Biological Aspects of Behavior

The area of biopsychology is a hybrid of two aspects of functioning that were once seen as disparate and incompatible. The struggles over integration are reflected both in its history and its current directions. Evolutionary psychology was introduced by Lamarck and Darwin, who influenced scientists to consider the continuity between man and nonhumans and the mental developmental changes throughout the evolutionary progression. An area that naturally complemented the study of evolution was comparative psychology, which provided an outlet for exploring questions in behavior, learning and consciousness. Research such as YerkesÆ investigation of complex adaptive behavior helped to develop comparative psychology into a field that went a step beyond behavioral studies that had focused on puzzle boxes (i.e., Thorndike) and mazes. The emergence of behavioral genetics increased the biological focus of the field and redirected the field toward within-species biopsychological study, a change from the previously focus on evolutionary behaviors between-species. Behavioral genetics also led to interdisciplinary studies of behavioral embryology and endocrinology (Hilgard, 1987).

Another more recent, but very significant, contributor to biopsychology is the development of the fields of neuroscience and neuropsychology. Early brain localization experiments by phrenologists such as Spurzheim and Gall set the stage for examining the relationship between behavior and brain physiology. Particularly notable are the contributions of Karl Lashley, whose search for the physiological basis of memory (engram) led to the questioning of neuroscientific theories at the time (Berridge, 2006). Soon, HebbÆs work on cell assembly redirected the field of neuroscience toward finer aspects of the nervous system, leading to advances in chemical and signaling components of the brain that are crucial to the current state of the field (Hilgard, 1987).

Current research in the field of biopsychology is continuing to provide insight into the relationship between brain and behavior. One physiologically-related example of how this type of research is carried out today is shown by current research on neuronal discharging. As a way to observe details of brain functioning, this type of research aims to find a group of neurons that can bridge behavior and cognition (Schall, 2004). Research seeks to gain insight into the bridge locus through observing saccades during gaze (Schall, 2004). However, it is difficult to determine how these functions map onto brain processes. Another area of study, change detection in single neurons, also attempts to observe brain function at a particular level of detail (Yu, 2006). Using spike statistics to detect change, Yu (2006) found that speed and accuracy are both critical. Research on this level relies heavily on mathematics, which illustrates another way that biopsychology is an integrative field. Modeling techniques used in, for example, exploring neuroimaging response, are also an important part of interpreting behavior at this level of functioning (Friston, 2005).

The present research is also still influenced by the early contributions and theories of the field, as evidenced by the role of complex evolutionary theory in helping to unify the research area. Theories such as multilevel evolutionary theory and systems theory notably contain the component of culture, as well more sophisticated concepts of genetic and environmental factors (Carporeal, 2001). At the same time, the increased influence of technological advances provides us with interesting physical artificial models of these types of systems (Carporeal, 2001). However, without further research and refinement, both technically and theoretically, these models run the risk of oversimplifying the evolutionary process.

Currently, the area of biopsychology represents an ever-growing field that is still in an, arguably, relatively early stage. However, the future promise of the field continues to lie in the integration between biological and psychological approaches to studying behavior (Gonzalez, 2006; Berridge, 2006). The more recent focus on neuroimaging and neurophysiology may lend better understanding to behavior when studied with psychological processes in mind. At the same time, Berridge (2006) stresses the increase in the role of psychology in biopsychological research. In addition, the importance of culture in studying individual differences becomes increasingly salient as the country continues to diversify (Berridge, 2006). Technological advances will also be crucial in future research, as techniques other than fMRI, such as molecular study, will help to refine our current practices (Berridge, 2006).

At the University of Michigan, this type of integrative research is being conducted in several different ways. For example, patients with a history of combat-related trauma experience exaggerated neurophysiological reactivity when under stress (King, 2006). Given that PTSD patients often have difficulty accessing or conveying their stressful thoughts and behaviors, studying the biological components of the disorder (i.e., alterations in the HPA axis) can have major implications for treatment. Biological components may also help to explain individual differences in why a percentage of those who have experienced trauma do not experience PTSD. PET and neuroimaging techniques aid in exploring these questions; however, as in many cases, desensitization due to repeated exposure to stressful stimuli (as necessitated by the imaging methodology) may present a confound. King (2006) also studies mindfulness therapies for PTSD, using physiological indicators to measure their effectiveness, thus linking research in clinical psychology with neurophysiology. Another example of MichiganÆs contribution to biopsychology is BerridgeÆs (2006) research on neural mechanisms of emotion, motivation, reward. Research on biological components of pleasure and desire can shed much light on these psychological processes.

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