Animal Vocal Communication: Assessment and Management Roles. *Second Edition.*

By Eugene S. Morton. Cambridge and New York: Cambridge University Press. $99.99. xi + 250 p.; ill.; index. ISBN: 978-1-107-05225-3. 2017.

Eugene Morton has made some of the most important contributions to animal communication in the last half-century. His first is the role of "habitat acoustics" in bird song evolution, which predicts that the evolution of vocal signals used for long-range communication will be influenced by environmentally induced signal attenuation and degradation. His second is development of motivation-structural rules, which predict how an animal's internal state influences the type of vocal signals that are used. This book presents his third, and most general, contribution to animal communication, suggesting a general framework within which animal vocal communication should be studied. Although he specifically discusses vocal communication, this new framework applies equally well to communication in other modalities.

In this new volume, Morton elaborates a general theory of vocal communication that was first presented in *Animal Vocal Communication: A New Approach* coauthored in 1998 with the late Donald H. Owings (Cambridge (UK): Cambridge University Press). In this second edition he emphasizes the role of the receiver/assessor in the evolution of acoustic communication.

The traditional approach to animal communication is often guided by concepts of information and linguistics. Senders encode information in a signal that is transmitted to the receiver who then decodes this information. Morton rejects this approach of the "informationizing" of animal communication. Instead, he suggests there are managers and assessors. Managers produce signals that are aimed at manipulating the behavior of the assessors, while assessors do not receive information but they assess signals. If and how they respond to signals is based on their determination of whether the signals mean something important to them.

To clarify the difference in these two approaches, consider two explanations of the same phenomenon—small male frogs produce high-frequency calls, large males produce low-frequency calls, and females prefer the calls of larger males: males encode information about their body size into the frequencies of their calls, females decode this information and then decide to mate with the larger males; versus call frequencies covary with the sizes of the larynges that produce them, and lower frequencies better match the tuning of the female's ear that results in females being more attracted to larger males. The first explanation utilizes an information metaphor while the second is based on biophysics. Are these explanations equivalent? We might ask rhetorically: since rocks of different sizes make different sounds when they are dropped into the water, does the rock encode information about its size into the sound of its splash?

Morton is not the only one with strong opinions about the role of information in animal communication. He repeatedly refers readers to the important contributed volume by Ulrich E. Stegmann (2013. *Animal Communication Theory: Information and Influence.* Cambridge (UK): Cambridge University Press), which contrasts the traditional information approach that emphasizes mutual benefits to signals and receivers with an approach that emphasizes influence and conflict between signal and receiver, a view that was popularized in the late 1970s by Richard Dawkins and John Krebs and is developed by Morton in wonderful detail in this book.

This volume is not a light read. Morton is not Doctor Dolittle. He is not proposing a fictional tale but instead presents a serious discussion of how we should view the evolution and function of animal vocal communication. For anyone interested in this most compelling of all animal behaviors, this book is well worth the time and effort.

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NEUROBIOLOGY

Cannabinoids and the Brain.

By Linda A. Parker. Cambridge (Massachusetts): MIT Press. $35.00. x + 237 p.; ill.; index. ISBN: 978-0262035798. 2017.

This book was written for readers interested in the scientific background of the medicinal use of cannabis and its potential therapeutic effects in a number of disorders, primarily of the nervous system affecting behavior, mood, and anxiety. It is highly technical and requires a good background in neurobiology. The author, Linda A. Parker, is a well-recognized cannabis researcher whose contributions to the field have led to prestigious awards. She has prepared this volume by compiling the most relevant scientific information on the pharmacology of known cannabinoids present in marijuana and some of their synthetic analogs.

The scientific information is provided in 12 chapters; the first and last chapters summarize a historical timeline of medicinal use, active chemistry isolation and current applications, and the current clinical and legal conundrum, respectively. Chapters 2 through