

Steve Grossberg - Brain Researcher, Latest Report
June 11, 2017

Our class is blessed with two of the outstanding brain scientists of our age, Mike Gazzaniga and Steve Grossberg. Last week Steve Grossberg shared with me some of his latest efforts. Here is his letter:

"Dear Harris:

Thanks very much for your thoughtful note in response to my annual gift to our class fund.

You kindly wrote that you hope that I am in good health. That is, of course, an increasingly meaningful good wish in the light of the fact that so many of our classmates are no longer with us.

I also hope that you are in good health!

Actually, I am feeling quite lucky all around.

In particular, over the past few weeks, I gave two plenary lectures at conferences in Anchorage and San Diego, and am about to travel to Dresden, Germany, to give a third one. They all include results from a major article that I published Open Access a couple of months ago about what happens in each of our brains when we consciously see, hear, feel, or know something. I thought that some of our classmates might be interested in reading about this topic, especially as we reach an age where consciously reflecting about our life experiences becomes increasingly salient:

Grossberg, S. (2017). Towards solving the Hard Problem of Consciousness: The varieties of brain resonances and the conscious experiences that they support. *Neural Networks*, 87, 38-95.
<http://www.sciencedirect.com/science/article/pii/S0893608016301800>

The pdf version has a searchable Table of Contents that enables you to easily read any particular sections that attract your interest.

It is, I think, one of my most important articles. It represents a synthesis of 40 years of work with many gifted colleagues. I was able to write it when I could make several additional discoveries that enabled the current synthesis.

The article is written to be as self-contained and non-technical as possible. Its results have enabled me to explain and predict a huge amount of psychological and neurobiological data about conscious and unconscious experiences in normal subjects and clinical patients for which I can find no other mechanistic explanations, let alone explanations as part of an emerging unified theory. The results in it have helped me to think about so many facts and issues that I have always wanted to understand that hope that some of our classmates might also find something of interest in it.

I should add that a video of my plenary talk will soon be put on YouTube.

The article's Abstract says:

"The hard problem of consciousness is the problem of explaining how we experience qualia or phenomenal experiences, such as seeing, hearing, and feeling, and knowing what they are. To solve this problem, a theory of consciousness needs to link brain to mind by modeling how emergent properties of several brain mechanisms interacting together embody detailed properties of individual conscious psychological experiences. This article summarizes evidence that Adaptive Resonance Theory, or ART, accomplishes this goal. ART is a cognitive and neural theory of how advanced brains autonomously learn to attend, recognize, and predict objects and events in a changing world. ART has predicted that "all conscious states are resonant states" as part of its specification of mechanistic links between processes of consciousness, learning, expectation, attention, resonance, and synchrony. It hereby provides functional and mechanistic explanations of data ranging from individual spikes and their synchronization to the dynamics of conscious perceptual, cognitive, and cognitive-emotional experiences. ART has reached sufficient maturity to begin classifying the brain resonances that support conscious experiences of seeing, hearing, feeling, and knowing. Psychological and neurobiological data in both normal individuals and clinical patients are clarified by this classification. This analysis also explains why not all resonances become conscious, and why not all brain dynamics are resonant. The global organization of the brain into computationally complementary cortical processing streams (complementary computing), and the organization of the cerebral cortex into characteristic layers of cells (laminar computing), figure prominently in these explanations of conscious and unconscious processes. Alternative models of consciousness are also discussed."

Best as ever,

Steve

Stephen Grossberg

http://en.wikipedia.org/wiki/Stephen_Grossberg

<http://scholar.google.com/citations?user=3BIV70wAAAAJ&hl=en>

<https://youtu.be/9n5AnvFur7I>

Wang Professor of Cognitive and Neural Systems

Professor of Mathematics & Statistics, Psychological & Brain Sciences, and

Biomedical Engineering

Director, Center for Adaptive Systems"

Boston University

<http://cns.bu.edu/~steve>

steve@bu.edu