Princeton University

Honors Faculty Members
Receiving Emeritus Status

May 2013

The biographical sketches were written by colleagues in the departments of those honored, except where noted.

350509-13

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Faculty Members Receiving Emeritus Status

Charles Gordon Gross

Charlie Gross is retiring this year after forty-three years on the faculty of the psychology department. With his pioneering research on the primate visual system, Charlie revolutionized our understanding of sensory processing and pattern recognition. His work was foundational to the field of cognitive neuroscience.

Charlie was born in Brooklyn, New York, on February 29, 1936, of Communist intellectuals. His elementary school experience was a disaster, inducing hyperactivity and attention disorder. His frustrated academic drive was channeled into earning Boy Scout merit badges, making him the youngest Eagle Scout in Brooklyn. At Erasmus Hall High School, a large heterogeneous school, he fell in with a group of very smart students, which transformed him into a good student. He was a finalist in the Westinghouse Science Talent Search for a project in ecology—plant succession—a natural choice of topic because he had spent every summer up to that point camping with his parents on an island in Lake George, New York.

At about the time that Charlie's father began to lose teaching jobs because of his politics, Charlie went off to Harvard University. He would have liked to major in history but soon found that his politics were inconsistent with getting As, so he majored in biology. As a freshman, he took a graduate seminar in the history of biology with I. Bernard Cohen, and this subject has continued to be a major interest. He also took physiological psychology with Phil Teitelbaum, history of psychology with E. G. Boring, and "Skinner" with B. F. Skinner, all of which had profound and permanent effects on him. Charlie researched bird navigation and published his first scientific paper with Don Griffin, codiscoverer of bat echolocation and one of the great experimental naturalists of our time. As a senior, Charlie was admitted to Harvard Medical School and was awarded graduate fellowships from the National Institutes of Health and the National Science Foundation

in biology. To avoid choosing, he postponed them all and accepted a Fulbright scholarship to study ethology at University of Cambridge from 1957 to 1959 (to England because he spoke no foreign languages, and in ethology because that was only done at that time at Cambridge and the University of Oxford, and they seemed like fun places to go; they were).

At Cambridge, Charlie wandered around for about six months, rowing on the Jesus College crew (his first organized sports activity and the last until he ran the New York City marathon in 1990), luxuriating in the political freedom that was lacking in McCarthyite America. Eventually, he ended up as Larry Weiskrantz's graduate student in psychology. Life was fun; there were no classes or exams, only a thesis. He coauthored pre-thesis papers on such things as taste, peripheral vision, hippocampal and frontal cortex stimulation (the subject of his first paper for *Science*), tranquillizers, and the academic record of members of the Royal Society (his first paper for *Nature*), and he wrote pop science articles and film and book reviews for student and local publications.

Later, Charlie was a postdoctoral fellow at the Massachusetts Institute of Technology (MIT) in 1961 under Hans-Lukas Teuber, who was organizing the first neuroscience department in the world. At MIT, Charlie abandoned the study of the frontal lobe and turned instead to the inferior temporal cortex. Inferior temporal (IT) cortex was known to be important for visual learning and memory; it was usually considered a "learning and memory" structure rather than a "visual structure." Charlie and his colleague Peter Schiller began single neuron recording studies on the IT cortex and discovered that IT neurons were exclusively visual, whereas superior temporal ones seemed to be auditory. In most of these experiments, the animals were anesthetized, but some involved unanesthetized ones. The results from awake animals were puzzling, suggesting that perhaps the cells had foveal receptive fields and were modulated by attention and memory.

In 1965, Charlie moved to the Department of Psychology at Harvard, where he and his colleagues made several new discoveries about IT neurons: these cells had large receptive fields that included

the fovea, were not retinotopically organized, and responded to complex stimuli much more than to spots, slits, or edges. A few responded best to faces, and a very few to hands. Although these discoveries represented a radical departure from conventional wisdom, several factors may have sensitized Charlie and his colleagues to make them. First, the researchers had been studying the effects of IT lesions on visual discrimination and knew the more complex the discriminanda, the greater the effect of the lesions. Second, Charlie had visited the Polish neuroscientist Jerzy Konorski, who had postulated the existence of "gnostic neurons," such as ones selective for faces, facial expressions, body parts, simple objects, and scenes, and suggested they would be found in the IT cortex. Third, Teuber was constantly telling stories about prosopagnosia (an inability to recognize faces) after temporal lesions. Fourth, Charlie's lab was in the same building as that of Jerry Lettvin, who was studying bug detectors in the frog and who invented the term grandmother cell. Finally, they were working near David Hubel and Torsten Wiesel, who had just published on hypercomplex cells and had suggested that cells with even more complex properties would be found in other areas. Apparently, nobody much believed the IT neuron story until it was replicated starting twelve years later by an increasing number of groups in the United States and abroad. However, the prolonged disbelief seemed to have no deleterious effect on Charlie's getting grants or, in 1970, a job at Princeton.

Throughout his adult career, Charlie has been extraordinarily fortunate in three main ways. The most important was the truly great collection of graduate students, postdocs, and research technicians who found their way to his lab. They made research, teaching, writing, and, in the early days, staying up all night an unalloyed joy. They were, and still are, loyal, hardworking, and enthusiastic colleagues. Goat and pig roasts in Charlie's backyard, canoe trips, hikes, and stormy lab meetings tied their lives together. Charlie likes to boast that they went on to well-rewarded careers, often receiving awards, memberships in honor societies like the National Academy of Sciences and the American Academy of Arts and Sciences, as well as professorial chairs and administrative and editorial positions. Charlie has also been fortunate

in his association with the enthusiastic MIT, Harvard, and Princeton undergraduates who have worked with him, many of whom have gone on to distinguished neuroscience careers. Finally, the institutions he has taught at and those that supported his research continue to give him the opportunity to travel, take photographs, and lecture all over the world.

Adapted from: "Charles C. Gross, Award for Distinguished Scientific Contribution [Biography]," American Psychologist*, 2005, 60, No. 8: 753-755.*