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A Primer of Conservation Behavior

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thors do an admirable job of situating their discussions against the backdrop of relevant theories and information from evolution theory and systems biology, while at the same distancing their arguments from claims about animal ethics or rights, the typical domain where debates about the validity of animal models have previously occurred. Perhaps most importantly, they do not attempt to take their conclusions too far, and grant that nonhuman animals can be used for some forms of basic biological research where prediction for human health is not the main goal. The important question that remains pressing after reading the text is what criteria can be used to judge the usefulness of nonhuman animal models, and whether (as the authors more or less conclude) humans may be the only adequate models for human health.

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BEHAVIOR

THE NESTING SEASON: CUCKOOS, CUCKOLDS, AND THE INVENTION OF MONOGAMY.

By Bernd Heinrich. Cambridge (Massachusetts): Harvard University Press. \$29.95. vii + 337 p. + 52 pl.; ill.; index. ISBN: 978-0-674-04877-5. 2010.

To call Bernd Heinrich a “biologist,” or even a “scientist,” is clearly an understatement. Rather, he combines an intense passion for nature with an enthusiastic curiosity and keen eye, and also an ability to write, making him what some have referred to as a modern-day Thoreau. This volume is one in a series of popular press books aimed at explaining the natural world, and our understanding of it, to a general audience. The primary focus of this particular volume is on the breeding behavior of birds, and it introduces readers to the often surprising ways that males attract mates, the complexities of social mating patterns (monogamy, polygyny, polyandry), the puzzling promiscuity that underlies many of the most “family values” monogamous relationships, and the intricate yet subtle strategies that parent birds employ to successfully raise their offspring.

Heinrich sometimes states controversial ideas a bit too glibly for my tastes but, overall, he does an admirable job of bringing readers up to date on scientific understanding of these fascinating animals. But the real strength of this book is its secondary focus: like his earlier popular works, most notably *The Mind of the Raven: Investigations and Adventures with Wolfbirds* (1999. New York: Cliff Street Books), this volume succeeds marvelously

because it feels so deeply personal. Each chapter is woven around Heinrich’s observations of birds living near his own secluded cabin, in particular a set of Canada Geese that seem like members of his own family. The personal observations and stories that punctuate the chapters are compelling and, as a result, the book is a real page-turner (this will not surprise readers familiar with the author’s earlier books). Heinrich’s observations give readers insight into the fascinating world of animal behavior, but they also give insight to the mind of an especially gifted and perceptive scientist.

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A PRIMER OF CONSERVATION BEHAVIOR.

By Daniel T. Blumstein and Esteban Fernández-Juricic. Sunderland (Massachusetts): Sinauer Associates. \$34.95 (paper). xv + 224 p.; ill.; index. ISBN: 978-0-87893-401-0. 2010.

This is a compelling read; I went cover to cover without putting it down. The authors systematically describe ways in which the study of animal behavior can influence conservation and management practices.

Blumstein and Fernández-Juricic have been at the forefront of this integrative field for more than a decade, hence the chapter structure is largely based around their own work. They cover aspects of foraging behavior, vigilance, predation risk, communication, habitat selection, and social and sexual behavior. Throughout, the authors have attempted to describe behaviors as mechanisms of population change and offered suggestions to wildlife managers for how they can better understand the conservation applications of behavioral ecology.

The goals of the volume are to promote a behavioral ecological toolkit for addressing wildlife management problems, and to foster dialogue between behaviorists and conservationists. I believe Blumstein and Fernández-Juricic have made a sterling effort toward delivering on the first goal. The second goal of fostering communication could be a long-term consequence of their *Primer*, but is too early to assess.

Although the authors state that they did not intend to review the literature comprehensively, one enjoyable element of the book was reading all of the case studies. For a 200-page volume it is jam-packed with interesting research summaries. However, more effort could have been spent developing overarching frameworks that connect behavior with conservation. For example, most wildlife managers care greatly about rates of birth, immigration, death, and emigration in their populations (i.e., the classic BIDE framework), yet

there is no explicit reference to such a framework; although parts could be quilted together from sections of some chapters. Additionally, there is little resolution of conflicts of biological scaling: behavioral ecologists predominately work at the among- and within-individual levels, yet conservationists are interested in population- and species-level processes and patterns. There are also scant success stories of where a behavioral application has led to a positive conservation outcome. Hence, I feel there were some lost opportunities for resolving and integrating structural differences between the fields. Such resolution is important in developing and promoting the use of the intended “toolkit.”

Even with these caveats in mind, I heartily applaud Blumstein and Fernández-Juricic. They are pioneers and there are inherent gaps when a field is first explored. The authors have made a significant and helpful contribution here and one that will surely inspire young behavioral ecologists to keep probing the links between behavior and conservation.

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NEUROBIOLOGY

SELF COMES TO MIND: CONSTRUCTING THE CONSCIOUS BRAIN.

By Antonio Damasio. New York: Pantheon Books. \$28.95. xi + 367 p.; ill.; index. ISBN: 978-0-307-37875-0. 2010.

The eleven chapters in this book focus on three related issues: How did nervous systems evolve minds? How did minds become conscious? How did these minds become self-conscious? Regarding the third question, this self is either a *self-as-object* or material me, defined as integrated neural processes, centered on the representation of the body, and expressed in mental states (p. 9), or a *self-as-knower* able to stand back and reflect on itself in the first-person, i.e., as I know this. In any case, even the reflections of this self-as-knower are biologically embodied. For Damasio, these preliminary philosophical and psychological analyses reflect the *conceptual legacy* regarding consciousness. An abbreviated account of Damasio’s claims is found in the recent interview, “Of Two Minds,” *Discover* December 2010:65-70, 76.

The text then shifts to an extended discussion of the historical and recent literature on the *neural legacy* concerning conscious states, specifically the evolution and neurobiology of the brain stem in

human primates. In contrast to the conceptual legacy associated with philosophy and psychology, a neural legacy attempts to explain “mind and consciousness parsimoniously, within the confines of neurobiology . . . unless the technical and theoretical resources of neurobiology are exhausted, an unlikely prospect at the moment” (p. 14). *Evolutionary* neurobiology therefore represents the most promising framework currently available for a scientific explanation of mind and consciousness. Transitioning to this latter framework involves at least three steps. First, given that the brain is essentially a cartographer, deconstruct the concept of “mind” into the sensory, proprioceptive, and motor representational maps brains encode. Next, reconstruct the evolutionary sequence by which these internalized topographic maps encode more and more information until, finally, these representations include the animal-as-knower as one of these representations.

Damasio’s working knowledge of the contemporary literature from philosophy, psychology, and cognitive science regarding minds and brains is impressive, as evidenced in the 23 pages of chapter-by-chapter notes and references. Still, there are at least three major literature references largely absent from this book: For all his emphasis on evolutionary neuroscience, especially regarding brain stem and cortical-level structures, and their respective contributions to higher-level cognitive states (particularly to the self-as-knower), there are few references to *comparative evolutionary neuroscience*. For example, the evolution of the neurobiology in nonhuman vertebrates and invertebrates receives very little attention. A second body of literature largely ignored is *computational neuroscience*. Also overlooked is the recent literature on cognition and agent-environment dynamics (e.g., A. Clark. 2008. *Supersizing the Mind: Embodiment, Action and Cognitive Extension*. Oxford (UK): Oxford University Press; A. Chemero. 2009. *Radical Embodied Cognitive Science*. Cambridge (MA): MIT Press).

As with Descartes and the conceptual legacy of philosophy and psychology, the focus of *Self Comes to Mind* is almost entirely on humans. Perhaps we should begin at the other end of the evolutionary spectrum with relatively simpler nervous systems (e.g., F. Prete. 2004. *Complex Worlds from Simpler Nervous Systems*. Cambridge (MA): MIT Press; G. North and R. J. Greenspan. 2007. *Invertebrate Neurobiology*. Cold Spring Harbor (NY): Cold Spring Harbor Laboratory Press; G. Roth and M. F. Wulimann. 2001. *Brain Evolution and Cognition*. New York: Wiley). As noted above, Damasio’s intention is to shift from a conceptual to a neural legacy. However, by focusing on humans we end up playing the same old Cartesian language game of “minds,”