Voiculescu Receives NAS Award in Mathematics

Dan Virgil Voiculescu

DAN VIRGIL VOICULESCU has received the 2004 NAS Award in Mathematics from the National Academy of Sciences (NAS). He was honored for "the theory of free probability, in particular, using random matrices and a new concept of entropy to solve several hitherto intractable problems in von Neumann algebras."

The NAS Award in Mathematics was established by the AMS in commemoration of its centennial, celebrated in 1988. The award is presented every four years in recognition of excellence of research in the mathematical sciences published within the past ten years. The award carries a cash prize of $5,000. Previous recipients are Robert P. Langlands (1988), Robert MacPherson (1992), Andrew J. Wiles (1996), and Ingrid Daubechies (2000).

The *Notices* asked Dimitri Shlyakhtenko of the University of California, Los Angeles, to describe Voiculescu's work. Shlyakhtenko responded: "Noncommutative probability theory views elements of a noncommutative von Neumann algebra as analogs of classical random variables. One of Voiculescu's discoveries is that in this more general noncommutative framework there is room for a new notion of independence, called freeness. Freeness bears the same relationship to free products of algebras as ordinary independence does to Cartesian products of probability spaces. Amazingly, as Voiculescu showed, many theorems and concepts in classical probability have very nice free probability analogs; this list includes the central limit theorem, notions of convolution, infinitely divisible laws, and so on. Remarkably, there is also a free probability analog of the classical information-theoretic notion of entropy. Free probability theory has now grown into a rich field, with connections and applications to many other areas of mathematics. For example, Voiculescu's discovery that certain random matrices are asymptotically free as their sizes go to infinity makes possible computations of expected asymptotic spectral density of their eigenvalues. On the other hand, his and his followers' work in free probability has led to a number of revolutionary results in von Neumann algebra theory, especially for von Neumann algebras associated to free groups."

Dan Virgil Voiculescu was born on June 14, 1949, in Bucharest, Romania. He studied mathematics at the University of Bucharest and received his Ph.D. there in 1977 under the direction of Ciprian Foias. Voiculescu was an assistant (1972–73) at the University of Bucharest and then a researcher (1973–75) at the Mathematics Institute in Bucharest. After the dismantling of the institute, he was a researcher (1975–86) in the mathematics department of INCREST in Bucharest. In 1986, after attending the International Congress of Mathematicians (ICM) in Berkeley, he stayed on as a visiting professor at the University of California, Berkeley. In 1987 he assumed his present position as a professor of mathematics at Berkeley. He was a Guggenheim Fellow (1997), a Miller Professor at Berkeley (1997–98), a visiting professor at the Institut Henri Poincaré (1999), and a Senior Scholar of the Clay Mathematics Institute (2000). He held the International Blaise Pascal Research Chair in spring 2003 and spring 2004. Over the years he has made several visits to the Institut des Hautes Études Scientifiques, the Schrödinger Institute in Vienna, and The Fields Institute in Toronto. Voiculescu was an invited speaker at the ICM in Warsaw in 1983, at the European Mathematical Congress in Paris in 1992, and at the ICM in Zurich in 1994.

—Allyn Jackson