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BOOK REVIEW

Noise Matters: The Evolution of Communication

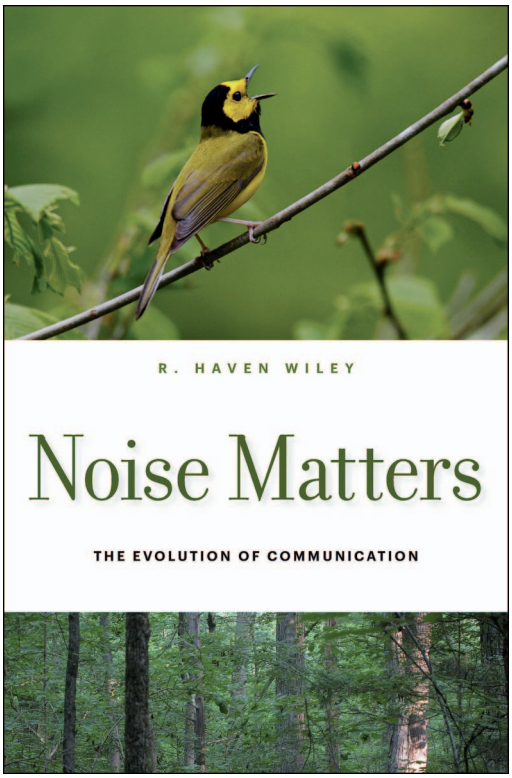
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Noise Matters: The Evolution of Communication by R. Haven Wiley. 2015. Harvard University Press, Cambridge, MA, USA. xi + 502 pp. $45.00 (hardcover). ISBN 9780674744127.

The lisping, dreamy song of a male Black-throated Green Warbler (*Setophaga virens*) is an intoxicating sound. But before it can reach the ear of a human and, more importantly, before it can be heard by a *female* Black-throated Green Warbler to elicit her response, the song must navigate a noisy path. In traveling through the forest, the song will experience inevitable degradation in transit, as the sound waves are distorted by leaves, branches, and many other obstacles. The song must also overcome interference from a variety of competing biotic sounds made by other bird species and by countless other animals. Additionally, the song must contend with substantial background noise produced by human activities, some as deafening as the din of chainsaws. Finally, and perhaps most critically, the male's song must arrive to the female at a time when she is actually receptive—and not cognitively preoccupied with other matters, like avoiding predators or finding food. Thus, for a male Black-throated Green Warbler, as indeed for any animal attempting to communicate, the world is a noisy place.



The central thesis of Haven Wiley's new book *Noise Matters* is that noise has ultimately been central to the evolution of communication and has resulted in myriad specializations in signalers and receivers to overcome noise to the greatest extent possible. As Wiley puts it, his objective is "to persuade you, dear reader, that noise is indeed inescapable" and furthermore that "noise does not just annoy, it changes everything" (p. 3). Wiley makes it abundantly clear, throughout the book, that despite many specializations in signals and behavior, the challenge of noise guarantees that communication, at best, can evolve to be effective but never error-free. This imperfection in animal communication will come as no surprise to most researchers in the field, given the substantial body of work on how animal communication is challenged by noise (Brumm 2013). Wiley's book, though, is a unique and intriguing contribution to this literature, especially given the four decades he has devoted to pioneering studies of noise in animal communication.

Wiley defines noise as "anything that interferes with the reception of signals" (book jacket). Signals are simply "those patterns of energy of interest to a receiver" (p. 11). In Part I, Wiley examines some of the clever ways that evolution has specialized animal signals to deal with noise. For instance, some species have evolved so-called alerting components, which are especially prominent and loud, thereby preparing receivers to attend to a signal that imminently follows the alerting component. Similarly, many songbirds will alter their signaling behavior depending on what other sounds currently mask the acoustic environment. Indeed, the impact of acoustic noise applies even to species that show exceptionally low rates of overall

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signaling (Symes et al. 2016), suggesting that natural selection has generally favored adaptive coping with noise in many species. Wiley devotes substantial space to songbirds, in particular, and suggests that their tonal songs, which are so pleasant to our ears, evolved mainly to achieve "greater throw" (p. 34) in long-range communication, thereby avoiding the degradation associated with broadband signals. Wiley also reviews, in depth, the mechanisms of sound propagation and perception, revealing his detailed knowledge of this topic. Some of the illustrations of the human vocal tract are even based on his own dissections.

In Part II, Wiley considers why, despite noise, evolution can still lead to joint optima for both signalers and receivers. The chapters in Part II are the more mathematical ones in the book. Wiley uses game theory to reveal that signalers and receivers can never escape noise, implying that ideal communication is impossible. Interestingly, one novel form of noise arises when signalers and receivers have conflicting interests: the prospect of deception. While many factors can ensure that signals remain "honest on average," the continued persistence of even low levels of deception will add further noise to the system, leading to accumulating errors in response by receivers. But unless these errors rise above a critical threshold where receivers experience a net fitness penalty, receivers will continue to respond to signals despite some uncertainty about their truthfulness. It is notable in relation to human gossip, in which the accumulation of noise and distortion is unparalleled, that simple comparisons across multiple independent sources can ultimately overcome the misinformation (Laidre et al. 2013).

In Parts III and IV, Wiley explores the rich gamut of signals, from those used in sexual selection, cooperation, and complex societies to molecular signals and even human language. He argues that all these signals support his central thesis of the importance of noise, and he even suggests that science itself must contend with noise as perhaps its biggest challenge. I found these parts of the book particularly intriguing, especially Wiley's argument that the foundational importance of noise in signaling can ultimately scale up to have cascading consequences on the evolution of cooperation in complex societies. Many of his ideas ultimately deserve further testing, especially with multimodal signals. Indeed, given that most of Wiley's examples concern acoustic signals, a rich path remains open for future work exploring how noise has likewise shaped visual, chemical, tactile, and electric signals (Bradbury and Vehrencamp 2011, Laidre and Johnstone 2013).

It is perhaps poetic, for a book arguing about the importance of noise, that readers themselves may encounter some non-negligible noise within the text. This is because Wiley's idiosyncratic style sometimes takes readers on unexpected tangents. For example, "Bell Research Laboratory, the sort of corporate institution no longer favored in these days of short-term profit maximization . . ." (p. 413). Or the author's philosophical view that "science itself is revealed as noisy perception of the external world" (p. 4). Readers should also be aware that, as Wiley cleanly states, "the chapters themselves are cleared of all citations" (p. 5). Indeed, because the chapter-by-chapter bibliography at the end of the book is not arrayed alphabetically (but rather on the basis of annotated descriptions by the author, with one or a few references after each description), it can be somewhat challenging to locate primary sources quickly. Despite all this, the book contains valuable gems. One hopes, therefore, that among ornithologists in particular and biologists more generally, it will rise above any background noise or distractions and ultimately find its way into the cherished libraries of many readers. For this book harbors a great deal of valuable information, synthetic wisdom, and intriguing new hypotheses, even if reading it means encountering an occasional bit of noise. But then again, all organisms have to deal with that.

ACKNOWLEDGMENT

This review is dedicated to M.C.S.

LITERATURE CITED

Bradbury, J. W., and S. L. Vehrencamp (2011). Principles of Animal Communication, second edition. Sinauer Associates, Sunderland, MA, USA.

Brumm, H. (Editor) (2013). Animal Communication and Noise. Springer, New York, NY, USA.

Laidre, M. E., and R. A. Johnstone (2013). Animal signals. Current Biology 23:R829–R833.

Laidre, M. E., A. Lamb, S. Shultz, and M. Olsen (2013). Making sense of information in noisy networks: Human communication, gossip, and distortion. Journal of Theoretical Biology 317:152–160.

Symes, L. B., R. A. Page, and H. M. ter Hofstede (2016). Effects of acoustic environment on male calling activity and timing in Neotropical forest katydids. Behavioral Ecology and Sociobiology 70:1485–1495.

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