

Hailman's clear, thoughtful approach demonstrates that information theory is relevant, but will his book encourage people to apply its equations? The author's gentle touch does not do full justice to the theory's power. Because information theory estimates the degree to which a signal decreases the receiver's uncertainty about its situation, its application forces biologists to consider the signal from the animal's point of view. This advantage was mentioned at the outset, but numerous examples that illustrate this passed with little further comment. Moreover, a theory that quantifies performance by telling us how effective signals are at communicating information, and also tells us why they are effective, can handle the tradeoffs that shape the evolution of signals but, with one exception (mimicry in damselflies), this was not apparent.

That said, books that provide a personal view of a deeply understood topic should be encouraged. They allow us to savor the vital essence that peer pressure squeezes out of contemporary research papers, namely the inquisitive, imaginative, argumentative, and constructive spirit that engages a scientist in observation, thought, and wonderment. Hailman comes across as a true naturalist and scholar, who engages with nature (he is coauthor with Elizabeth Hailman of *Backpacking Wisconsin*. 2000. Madison (WI): University of Wisconsin Press), seeks to understand and explain, and delights in applying one of the 20th century's greatest theories.

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THE ORIGINS OF MEANING: LANGUAGE IN THE LIGHT OF EVOLUTION. *Volume 1. Studies in the Evolution of Language, Volume 8.*

By James R. Hurford. Oxford and New York: Oxford University Press. \$35.00. xiv + 388 p.; ill.; index. ISBN: 978-0-19-920785-5. 2007.

The author of this volume is the leading figure in the modern study of the evolution of language. What sets this endeavor apart from its 19th-century predecessors is a strict adherence to Darwinian tenets, a point that Hurford advertises prominently in the subtitle of this book (which is the eighth in a series that Hurford edits, along with Kathleen R. Gibson). This volume is meant for a broad academic audience and in this goal it succeeds admirably; it is free of jargon and presents complex ideas in a comprehensible fashion without condescension. If only all academics could write in this way.

The task of providing a strictly Darwinian account of language evolution is daunting. After

all, as Hurford notes (p. 247), the advent of language and complex human society has been called the last of eight major informational transitions in evolution, alongside such steps as the transition of RNA to DNA and the appearance of multicellular organisms. But language is unique to our species; we diverged from our nearest ancestors, the great apes, between ten and five million years ago and they have no system of communication that remotely resembles language, making any sort of triangulation exceedingly difficult. Much of what the author has to say is therefore speculative, but his speculation is informed by a grasp of a very wide range of research from animal behavior to cognitive and evolutionary psychology to philosophy (including formal logic) to linguistics, Hurford's own field.

The book is separated equally into two parts. The first part is entitled *Meaning Before Communication* and deals initially with the problem of animal knowledge (itself a taboo subject until quite recently). Hurford then shows how to get from animal knowledge "towards human semantics" (the title of one of the chapters), where, in the only truly specialized chapter, he goes so far as to provide a formal logical system for these "representations of the world formed by pre-linguistic creatures" (p. 162).

The second part of the book, *Communication: What and Why?*, moves from internal semantic representations to their expression via communication. Here Hurford does a superb job of connecting research on animal communication with quite sophisticated issues in linguistics and philosophy (for example, reference and speech acts) in such a manner as to illuminate both poles of the connection.

The final two chapters of the book attempt to provide an account of language evolution that shows how this uniquely human trait might have evolved by normal evolutionary mechanisms rather than by saltation or some other extraordinary mechanism of the "then a miracle happened" variety. The central themes of these chapters are altruism and cooperation, two topics that have been historically difficult to reconcile with orthodox selfish Darwinism, but where enough progress has been made recently to provide a solid foundation for Hurford to work on.

The author closes with the hope that this volume has given readers an appetite to go on to the second volume in this two-part work: *The Evolution of Linguistic Form*. He certainly has me hooked.

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