years to explore other fields, despite my attempts to not go into science/medicine, I eventually realized it was the career I would enjoy most and ended up pursuing my MD-PhD in neuroscience and becoming a neurologist. Curiously, my older brother Dan, had a not too dissimilar path. After trying out business

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consulting for a few years he returned to science and medicine, getting his MD-PhD in neuroscience and is now a renowned neurogeneticist whose work is heavily influenced by Norman's. I completed my neurobehavior/dementia fellowship, and continue to work, with Bruce L. Miller, a protégé of Frank S. Benson, who in turn was a well-known protégé of Norman. There is no escaping Norman Geschwind if you want to study behavioral neurology. Nearly all of the leaders in the field were either his students or worked with him at some time. Although my own area of neurological clinical research in rapidly progressive dementia and early features of certain genetic neurodegenerative diseases is different from Norman's, there is some overlap, particularly in the relationship of brain and behavior. As might be expected for a neurologist named Geschwind, I continually am asked by colleagues if I am related to Norman or "the Geschwind." The questioner almost always has a story about how they were personally affected by Norman. I am amazed how often I hear how even a brief exposure to working with Norman was a career changing event—his ability to inspire was that profound.

Norman Geschwind was born in 1926 (and raised) in Brooklyn, NY the second son of Morris and Hannah (later Americanized to Anna) Geschwind (his older brother Irving became a distinguished endocrinologist). As a child, he learned to speak Yiddish and Hebrew, in part through his studies at the Yeshiva. In high-school he excelled at languages, learning French and Latin, and math. He went to Harvard University in 1942 as a math major, but while serving in World War II, he became interested in human behavior on the battlefield and upon returning to Harvard in 1947, he changed his major to psychology. He was bothered by the general lack of understanding of and interest in the basic neurology behind psychology at the time. Although he considered graduate school in psychology, he decided to go to medical school, with the intention of studying psychiatry. After taking the basic science classes, as well as physiology and neuroanatomy courses, in addition to exposure to certain key professors, he decided to pursue neurology in order to study higher brain functions. He graduated from Harvard Medical School in 1951 and after a medicine internship at Beth Israel Hospital in Boston, he went on fellowship to Queen Square in London to study neurology. Initially, he focused on studying neuromuscular diseases, in part because of strong mentorship in this area as well as an overall lack of interest or focus in brain localization, but eventually he found a mentor, Sir Charles Symonds, and colleagues interested in the brain localization of findings, including behavior (Damasio 1985; Devinsky 2009; Geschwind 1974). In London, he also met his future wife, Pat, and mother of his three children, Naomi, David and Claudia.

He returned to Boston in 1955 as the neurology chief resident at Boston City Hospital under Derek Denny-Brown. He also initially continued laboratory research in neurophysiology at MIT (on the squid axon!), before realizing that laboratory work was not his strength. He began to work at the Boston VA hospital in 1958, where he was exposed to many patients with aphasia, and he eventually turned his attention to how the brain is organized to produce behavior, particularly language. The head of Neurology and the aphasia unit, Dr. Fred Quadfasel, a German neurologist, introduced him to the original paper in German by Dejerine of the first postmortem case of a patient with alexia without agraphia (Damasio 1985; Devinsky 2009). Soon after this he saw his first case of alexia without agraphia, due to a callosal lesion, which he later published with Edith Kaplan (Devinsky 1997; Geschwind and Kaplan 1962). Because Norman spoke so many languages, he often was able to read the original literature rather than interpretations by others who often disagreed with, or simply didn't understand, the original writings. Norman realized that many seminal findings in neurology had been written about decades before, yet forgotten by most of the medical community. The case of alexia without agraphia that he shared with Edith Kaplan and other cases helped solidify his thinking about the localization of various brain functions and disconnection of brain regions would lead to specific behavioral impairment. At a dyslexia meeting in Baltimore in 1961, he discussed his theories on the role of cortical connections with the distinguished psychologist Oliver Zangwill, who in Norman's words "...listened patiently to the exposition of my ideas on the significance of the cortico-cortical connections for the higher functions. A short time later, while on a trip to Boston, he suggested to me that I should prepare an extended account of these ideas" (Devinsky 1997, 2009; Geschwind 1974). This led to Norman's two seminal monographs published in *Brain* in 1965, "Disconnection Syndromes in Animal and Man," reprinted in this edition and introduced in a commentary by Bruce Miller.

In 1963, Norman was appointed director of the VA Neurology Service and in 1966, at the age of 40, became Chair of the Department of Neurology at Boston University. At the age of 42, in 1969, he became the James Jackson Putnam Professor (and Chair) of Neurology at Harvard Medical School, a position he held until his sudden death on November 4, 1984.

When I read some of Norman's earlier writings I am struck by the accuracy of his predictions about what we would learn in time about the role of brain function and behavior. In 1982, when discussing the role of temporal lobe epilepsy and behavior, lamenting about how the fields of neuropsychology and neurology had missed the notion that neurological brain diseases could lead to profound

behavioral abnormalities, Norman wrote, “It may even be the case that the largest group of patients with disturbances of behavior as a result of malfunction of the brain will be those who today are given psychiatric diagnoses and who occupy such a vast number of mental hospital beds in every advanced country. Temporal lobe epilepsy as we now understand it will probably be the cause of only a small fraction of these cases” (Devinsky 2009). This comment has turned out to be an incredibly accurate prediction of behavioral neurology. It is particularly apropos for the work of my mentor, Bruce Miller, a 2nd generation disciple of Norman Geschwind (through his teacher Frank Benson). Bruce helped bring the disease frontotemporal dementia (FTD), a neurological disorder with profound psychiatric and behavioral manifestations, to the forefront of the neurology community. Norman would have been proud at the level of attendance at recent American Academy of Neurology meeting sessions on FTD; lectures often had to be moved to larger rooms at the last minute, and even then there was standing room-only.

There is so much that is remarkable about Norman’s work and legacy. I wonder what lessons those of lesser intellect might garner from his teachings. I am constantly amazed at his ability to reread old literature (in the original language!) and to find critical information that had been overlooked or forgotten by modern day science and medicine.

His ability to speak so many languages certainly facilitated this. Perhaps one of the profound lessons I have learned is how he taught his students, who in turn have taught me, the incredible value of a well-described and analyzed case report.

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