



**SHAWN E. NORDELL
THOMAS J. VALONE**

ANIMAL BEHAVIOR

CONCEPTS, METHODS, AND APPLICATIONS

**INTERNATIONAL
EDITION**

OXFORD
UNIVERSITY PRESS

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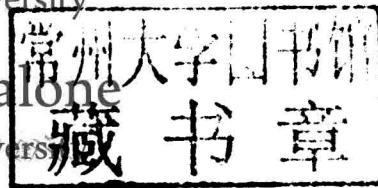
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New York Oxford

OXFORD UNIVERSITY PRESS

Oxford University Press is a department of the University of Oxford.
It furthers the University's objective of excellence in research, scholarship,
and education by publishing worldwide.

Oxford New York
Auckland Cape Town Dar es Salaam Hong Kong Karachi
Kuala Lumpur Madrid Melbourne Mexico City Nairobi
New Delhi Shanghai Taipei Toronto

With offices in
Argentina Austria Brazil Chile Czech Republic France Greece
Guatemala Hungary Italy Japan Poland Portugal Singapore
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Published in the United States of America by
Oxford University Press
198 Madison Avenue, New York, NY 10016
<http://www.oup.com>

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ISBN 978-0-19-973760-4

Printing number: 9 8 7 6 5 4 3 2 1

Printed in China on acid-free paper

Animal Behavior

For
James and Geraldine Valone
and
Buck, Ernie, Kirby, Grace, and Max

Preface

Our love of science is rooted in our undergraduate experiences, when we were both fortunate to first become immersed in the research process. We conducted projects that required us to develop research questions and hypotheses, consult and reference the primary literature, collect and analyze data, and present and discuss our conclusions. But not all undergraduates have such an opportunity. With this textbook, we hope to share the excitement of our own learning experiences. The narrative we present guides students through each step of the research process, from the development of the research question and hypothesis through tests of predictions, with ample (but not overwhelming) details on methodology and results. Our goal is for students to engage with the work of animal behavior research, just as we did as undergraduates.

This book is based on the growing mandate to shift science education from a pedagogy of rote memorization to one of critical thinking, emphasizing big-picture concepts and the nature of scientific inquiry. As instructors, we understand the need to provide not only extensive coverage of animal behavior but also the tools to create true learning opportunities. In addition, students increasingly seek relevance in their courses, asking, “How can I apply this?” To address all these needs, we go beyond merely presenting information: **we take a conceptual approach that highlights the process of science and the real-world applications of animal behavior research.**

The approach: concepts, methods, and applications

Our approach involves three major components. First, we organize each chapter around three to six major concepts. Second, we deconstruct research studies to emphasize the process of science. And third, we provide real-world applications in each chapter to tie the concepts to societal issues. Throughout the book, we use an accessible, question-driven style to engage students.

CONCEPTS

Each chapter is built around **broad organizing concepts**, such as “Evolution by natural selection favors behavioral adaptations that enhance fitness.” The development of a conceptual understanding is crucial for students to be able to make connections, see broader implications, and apply their learning. We thus present major concepts as a framework for understanding and evaluating empirical research examples. These framing sentences synthesize and summarize foundational research on complex topics in animal behavior. By using concepts as an outline for each chapter, we offer students a clear learning progression, enabling them to scaffold their knowledge throughout the chapter and develop higher order thinking skills.

METHODS

We illustrate each concept using research from the primary literature, with an emphasis on the **methods of the featured studies** so that students can become immersed in the process of animal behavior research as a rigorous quantitative science. As scientists, we know that it is impossible to evaluate research without fully understanding how the research was conducted. Yet students often perceive science as a series of facts and do not have a full understanding of where our knowledge comes from. To counter their misperceptions, we clearly identify the research question, hypothesis, and prediction for featured studies and then illustrate how the methods

allow the prediction to be tested. We present the resulting data in a way that shows students the individual variation present in all data. For example, we present means with standard errors in many of the results figures in the book. The book also offers a detailed chapter on standard methodology used in animal behavior research.

The featured studies have been carefully chosen to represent a broad range of taxa and include a combination of classic and contemporary research that is student accessible. We introduce the researchers from each study using their full names so that students can appreciate not only the diversity of taxa studied but also the diversity of researchers.

APPLICATIONS

Each chapter contains examples of how various people and groups are **applying the concepts** in animal behavior research to societal problems and issues. Students rarely have the opportunity to see how animal behavior research might be relevant to their own lives. Yet there are many applications of this field, such as how habitat selection behavior is being used to more effectively reintroduce species to restored areas or how crop damage can be mitigated by manipulating predation risk. Throughout the book, we highlight these examples in the “Applying the Concepts” feature.

Overview of chapters

The first three chapters lay the groundwork for understanding the science of animal behavior. In Chapter 1, we provide a brief review of the scientific method. The next two chapters focus on the development of behavior through the examination of behavioral genetics (Chapter 2) and learning and cognition (Chapter 3). We then examine communication (Chapter 4), foraging (Chapter 5), and antipredator behavior (Chapter 6). Chapter 7 is devoted to animal movement, taking a look at both dispersal and migration. In Chapter 8, we cover habitat selection, territoriality, and aggression. The next two chapters focus on reproduction, examining mating behavior (Chapter 9), and parental care (Chapter 10). We end with a chapter devoted to social behavior (Chapter 11). Although the book contains chapters that differentially emphasize proximate and ultimate explanations of behavior, we infuse both approaches throughout the chapters by the incorporation of Tinbergen’s four questions.

Teaching and learning features

- **“Scientific Process” boxes:** To further emphasize the process of science, each chapter contains one to three “Scientific Process” boxes. These present detailed research descriptions within a scientific framework, clearly and concisely laying out each step: research question, hypotheses, predictions, methods, results, and conclusions. Students can thus easily follow the research example at a glance, from its conception (the original research question) to the use of the scientific method (the creation of testable hypotheses, the experimental protocol used, the evaluation of data) and ultimately the findings of the work (conclusions of the study). The details contained in these examples illustrate and reinforce the rigorous nature of animal behavior research.
- **“Toolboxes”:** These boxes explain essential skills or complex terms in the science of animal behavior. They do not appear in every chapter but are included as needed to build students’ intellectual toolkit. They have two functions. First, these boxes show students how they can apply the scientific concepts to their own work. For example, one toolbox describes animal sampling techniques because we know that many students will be asked to collect data as a part of this course. Second, toolboxes provide additional background information. For instance, many students may lack knowledge

about phylogenies, which is crucial for employing the comparative method in behavior research. Therefore, one toolbox provides information describing phylogenies, how they are constructed, and how they are interpreted. Another toolbox explains how data are described and summarized to help students understand the data presented throughout the book.

- **“Applying the Concepts” boxes:** These boxes, which appear in each chapter, contain examples of how animal behavior research is being applied to real-life problems. This feature shows students the importance and relevance of “pure” scientific research to larger societal problems. By including these boxes in every chapter, we give students opportunities to see the broader implications and importance of research.
- **“Chapter Summary and Beyond”:** At the end of each chapter, we provide a brief summary of the concepts covered. In doing so, we also point students to recent papers that further develop the ideas presented in the chapter. No textbook can be all-inclusive, so these papers are ideal for students or instructors seeking additional information about a concept.
- **Chapter questions:** At the end of each chapter, we provide a range of questions, including some that could be used as assignments, to promote critical thinking and foster class discussions. Answers and notes for these questions are included in the instructor’s resources.
- **Diverse research examples:** The book contains research examples covering a diverse range of taxa from all over the world. We have consciously worked to include ample representation from major taxa (invertebrates, amphibians, reptiles, fish, birds, and mammals) in each chapter. Because most students have a limited knowledge of animal diversity, we have included an image of each featured research species in addition to brief natural history descriptions. We also include data summary figures as they typically appear in the primary literature. Thus, students can see that variation in behavior is ubiquitous in research: individual data points are plotted on line graphs, and bar graphs contain means with standard error bars.

Support package

Oxford University Press offers a comprehensive ancillary package for instructors who adopt the International Edition of *Animal Behavior: Concepts, Methods, and Applications*. The following resources are available to instructors through their local Oxford University Press sales representative:

- **Digital image library:** The image library includes electronic files in PowerPoint format of every illustration, graph, photo, figure caption, and table from the text, in both labeled and unlabeled versions. Images have been enhanced for clear projection in large lecture halls.
- **Lecture notes for each chapter:** Editable lecture notes in PowerPoint format make preparing lectures faster and easier than ever. Each chapter’s presentation includes a succinct outline of key concepts and featured research studies, and incorporates the graphics from the chapter.
- **Test bank:** We have created a test item file that includes over 200 multiple-choice questions suitable for exams.
- **Answers and notes (for chapter questions)**

Contact your local OUP sales representative for access to these resources.

Acknowledgments

This book is the product of our rather long collaboration in both the academic sphere and life outside of academia, but we have many people to thank for providing us with immense support. We thank our scientific mentors who helped us develop our love

and understanding of science. For Shawn, this group includes her Master's advisor, Donald Thomson, who introduced her to the wonderful world of field research, and her Ph.D. advisor, Astrid Kodric-Brown, who taught her critical thinking without being critical. For Tom, this group includes his undergraduate advisor, Tom Caraco, who introduced him to the wonderful science of animal behavior, and his Ph.D. advisor, Michael Rosenzweig, who taught him how to be a scientist. Shawn would also like to thank her pedagogical mentor, Mary Stephen, director of Saint Louis University's Reinert Center for Teaching Excellence, who helped her develop her understanding of and research on the scholarship of teaching and learning. We would both like to thank our many, many wonderful students who graciously provided constructive feedback and input regarding our teaching and their learning of our favorite discipline. We also thank our Saint Louis University colleagues for their support throughout the process, particularly the Department of Biology, Don Brennan, and Joe Weixlmann. Finally, we thank Robin Carter, Scott Freeman, Sallie Marston, Manuel Molles, and Bob Ricklefs for sharing their wisdom and advice regarding the world of writing textbooks.

We also wish to express our deep appreciation to the wonderful team at Oxford University Press USA who guided us through this project: Jason Noe, senior editor, who somehow convinced us we should and could write this book and guided us graciously through the process; John Haber, developmental editor, who in a most affable manner taught us the fine art of clarity in writing and provided continuous good humor despite missed deadlines; Lauren Mine, developmental editor, who provided great insight and attention to details to ensure our vision was realized; Shelby Peak, production editor, for meticulously shepherding the manuscript through copy editing and typesetting; Melissa Rubes, Katie Naughton, Caitlin Kleinschmidt, and Andrew Heaton, editorial assistants, for conscientiously following up on so many details; Jason Kramer, marketing manager; Frank Mortimer, director of marketing; Patrick Lynch, editorial director; and John Challice, vice president and publisher. We also wish to thank those in production and design who worked so hard to make this such a beautiful book: Kim Howie, senior designer; Michele Laseau, art director; Lisa Grzan, production manager; and the team at Precision Graphics.

We could not have completed this project without the amazing and continued support and encouragement of our dear friends and family. We thank our friends in St. Louis (especially Vera and Joe Brandt, Bob and Caroline Cordia, Jean and Bill Curtis, Diane and Frank Lockhart, Sharon Matlock, Denise Mandle, and Chris Sebeliski) and Tucson (especially Ellen Tuttle, Marcy Tigerman, Marcy Wood), for whom we express great love and gratitude. Their unflinching enthusiasm was appreciated more than we can ever say and helped us through many deadlines. We also thank our families both past and present, who supported our endeavors with love and appreciation. Shawn would like to thank her Academic Ladder Writing Club group members, who supported her writing on a daily basis.

Finally, we thank Buck, Ernie, Kirby, Grace, and Max, whose boundless energy and wagging tails kept us smiling and have taught us more about animal behavior than they will ever know.

We thank the following reviewers, commissioned by Oxford University Press, for providing thoughtful and constructive suggestions. The book benefited greatly from their skillful input:

Elizabeth Archie, University of Notre Dame	Andrew R. Blaustein, Oregon State University
Suzanne Baker, James Madison University	Joel Brown, University of Illinois at Chicago
Peter Bednekoff, Eastern Michigan University	Theodore E. Burk, Creighton University
Russell Benford, Northern Arizona University	Prassede Calabi, University of Massachusetts–Boston
	Blaine Cole, University of Houston

Francine Dolins, University of Michigan–Dearborn
 Richard Duhrkopf, Baylor University
 Emily DuVal, Florida State University
 Fred C. Dyer, Michigan State University
 Janice Edgerly-Rooks, Santa Clara University
 Miles Engell, North Carolina State University
 Ann Fraser, Kalamazoo College
 Sharon Gill, Western Michigan University
 Harold Gouzoules, Emory University
 Blaine D. Griffen, University of South Carolina
 Sylvia L. Halkin, Central Connecticut State University
 Jodee Hunt, Grand Valley State University
 Valerie James-Aldridge, University of Texas–Pan American
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 Astrid Kodric-Brown, University of New Mexico
 William Kroll, Loyola University Chicago
 David Lahti, Queens College
 Tracy Langkilde, Pennsylvania State University
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 Lauren Mathews, Worcester Polytechnic Institute
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 Kevin J. McGraw, Arizona State University
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 Al Uy, University of Miami
 E. Natasha Vanderhoff, Jacksonville University
 Sean Veney, Kent State University
 Margaret Voss, Penn State University
 David Westneat, University of Kentucky
 Michele Jade Zee, Northeastern University

We also thank the following people for generously providing images and/or videos: Maria Abate, Mark Abrahams, Elizabeth Adkins-Regan, Ginger Allington, Esteban Alzate, Nick Barber, Anders Berglund, Thore Bergman, Jay Biernaske, Eric Bollinger, Thierry Boulinier, Alice Boyle, Jacob Bro-Jorgenson, Jason Brown, Valerie Bugh, Kevin Burns, Rhett Butler, Joanne Cable, Colin Chapman, Mark Chappell, Karen Cheney, Nikita Chernetsov, Aurelie Cohas, Aaron Corcoran, Isabelle Côté, Jillian Cowles, Susan Crowe, Herman Dierick, Niels Dingemanse, Hannah Dugdale, Jeffery Dunk, Doug Eifler, Josh Engel, Brad Fiero, Benjamin Fitzpatrick, Leonard Freed, Nicole Gerlach, Eric Gese, Matt Goff, James Grant, Kristine Grayson, David Green, Simon Griffith, Benoit Guénard, Beth Hahn, Jens Herberholz, Samantha Hilber, Chad Hoefler, Anne Houde, David Jamison, Julie Jaquiéry, Trevor Jinks, Jörgen Johnsson, Clement Kent, Alan Krakauer, Jens Krause, Ipek Kulahci, Kevin

Laland, Jeffrey Lane, Bernd Leisler, Bill Leonard, John Lill, Adeline Loyau, Lauren Mathews, John McCormack, Mark McCormick, Randolph Menzel, Don Miles, Matthew Mitchell, Carson Murray, James Nichols, Justin O’Riain, Alvaro Palma, Luis Pardo, Lorna Patrick, Irene Pepperberg, Nigel Raine, Leeann Reaney, Diana Reiss, Raleigh Robertson, Helen Rodd, Kenneth Ross, Tiffany Roufs, Yvan Russell, Ralph Saporito, Gabriele Schino, Ingo Schlupp, Kenneth Schmidt, Peggy Sherman, Dominique Sigg, Hans Slabbekoorn, Marla Sokolowski, Verónica Thiemi Tsutae de Sousa, Geoffrey Steinhart, Bård Stokke, Paul Switzer, Ryan Taylor, Fabricio Barreto Teresa, Barbara Tiddi, George Uetz, Cock Van Oosterhuit, Michael Ward, Patrick Ward, Brandon Wheeler, Jan Wijnenga, Henry Wilbur, Gerald Wilkinson, Steve Yanoviak, and Mai Yasué.

We appreciate your constructive feedback. Please e-mail us your thoughts at shawn.nordell@gmail.com.

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Thomas J. Valone

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