



Physical Anthropology Section - 2013

129 Contemporary Neuroscience Affects Forensic Behavioral Science Standards

John L. Young, MD*, 203 Maple St, New Haven, CT 06511-4048

The goal of this presentation is to incorporate the implications of important findings from neuroscience into the daily work of advancing and applying forensic behavioral science.

This presentation will impact the forensic science community by gaining appreciation of neuroscientific discoveries, delighting in the significance for forensic behavioral science in a variety of relevant social contexts.

Examinations of forensic behavioral science in response to the February 2009 report of the National Academy of Sciences Report, *Strengthening Forensic Science in the United States: A Path Forward*, point to a gratifying array of established habits that currently promote a high level of quality in both training and practice. Although its advances already impact practice, training, and research in the field, surprisingly little has been said so far about the implications of neuroscience. Yet it is a rapidly proliferating area that can be expected to command more attention in the very near future.

Experiences so far have provided a basis for high expectations as neuroscientists continue making their discoveries. This trend began during the 1970s with the establishment in cats of a distinction between two kinds of aggression, affective and predatory, each associated with changes in the activity levels of different brain structures. During the same decade, the first pharmacological agent shown to lower aggressive behavior, lithium, was documented in humans. Soon after, there appeared several associations relating brain structures and behavior, including the amygdala and emotional memory, the prefrontal cortex and executive function, and the limbic system and impulsive reactions.

As we gain information about the functions of brain structures and their connections through the use of functional Magnetic Resonance Imaging (fMRI), we increasingly recognize serious risks of oversimplification. The human brain has 100 billion neurons each connecting to a rough average of 1,000 others, and there are several glial cells for each neuron. These cells are being found not so inert as was once thought. The amygdala itself is composed of several paired nuclei, making it more than a single organ. Moreover, concerns are now arising about the validity of once-established results in neuroscience.

Appropriate concerns are being raised about the use of neuroimaging in the courtroom. Images have an inherent convincing quality unlike galvanic skin responses and similar behavioral evidence. Valid information about the developing brain is likely to have a helpful place in the evaluation of competency to stand trial. At least since the trial of John Hinckley, Jr., we have seen controversies concerning the use of neuroscientific techniques to aid in the assessment of criminal responsibility. Fascinating results are emerging with respect to the detection of malingering and other lying. A recent civil case involved the use of fMRI to demonstrate a putative association between violent video game playing and violence in order to support the claim of the state that it had a compelling interest in regulating these videos.

The study of violent behavior stands to gain much if it undertakes to link the findings of neuroscience to the social contexts in which human brains give meaning to the making of choices, including the choice to behave violently.

Another area of growing concern is medicinal enhancement, the use of substances to bolster alertness, memory, cognition, and other functions, such as physical prowess. Some compounds are new; others, mostly psychotropics, are familiar but are being proposed for off-label uses. Forensic behavioral science has a role in assessing this practice, especially as it spreads to new social contexts. As neuroscience continues to make its advances, it is increasingly important for forensic behavioral science experts to keep pace by applying close vigilant attention to the relationships among scientists working in different but interacting social contexts.

Neuroscience, Social Contexts, Practice Standards