What Don’t We Know? Explore the Frontiers of the Mind

Random Thoughts: Modeling the Mind
April 11, 2011, with Laurence Abbott, Ph.D.

LAURENCE ABBOTT, PH.D., is the William Bloor Professor of Theoretical Neuroscience at Columbia University and co-director of the Center for Theoretical Neuroscience. Professor Abbott received his Ph.D. in physics at Brandeis University in 1977 and spent ten years working in theoretical particle physics before switching to neuroscience. His current research involves the mathematical modeling and analysis of neurons and neural networks, using analytic techniques and computer simulation to show how large populations of neurons interact to produce functional circuits. The goal is to determine the mechanisms by which large networks of neurons represent, store, and process information.

Scents and Sensibility
May 11, 2011, with Richard Axel, M.D.

RICHARD AXEL, M.D., is University Professor and Investigator at the Howard Hughes Medical Institute, College of Physicians and Surgeons of Columbia University. Dr. Axel obtained an A.B. from Columbia College and an M.D. from The Johns Hopkins Medical School. In earlier studies, Richard Axel and his colleagues, Michael Wigler and Saul Silverstein, developed gene transfer techniques that permit the introduction of virtually any gene into any cell. These studies not only allowed for a novel approach to isolate genes but also provided a detailed analysis of how they worked. At the same time, these experiments allowed for the production of an increasingly large number of clinically important proteins. These studies also led to the isolation and functional analysis of a gene for the lymphocyte surface protein, CD4, the cellular receptor for the AIDS virus, HIV.

Dr. Axel then began to apply molecular biology to problems in neuroscience with the expectation that genetics could interface with neuroscience to approach the tenuous relationship between genes, behavior, and perception. His studies on the logic of the sense of smell revealed more than a thousand genes involved in the recognition of odors and provided insight into how genes shape our perception of the sensory environment. Dr. Axel’s current work centers on how the recognition of odors is translated into an internal representation of sensory quality in the brain and how this representation leads to meaningful thoughts and behavior. Dr. Axel was awarded the 2004 Nobel Prize in Physiology or Medicine for his pioneering studies on the sense of smell.
Both Conversations Moderated by Thomas Jessell and Charles Zuker

THOMAS JESSELL, PH.D., is Claire Tow Professor in the Departments of Neuroscience, and Biochemistry and Molecular Biophysics, and co-director of the Mind Brain and Behavior Initiative at Columbia University. Professor Jessell’s research has defined mechanisms that control the assembly of neural circuits and has revealed how the organization of these circuits controls motor behavior. The principles that have emerged from his studies in the spinal cord have been found to apply to many other regions of the central nervous system, establishing a basic plan for brain wiring and function. Professor Jessell’s findings have also paved the way for new cell and drug therapies for motor neuron disease and spinal cord injury.

Professor Jessell received his Ph.D. from Cambridge University, UK, and was a postdoctoral fellow in Gerald Fischbach’s laboratory at Harvard Medical School and a Locke Research Fellow of the Royal Society.

From 1981 to 1985, he was on the faculty of the Department of Neurobiology at Harvard Medical School, before moving to Columbia University in 1985. Since then Professor Jessell has been an investigator of the Howard Hughes Medical Institute. He is a fellow of the Royal Society of London and of the UK Academy of Medical Sciences, a foreign associate of the U.S. National Academy of Sciences, and a member of the Institute of Medicine of the National Academies.

CHARLES ZUKER, PH.D., is an investigator of the Howard Hughes Medical Institute, a professor of biochemistry and molecular biophysics and of neuroscience in the College of Physicians and Surgeons at Columbia University, and a senior fellow at the Janelia Farm Research Campus. He was previously the Kevin and Tamara Kinsella Chair of Neurobiology and Distinguished Professor at the University of California, San Diego, School of Medicine. His research focuses on the senses and how the brain can turn reception into perception.

Currently, Professor Zuker’s lab works on the biology of taste. He is a graduate of the Universidad Catolica de Valparaiso in Chile (B.Sc.) and the Massachusetts Institute of Technology (Ph.D.). Professor Zuker is an elected member of three prestigious professional associations: the American Academy of Arts and Sciences, the National Academy of Sciences, and the Institute of Medicine, and has been honored with the Alfred P. Sloan Award in Neurosciences, the Cogan Award for Vision Research, Columbia University’s W. Alden Spencer Award, and the International Flavor and Fragrances Award.

For more information or to RSVP for a future conversation, please contact Meghan Fay at 212-851-7893 or meghan.fay@columbia.edu.

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