

sued in the last two decades. Chapter 1 begins with a short history of neuroscience, the organization of the brain, and a brief note on excitability of axons. Chapter 2 describes the basic structure of neurons and discusses some very old models, including a rather dated “multiplex” neuron. I would guess that the original motivation for these simplified models came from the lack of fast, accessible computers. These days, such models are generally of historical interest only. Chapter 3 contains a standard discussion of the Nernst equation and passive membrane properties (resistance and capacitance). The Hodgkin-Huxley theory of voltage gated channels is described in Chapter 4. No other channel types or models of such channels are described in the book. Readers will have to go to other sources to get the actual equations for the channels and gates. The author describes a numerical shooting method for finding the traveling pulse. Chapter 5 continues with the traveling pulse equations, proceeding in the standard manner of breaking the solution into fast and slow parts. The fast equations are solved using a phase-plane method.

In Chapter 6, several simplified versions of the nerve axon equations are analyzed. Discussions of existence and stability are provided, although none of the beautiful and deep theory developed by Evans is described. The theory for propagation and saltatory conduction in myelinated axons is developed in Chapter 7. The author makes a case for the importance of ephaptic conduction between two neighboring axons in Chapter 8. The idea is that two nearby axons can be coupled through the extracellular medium and, thus, spikes in neighboring axons may interact. The linear theory for dendrites is covered in detail in Chapter 9. Interesting nonlinearities due to shunts in the cable are discussed and, at the end of this chapter, the author provides a list of outstanding research problems. A few examples of neural networks (McCulloch-Pitts, feedforward, and some continuous models) are briefly described in Chapter 10, but there are no applications of these to any interesting problems. The following chapter discusses the idea of cell assemblies as put forward by Donald Hebb. Again, there are no applications of the theory or any computational explorations. The only theory explored in this chapter is the analysis of a simple competitive system based on Lotka-Volterra equations. The book concludes with some philosophical discussions of causality and the neural bases of emotions. In sum, it is a clearly written book covering material that is of primarily historical interest.

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## BEHAVIOR

ALTRUISTICALLY INCLINED?: THE BEHAVIORAL SCIENCES, EVOLUTIONARY THEORY, AND THE ORIGINS OF RECIPROCITY. *Economics, Cognition, and Society.*

By Alexander J Field. Ann Arbor (Michigan): University of Michigan Press. \$54.50. xvi + 373 p; ill.; index. ISBN: 0-472-11224-4. 2001.

In this volume, the author, an economist, sets out to explain why humans are so much nicer than rational choice theory says they should be. For example, why do people cooperate in one-shot Prisoner's Dilemmas when a rational chooser would certainly defect? And how could a tendency to cooperate have established itself in a world of defectors?

The biologist's answer is simple: people are not rational choosers. In evolutionary theory, *natural selection*, not the individual, plays the role of rational chooser. Natural selection “chooses” between alternative designs of organisms; and selection evidently favored a “Tit-for-Tat” design in the context of repeated Prisoner's Dilemmas (see R M Axelrod. 1984. *The Evolution of Cooperation*. New York: Basic Books). Given that such designs do not always work perfectly in novel contexts, it should come as no surprise that a veteran cooperator such as *Homo sapiens* is insensitive to artificial, laboratory conditions of anonymity and one-shotness, and open with a “nice” move.

A lone cooperator is a vulnerable creature; and so how did this cooperative tendency get off the ground in the first place? The biologist has several nonexclusive answers. Perhaps a mutant cooperator was clustered with its cooperative offspring. Perhaps reciprocity was a cue of (distant) kinship. Perhaps mutualism shaded into reciprocity via small increases in the time-lag between rounds of mutual benefit—from milliseconds, to minutes, to months. Perhaps the attention to reputation and the punishment of infractions that are common in dominance hierarchies were deployed, more benignly, to maintain reciprocal schemes. Any combination of routes provides ample “preadaptations” for full-blown reciprocity. Problems solved.

The economist's answer is less straightforward. Along with other economic migrants to evolutionary theory, Field assumes that the *individual* is the rational chooser, fitness maximizer, or unit of selection. He correctly deduces that this *creates* the “problem of altruism,” but he then incorrectly concludes that this problem can be solved only by group selection. Field does not consider any of the

alternative routes to reciprocity. And the author's sole evidence of group selection in our species' past is our current tendency to cooperate in one-shot dilemmas; he does not present any independent evidence that the "right conditions" for group selection were present during human evolution. His defense of group selection therefore carries little weight.

A book on this topic could have provided a much-needed overview of the emerging synthesis of evolutionary psychology and behavioral economics. Unfortunately, this volume is skewed toward promoting group selection, and its structure is dizzyingly repetitive. Interested readers are advised to turn instead to Robert Frank's *Passions within Reason: The Strategic Role of the Emotions* (1988. New York: Norton).

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#### SEXUAL SELECTIONS: WHAT WE CAN AND CAN'T LEARN ABOUT SEX FROM ANIMALS.

By Marlene Zuk. Berkeley (California): University of California Press. \$24.95. xi + 239 p; ill.; index. ISBN: 0-520-21974-0. 2002.

Does the study of animal behavior tell us about human sex roles, or is it unintentionally the other way around? In her new book, Zuk addresses the relationship between feminism and behavioral ecology, particularly the study of sexual selection. It advances two main themes. First, that human understanding of animal behavior can be distorted by our cultural biases, especially sexual stereotypes. Second, that the behavioral diversity of animals should be appreciated for its own sake, not just for what it can ostensibly teach us about ourselves (i.e., sometimes a duck is just a duck, not a role model).

The 12 chapters are separated into three parts. Part One reviews how human-based sexual stereotypes (e.g., males are aggressors, females are passive, selfless mothers) can prevent us from objectively seeing how animals behave. In this section and elsewhere, Zuk also argues against using the behavior of nonhuman animals as justification for human behavior and political agendas, including "ecofeminism." Part Two deals with biases associated with the lingering concept of the *scala naturae*, the Aristotelian chain of being from "higher" to "lower" forms of life, with humans (of course) at the top. Part Three consists of four chapters, each addressing a different aspect of human biology—female orgasm, menstruation, homosexuality, and putative differences in spatial ability between males and females. Zuk discusses how these traits might have evolved, and how tradi-

tional gender biases have impeded the study of these topics.

The book is easy to read, insightful, and frequently very funny. Overall, Zuk makes a valuable contribution by showing how sexism can stand in the way of doing good science in behavioral ecology and evolutionary biology (even if not every example is compelling). For this reason, *Sexual Selections* should be essential reading for scientists and students in the field of behavioral ecology. Zuk's book seems accessible for nonspecialists as well, and includes a good introduction to some basic evolutionary concepts. For all readers, it offers a plethora of fascinating, natural history stories, as it exposes many myths about animal behavior, human sexuality, and the putative conflicts between science and feminism.

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#### HUMAN BIOLOGY & HEALTH

##### SCOURGE: THE ONCE AND FUTURE THREAT OF SMALLPOX.

By Jonathan B Tucker. New York: Atlantic Monthly Press. \$26.00. vii + 291 p; index. ISBN: 0-87113-830-1. 2001.

With the current public concern over the potential use of smallpox as a biological weapon, this recent book is a most timely addition to the literature on this disease's history. Using journalistic jargon rather than the traditional academic format, the author traces the impact of smallpox on previous societies up through the current threats to world health.

Tucker briefly reviews the history of smallpox in the ancient civilizations of Egypt, Mesopotamia, India, and China. His main interest, however, is discussing how this disease has been used as a biological weapon, from the French and Indian War through today. Coverage of the pre-World War II history of smallpox is very limited, and Tucker fails to cite some of the standard secondary sources for this earlier period, such as John Blake's major study on smallpox variolation in 1721 Boston and Genevieve Miller's classic work, *The Adoption of Innoculation for Smallpox in England and France* (1957. Philadelphia (PA): University of Pennsylvania Press). After this superficial treatment of earlier smallpox epidemics, Tucker spends the vast major-