Department of Mathematical Sciences
Colloquium

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FUNDAMENTALS OF DOPAMINE NEUROPHYSIOLOGY AND BEHAVIOR, CHANGES DURING PARKINSON'S DISEASE AND STIMULANT DRUG ADDICTION, AND COLLABORATIONS FOR MATHEMATICAL MODELS

I am a behavioral neuroscientist who is interested in the dynamic processes of neurotransmission that sculpt behavior. Thus, I am interested in the plasticity of neurotransmission as it is related to compensation during the neurodegenerative process of Parkinson's disease. Surviving brain dopamine neurons of the basal ganglia motor system, which are progressively lost in development of Parkinson's disease, are able to increase their rates of dopamine production and subsequent release in order to normalize function. Mathematical Principles of Reinforcement (MPR), developed by Killeen, will be introduced to demonstrate how this mathematical model captures behavioral deficits in a rat model of Parkinson's disease. Additionally, dopamine neurons from the mesolimbic pathway, a reinforcement/reward system, are known to increase dopamine activity in response to repeated exposure to stimulant drugs, such as cocaine and amphetamine. This pathway emits dopamine release in the presence of environmental cues that are classically conditioned to stimulant drugs. There exists a cascade of neurochemical events comprising neurotransmission, termed turnover, and a developing mathematical model of these turnover processes is being developed in collaboration with David Tello, a doctoral mathematics student at ASU, which will be introduced as an example for how mathematical modeling can augment the research program of a behavioral neuroscientist.

Friday, March 12, 2010 at 3 pm in Bell Hall 143
The University of Texas at El Paso

Refreshments will be served in front of the colloquium room,
15 minutes before the start of the colloquium.