



Book review

Review of the Evolution and Function of Cognition,
F. Goodson; Lawrence Erlbaum, 2003

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Employed with fundamental postulates and concrete theories, Felix E. Goodson, emeritus professor of psychology at DePauw University and author of *Evolutionary Foundations of Psychology* (1973) and *Theories in Contemporary Psychology* (1976), attempts to explain the progression of how our minds evolved in his carefully written textbook, *The Evolution and Function of Cognition*. Goodson's text weaves together numerous different fields within the basic sciences in order to present a framework for how the cognitive faculties of our mind evolved. Generally, Goodson adeptly uses eight progressive steps in evolution, as a scaffold to explain the development and function of numerous elementary cognitive phenomena.

The first chapter of *Evolution and Function of Cognition* begins with a concise overview of the basics in evolution and then concludes with a statement of purpose declaring that the theories within the text serve to outline the "manner in which information processing capacities of living

systems actually work" (p. 33). In the second chapter Goodson defines the postulate of process as all activity that serves as an instantaneous "function of impelling the organism toward equilibrium" (p. 46). In addition Goodson subsequently defines the postulate of inference as "every attribute that has been remained characteristic of a species for an enduring period contributes (or once contributed) to the survival of the genetic material" (p. 51). In the third chapter Goodson asserts that the first progressive step in evolution was single dimensional differential behavior, stating that the strength of an organism's behavior is inversely related to the distance from a source of energy, where behavior is more rapid in response to higher levels of energy. Goodson posits that the second progressive step was dual dimensional differential behavior, where an organism is capable of responding to two different energy sources. Although Goodson admits that both processes are hypothetical, he clarifies this statement by explaining that the first moving organisms were most likely multi-energy responders (third step) and thus the previous two steps were a necessary precedent in

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evolution. Goodson's fourth progressive step in evolution was the association between cue and behavior, which provided organisms with appropriate adaptive responses to situations or events that significantly persisted with time. Goodson notes that one limitation of the association between cue and behavior is the lack of plasticity to changes that inevitably occur in the environment. This limitation was circumvented by the emergence of learned associations (fifth step). The sixth progressive step was observation learning, which provided an internalized replica of an organism's environment. The seventh progressive step was internal locomotion, or the processes that results in various cognitive phenomena including thinking. The eighth and final progressive step, according to Goodson, was the development of language. The remaining six chapters expand on the previous fundamental postulates and progressive steps, whereby different cognitive phenomena (i.e., memory, dreaming, etc.) are discussed in depth. Throughout the text Goodson encourages his readers to continually ask "Is this really the way I work?" (p. 79).

Praise is warranted for Goodson's ambition in synthesizing the work of Freud, Wundt, Sherrington, Lashley, and Ebbinghaus within his framework. Clearly, *Evolution and Function of Cognition* would benefit higher level undergraduate or graduate students with a strong background in historical psychology and curious readers with an appreciation for classic psychological content. Such readers will undoubtedly appreciate the abundant historical references that span almost two centuries of research. Another positive aspect of *Evolution and Function of Cognition* is that Goodson's postulates and progressive steps are based on solid scientific rationale. For example Goodson's postulate of progression can be applied to many different life forms (i.e., protoplasm, plants, animals, etc.), and takes into account the most fundamental elements of life such as the necessity of energy. Moreover, Goodson clearly states his progressive steps in a logical fashion and then reinforces these theories throughout the remaining text. The overall effect is a well-integrated text that facilitates understanding more abstract theories.

Although the rich historical accounts and sound scientific rationale within the text deserve praise, one criticism is that Goodson has neglected to shed insight on some of the most pertinent contemporary issues within Cognitive Psychology. For example, one important theory that exists within the field of learning and memory is the notion of memory reconsolidation, or the process of restoring long-term memories subsequent to reactivation (Nader, Schafe, & LeDoux, 2000). It would have been interesting (at least to me) if Goodson discussed the evolutionary adaptive benefits of forming labile memories every time a consolidated trace is reactivated. Moreover, Goodson could have elaborated on how the reconsolidation phenomenon may have been one possible solution to the limitation faced with the association between cue and behavior (step four). Clearly in order to ensure survival, organisms would have to be able to adapt to new situations and thus be able to modify previous associations after an environment has changed in some way or another. From an evolutionary perspective, a process whereby consolidated memories become labile and thus modifiable, would be more beneficial to survival than a memory trace that always remains permanent. In addition, another interesting area that was unexplored, was the adaptive qualities of extinction learning, which is the marked decline in frequency of a conditioned response subsequent to retrieval without the presence of a reinforcer (Pavlov, 1927). The present community consensus is that this phenomenon consists of altering previous learned associations and not by the formation of new memory traces (Dudai, 2002). Clearly, a process that consists of modifying a preexistent memory trace would be a more adaptive mechanism in comparison to creating a completely new trace.

Another criticism with *Evolution and Function of Cognition* is Goodson's discussion of the evolutionary function of dreaming. Goodson boldly states that "dreams per se have no particular function" (p. 243) and suggests that due to the raised sensory and motor thresholds during sleep, insight into an individual's autocept is possible. Although Goodson briefly mentions the importance of dreams in processing information, he neglects to emphasize the important role that dreaming serves

in certain off-line memory processing. For example, Stickgold, Hobson, Fosse, and Fosse (2001) has suggested that dreaming serves an evolutionary adaptive role in facilitating information storage within the cortex. Clearly, dreaming may serve a more fundamental role for survival than providing insight into an organism's "apperception of encodes" (p. 243).

Lastly, the most frustrating aspect of reading *Evolution and Function of Cognition* was the abundant use of jargon without illustrations or figures. Although a glossary exists at the back of the text, schematic diagrams could facilitate learning different terms and conceptualizing the various experiments referred to within the text. Perhaps Goodson could have put more effort into providing his readers with blurbs at the bottom or side of the page, like so many other contemporary science text books, in order to provide readers with helpful background information.

Despite such criticism, *Evolution and Function of Cognition* is a well-integrated textbook filled with interesting insight based on well grounded

scientific rationale. However, Professors should seriously consider whether their students have the appropriate background or maturity before recommending this text for their courses. In conclusion, although Goodson may not have a contemporary perspective on how our minds work, his *Evolution and Function of Cognition* is a commendable effort worth reading.

References

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