

# NEURAL ENGINEERING SEMINAR SERIES

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## An Attempt to Build a Single Framework for Multiple Forms of Perceptual Memory

<https://psu.zoom.us/j/94639233394>

**Sept. 14, 2022**

12:15 -1:15 p.m. (E.T.)

W306 Millennium Science



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Tactile Perception and  
Learning

**ABSTRACT:** Rats can learn to apply a multitude of different perceptual and memory operations to a given set of tactile stimuli. For instance, they can express working memory, where the most recent stimulus ( $n-1$ ) has to be stored and retrieved to support a comparison to the ongoing stimulus ( $n$ ). Presented the same stimulus set, they can express reference memory, where the ongoing stimulus ( $n$ ) has to be compared to some stable, internal boundary. They can change that internal boundary as a function of stimulus statistics. They can learn to ignore or attend to tactile stimuli according to acoustic cues. While it might seem easiest to draw up computational/functional algorithms tailor-made to each behavior, we are trying to explain several different behaviors by one common framework. Here I will present psychophysical experiments, together with a schematic model to explain the flexibility of perceptual memory, and preliminary physiological findings that aim to give a real biological fabric to the schematic model.

### BIOGRAPHY:

1984-89: PhD in Neurobiology, University of North Carolina, USA  
1980-84: BSc in Engineering Science, University of Virginia, USA

After a postdoctoral position at Brown University and an Assistant professor position at Vanderbilt University, Diamond joined the International School for Advanced Studies (SISSA). Since 2000 he has been a SISSA professor of Cognitive Neuroscience and Director of the Laboratory of Tactile Perception and Learning.

He serves on the faculty of:

SISSA PhD in Cognitive Neuroscience

SISSA PhD in Theoretical and Scientific Data Science

Università Ca' Foscari (Venice)/SISSA Master's degree in Computational Neuroscience

The lab aims to understand the neuronal language of memory and perception – how brain activity gives rise to meaningful percepts, how these are stored and recalled to guide decisions. Besides publications in journals, other work includes the 2011 and 2020 editions of the popular textbook *From Neuron to Brain* (Oxford Univ Press). The lab has trained 17 PhDs and 16 postdocs; among these, twelve nations are represented. Additionally, Diamond serves as the SISSA International Relations Delegate (2015-present). Recent efforts concern setting up SISSA programs to host scholars (from PhD to faculty) fleeing from war. In the last year, the Afghanistan and Ukraine crises have been pressing.