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Book Review

The MIT Encyclopedia of the Cognitive Sciences, edited by Robert Wilson and Frank Keil ☆

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The MIT Encyclopedia of the Cognitive Sciences has collected nearly 500 entries on cognitive science, each written by a leading researcher in the field. It is a useful and timely book with many strong points. It will be an essential reference work for any student of the cognitive neuroscience. I have used it to learn, to browse and to teach. The Encyclopedia is available online; this feature is quite helpful and easy to use.

In this review I will focus on five entries in the encyclopedia, that bear closest connection with my own work; I found these articles immensely informative.

Hauser and Marler's entry reminds the cognitive scientist of several major findings from animal communication. These include the result from behavioral ecology that although animals communicate, they do not always tell the truth. Furthermore, few animals produce vocalizations that tell others about specific events (see social cognition entry from Cheney and Seyfarth below). Animals do not do what humans do, which is to combine speech elements into an infinite variety of meaningful sounds. Song birds show this recombination ability, but their recombinations lack meaning and are primarily affective signals. Nevertheless, the many common features shared with human language make bird song a great model for communication. Like humans, song birds are superb vocal learners. Both learn their vocal motor behavior early in life, with a strong dependence on hearing both the adults that they will imitate, as well as themselves as they practice. The similarities and differences between human and animal communication described in this entry show that animal models are an essential part of cognitive science.

Rauscheker's review of auditory physiology shows how complex sound stimuli are processed by the auditory system. The brains of animals like frogs, songbirds, owls and bats all show sensitivity to complex sounds. The key is that the complex sounds used in these neurophysiological studies have a clear behavioral context identified in ethological studies. Responses to other mammalian vocalizations (apart from bats), are only beginning to be better understood (e.g., the communication sounds of monkeys). At present, cognitive

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scientists will learn from Rauscheker's entry how little is known about how the mammalian auditory system encodes responses to complex sounds.

Moss' entry on echolocation shows just how well we understand the processing of complex sounds in bats. This entry stands in stark contrast to the studies described in Rausckecker's entry on auditory physiology in other mammals. Of course, bats are specialized to detect the echos returning from their calls. Thus it is clear what they are listening to. Because this ethological key is available, bat studies have been able to progress to studies of higher level perception of the auditory world, such as target shape discrimination. An essential issue in both cognitive and neural science is whether the strategies developed for animals like bats and song birds can be generalized to studies of human communication.

These strategies are reviewed in Marler's entry on ethology. He points out the ethological foundations of cognitive science and identifies historically important biological concepts. In the 1940s, Lorenz, Tinbergen and von Frisch (and others) emphasized that behavior was endogenous, that sign stimuli and instinct existed, and that cross-species comparisons could be very useful. These are concepts that stem from the biological Darwinian approach, rather than from psychology, and they raise issues that are still relevant in cognitive science where many studies are confined to humans. Comparisons with animals are important.

Cheney and Seyfarth's entry on Social Cognition in animals reinforces the interactions between cognitive science and animal behavior already described above. They work on monkeys who do provide referential calls. Both vervet and diana monkeys classify vocalization into categories according to their meaning. They provide the example of the female diana monkeys who give a leopard alarm call when they hear a leopard's growl, a male diana monkey's leopard alarm or the shriek of a duiker (a small antelope eaten by leopards). They suggest the diana monkey has some sort of mental representation of a leopard.

These entries on animal communication and behavior are an authoritative guide for cognitive scientists. They make it clear that cognitive science gains its great strength from the interactions between many different fields.

Wilson, R.A. & Keil, F.C. (Eds.) (2001). The MIT Encyclopedia of the Cognitive Sciences, Cambridge, MIT Press (paperback version). NRC (2007). Taking Science to School. National Academies Press (authored a major portion of this book). Keil, F. C. (2014). Developmental Psychology: The Growth of Mind and Behavior. W.W. Norton (886 pages). Lockhart, K.L. & Keil, F.C. (2018). Publisher. Cambridge, Mass. : MIT Press. Collection. inlibrary; printdisabled; internetarchivebooks.Â Includes bibliographical references and indexes. Philosophy / Robert A. Wilson -- Psychology / Keith J. Holyoak -- Neurosciences / Thomas D. Albright and Helen J. Neville -- Computational intelligence / Michael I. Jordan and Stuart Russell -- Linguistics and language / Gennaro Chierchia -- Culture, cognition, and evolution / Dan Sperber and Lawrence Hirschfeld. Association of American Publishers PROSE Award, 1999. Access-restricted-item. true. Edited by. Robert a. wilson and. Frank C. keil. The MIT Encyclopedia of the Cognitive Sciences. The MIT Encyclopedia of the Cognitive Sciences EDITED BY. Robert A. Wilson and Frank C. Keil. A Bradford Book The MIT Press Cambridge, Massachusetts London, England. ï£© 1999 Massachusetts Institute of Technology All rights reserved.Â Frank Keil thanks Cornell University for internal funds that were used to help support this project. Philosophy Robert A. Wilson The areas of philosophy that contribute to and draw on the cognitive sciences are various; they include the philosophy of mind, science, and language; formal and philosophical logic; and traditional metaphysics and epistemology. Edited by Frank C. Keil and Robert A. Wilson. A Bradford Book. Buying Options.Â Robert A. Wilson is Professor of Philosophy at La Trobe University, the author of Genes and the Agents of Life, and coeditor of The MIT Encyclopedia of the Cognitive Sciences and of Explanation and Cognition (MIT Press). He directed the project that built EugenicsArchive.ca and is a director and the executive producer of the documentary Surviving Eugenics. Reviews. The Cognitive Sciences emerged in recognition of the fact that scholars and scientists in many different fields shared common problems and needed to collaborate. Robert A. Wilson, Frank C. Keil. "Amongst the human mind's proudest accomplishments is the invention of a science dedicated to understanding itself: cognitive science. This volume is an authoritative guide to this exhilarating new body of knowledge, written by the experts, edited with skill and good judment. If we were to leave a time capsule for the next millennium with records of the great achievements of civilization, this volume would have to be in it."--Steven Pinker.