
Preface

Behavioral ecology is a field that largely depends upon empirical investigation and observation, and as such leans heavily on statistical methods. Thus, behavioral ecologists require some instruction into those statistical concepts and methods that will be of use to their work. For example, in the September 2017 issue of the journal *Behavioral Ecology*, we counted more than 50 different statistical techniques. Although all the methods mentioned in that work could be found in various statistical texts, it would be difficult to find all of them in one place. This text was written with the behavioral ecologist in mind. Not only does it contain information on methods that have been widely used by behavioral ecologists, it also provides a little depth into the theory under which those methods were derived. Without getting overly mathematical, the theoretical aspects are described in order to elucidate the assumptions and limitations of the methods. In that way, the scientist will have a better view as to when these methods are applicable, and the appropriate level of skepticism required when interpreting results. Sometimes there may be more than one technique for analyzing the same data and providing the same type of conclusion. This text will also compare such methods, describe their assumptions, and hopefully provide some insight into which technique the researcher might choose. In particular, methods that require few assumptions about the underlying probability distributions of populations or data-generating processes will be described, together with associated computer programs. The computer programs provided are written in the R language, which has gained much popularity in the scientific world. Datasets provided are mostly based, at least to some degree, on real studies, but the data themselves are simulated, and the examples are simplified for pedagogical purposes. Those studies providing the inspiration for the simulated data are cited in the text.

It is assumed that the reader has had exposure to statistics through a first introductory course at least, and also has sufficient knowledge of R. This is not a primer for R or for statistics. However, some introductory material is included to aid the less initiated reader. The first five chapters largely consist of material covered in many first courses on statistics for biologists. However, there is mention of some intermediate notions, such as rank-based methods, permutation tests, and bootstrapping. In most chapters, at least two different methods are presented, together with their primary assumptions, for analyzing the exact same data. As such, this is not a book about parametric, nonparametric, frequentist, or Bayesian statistics. Rather, with no sword to grind, statistical methods are presented to the researcher in order to familiarize him or her with techniques described in scholarly literature.

Hopefully, the text will remove the perception of the magical aura that statistical methods often evoke.

The remaining chapters cover methods that each have multiple books written on them. As such, this can only be viewed as an introduction, and an introduction to some more fundamental but not elementary methods. Nevertheless, the material presented should at least get the reader started on the path.

Something should be said about the organization of material within a chapter. Except for Chapters 1, 15, and 16, each chapter is divided into five sections:

- General Ideas
- Examples with R Code
- Theoretical Aspects
- Key Points
- Exercises and Questions

Hopefully, the first two sections, General Ideas and Examples with R Code, can get the reader started in the process of analyzing data. The Theoretical Aspects section will help provide some explanation of how the methods actually work, why they work, and what assumptions are necessary for them to work correctly. We strongly recommend that the student reads the Theoretical Aspects sections in order to gain a better understanding of the methods, their strengths, and their limitations.

As in the case of all texts, some very important topics have been omitted. In particular, the uses of statistical methods for phylogenetic analyses and spatial modeling have not been discussed. These, and other advanced methods, are beyond the scope of this book.