

**Center for Applied Mathematical Sciences
Distinguished Lecturer Fall 2011
and
Irene McCulloch Lecturer in Sciences and Engineering**



Nancy Kopell

Connecting The Dots: Propofol, Parkinson's Disease and Brain Rhythms

Abstract: Rhythms of the nervous system are produced in all cognitive states, and have been shown to be highly associated with a myriad of cognitive tasks. Thus, changes in these rhythms, however they come about, are likely to change the ability to do such tasks. This talk focuses on the beta (12-30 Hz) and alpha (9-11) rhythms, and pathological states due to anesthesia and PD; it is about three related studies, the latter two emerging from the first one. The first concerns an early stage of anesthesia, in which, paradoxically, the subject gets more excited and disoriented. With low propofol, the brain rhythms show an increase in beta oscillations, which in normal awake state is associated with brain functions including motor preparation and higher-order processing. The second concerns the beta oscillations associated with abnormal motor control in Parkinson's disease. The relationship between the two phenomena can be seen from the underlying physiology using modeling as well as experiments. Finally, the first story led to looking at higher doses of propofol at which consciousness is lost, and uses experimental data to get new ideas about the physiological basis for the loss of consciousness. Again, the focus on relevant physiology of the rhythms is what led, though modeling, to the new insights. Applications to other states of consciousness, such as coma, may be discussed.

Monday, December 5, 2011

Lecture: 3:30 – 4:30 pm
Andrus Gerontology
Center Auditorium

Reception: 4:30 – 5:30 pm
Hedco Large Conference
Room (HNB 107)

CAMS Director:
Susan Friedlander
susanfri@usc.edu



Nancy Jane Kopell is a professor of mathematics at Boston University, where she currently is co-director of the Center for BioDynamics. Kopell co-founded the Center in 1997 with Jim Collins, launching a multidisciplinary effort that combines advanced mathematics, biology and engineering to gain a better understanding of physiological systems in humans and other species and to develop new medical devices and treatments. She also co-founded the Program in Mathematical and Computational Neuroscience to provide graduate students and post-doctoral associates with a background in the physical sciences to work in neuroscience.

Kopell received her PhD in 1967 from the University of California, Berkeley. She held a Moore Instructorship at the Massachusetts Institute of Technology from 1967 to 1969, then joined the faculty at Northeastern University. In 1978 she was promoted to full professor at Northeastern. She has held visiting positions at the Centre National de la Recherche Scientifique in France (1970), MIT (1975, 1976-1977) and the California Institute of Technology (1976). She received Guggenheim and Sloan Fellowships and was an invited speaker at the International Congress of Mathematicians in 1983. In 1990, she was a plenary speaker at two meetings of the Society for Industrial and Applied Mathematics; that same year, she was awarded a MacArthur Foundation Fellowship. In 1996, she was elected to the National Academy of Sciences, and in the same year was elected to the American Academy of Arts and Sciences. In April 2000, Kopell was named Boston University's first William Goodwin Aurelio Professor of Mathematics and Science.