25 Years of Battling Academic Hegemony, Gender Stereotypes and Political Power: Deconstructing the Mantis Visual System in the Service of Helping Children

Frederick R. Prete, Ph.D.
Department of Biology

It's a basic fact of neuroscience, that people spontaneously construct cognitive frameworks of thought through which, and in terms of which they interpret the world. These cognitive myths, models, metaphors, and (sometimes) misunderstandings are held tightly, vigorously defended, are resistant to disconfirming data, and are long-lived. The construction of cognitive frameworks is both normal, and understandable. The brain seeks to make order out of the world and arms itself with interpretations that provide us with both subjective stability and the perception that we can reliably understand and make predictions about what's going on around us. Unfortunately, these cognitive frameworks are often as erroneous as they are intractable. And, since scientists are, in fact, people, too, they are subject to these very same cognitive foibles. In this talk, I take a brief, retrospective look at my research on the behavioral neurobiology of the praying mantis and point out how academic hegemony, gender stereotypes, and scientific-political power struggles have interfaced with my attempts to reshape our understanding of praying mantises. Historically, praying mantises have been seen as charismatic, enigmatic, and charming insects that have fascinated people at least since the *Egyptian Book of the Dead* (ca., 1550 BCE). That interest notwithstanding, virtually everything I read about this creature after serendipitously discovering my first mantis on the steps of the biology library at The University of Chicago turned out to be erroneous. My decades-long quest to understand this animal's behavioral biology has lead me on an intellectual journey through the dusty shelves of rare book rooms, treatises on the evolution of cognition, empirical research papers on the cellular physiology of photoreceptors, and technical instruction manuals on the computer programming languages used to construct robotic seeing systems. Finally, with the help of a diverse group of dedicated undergraduate research students, I think that I have come to a tentative understanding of some aspects of this animal's neurobiological and behavioral organization. One of the most interesting aspects that I have uncovered is the mantis' uncanny ability to identify a variety of very different objects as members of a single abstract cognitive category (e.g., prey, predator, or perch). This ability is analogous to a human's ability to recognize a variety of objects as 'chairs', for instance, despite each chair's unique (and often quite different) appearance. In the case of prey recognition, research in my lab has revealed that mantises rely on a unique computational algorithm to classify prey objects by simultaneously assessing a finite number of identifiable stimulus parameters. If a sufficient number of these parameters reach threshold values (and the physiological context is appropriate), the mantis will classify the object as a prey item and try to capture it. I am now using the mantis' basic computational algorithms to model object recognition computer software which, in turn, can drive haptic (vibratory, mechanosensory) stimuli in mobility aids for visually impaired children (www.hapticInsight.org).