

MINDS, TECHNOLOGY, AND SOCIETY

Seminar Series

UC MERCED, Spring 2018

Heather Broccard-Bell, Ph.D.

“Noise! What is it Good For?”

Abstract: Variability. Error. Spontaneous activity. Noise! Whatever you want to call it, superfluous random activity has long been the bane of engineers and scientists alike. From communications to mechanics, engineers have historically striven to minimize aspects of their designs that lead to unpredictable behavior. In the life sciences, noise ranging from randomness at the molecular level to inappropriate communicatory signaling among organisms has typically been seen as the outcome of systems created by evolution, where adaptations are pseudo-haphazardly cobbled together, tuned only to the degree that the system does not suffer catastrophic fitness consequences relative to its competitors. In other words, evolution has built systems that work "well enough" without being perfect. Recently, however, both engineers and researchers have begun to show that, at least in certain contexts, noise can actually be a feature, not a bug. My current research, through field, laboratory, and simulation experiments using the communication system in honey bee colonies as a model, is an effort to understand how the spontaneous production of an inhibitory signal might actually contribute to the ability of the colony to rapidly adapt to dynamic environmental conditions. Understanding the mathematical structure underlying honey bee communication could have repercussions for understanding other complex biological systems based on similar organizing principles (like brains and ecosystems), in addition to being useful for the creation of truly adaptive artificial systems like sensor networks.

Heather Broccard-Bell received her Ph.D. in Neuroscience -- Behaviour and Evolution from the University of Lethbridge, in Alberta, Canada under Dr. Sergio Pellis, where she worked on testing a theory of behaviour based on control systems engineering, called Perceptual Control Theory, in a bunch of animal species. Since 2014, Dr. Broccard-Bell has been working in the Division of Biological Sciences, Section of Ecology, Behavior, and Evolution at UC San Diego as a postdoctoral fellow in the lab of Dr. James Nieh. She also teaches Research Methods, Statistics, Animal Behavior, Evolutionary Psychology, Biopsychology, and Evolutionary Biology at UC San Diego, the University of San Diego, and California State University San Marcos in the Psychology and Biology departments (yes, that's as hectic as it sounds).



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3:30 PM

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