

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.

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

Shawn E. Nordell

Thomas J. Valone