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Book Review

Quantifying Behavior the JWatcher Way. Daniel T. Blumstein and Janice C. Daniel.

Sunderland, MA: Sinauer Associates Inc., 2007. 211 pp. ISBN 978-0-87893-047-0, $19.95.

As a behavioral researcher, I have scored countless hours of videotaped behavior of wild animals. I always knew JWatcher existed as an outstanding, free event recorder but I never took the plunge and used it to score my behavioral data. Given that I wanted to score many different kinds of detailed behavior simultaneously that required rewinding video sequences multiple times, it just seemed easier to log behaviors on a spreadsheet and manually enter counter times. After reading this new JWatcher manual and with the release of JWatcher video, I will never go back to spreadsheet decoding again. Animal behaviorists Daniel Blumstein and Janice Daniel, in collaboration with Chris Evans and Adaptive Arts Pty Ltd., created JWatcher in the late 1990s to use for the continuous recording of human or nonhuman behavior. They currently offer three versions of the software: Version 1.0 includes the original event recorder and sequential analysis functions, JWatcher Video is the newest incarnation that allows the user to score digital video files while linked to JWatcher, and JWatcher Palm works on handheld PDA units and data files may be transferred to a computer running JWatcher for further analysis. In this review, I address only the usefulness of the book without regard to the quality of the JWatcher software. Therefore, I discuss the manual based solely on its ability to guide the user through the process of scoring animal behavior successfully, using the software, and how it compares to the free Version 0.9 Manual available on the Internet.

This book is a perfect introduction to how to use JWatcher and how to measure and quantify behavior. While navigating through the many features of the program, Blumstein and Daniel teach the user how to think about scoring behavior and indicate new quantification and statistical techniques that the user may not have considered. One of the valuable aspects of this book is that it is accessible to people at all levels of experience. An experienced behaviorist may pick up the book, skip immediately to how to use the program, and begin creating an ethogram and scoring behavior; whereas, an undergraduate can start reading on page 1 about how to quantify behavior and how to think about defining behavioral patterns. Chapter 1 is an overview of how to quantify behavior. The authors stress the importance of developing a focused question, formulating hypotheses, and evaluating the hypotheses with well-designed experiments. Using examples from their own research on marsupials, Blumstein and Daniel walk the reader through the creation of an ethogram that collects as much information as possible but is still simple enough to maximize precision and repeatability. They also discuss the importance of selecting the most appropriate way to collect data (e.g., videotape, audiotape, or live recording using JWatcher).

The discussion of the software itself begins in Chapter 2, with an overview of the program, instructions for how to install it, and a taxonomy of the types of files used at each stage of data capture, quantification, and analysis. The manual takes the approach of "score once, analyze many times," and stresses the importance of preparing a thoughtful ethogram to answer focused questions (Chapters 3 and 4) before beginning data collection (Chapters 5 and 6). One of the most useful features of this book is the abundance of screen shots not only of the JWatcher interface itself but also of files of results as they appear when opened on a spreadsheet. These images make the reader more confident that he or she is navigating through the program properly and are helpful in understanding the information-filled results files. Beginning with Chapter 7, the book is split into three parts: basic analysis (counts, probabilities, durations, proportions, and conditional behaviors), reliability analysis (quantifying intra-observer and inter-observer reliability), and sequential analysis (runs, lags, complex sequences, and Markovian analysis). At this point, readers with different levels of experience with behavioral quantification and different goals will likely diverge in their use of book. Undergraduates and young graduate students should collect pilot data and check their scoring

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reliability. Chapter 7 succinctly demonstrates how to run reliability analyses to check intra-observer or inter-observer reliability and calculate "percent agreement" and Cohen's kappa. More experienced researchers, prior to scoring data, should read about how to create a focal master file (Chapter 8). One of the trickier aspects to using this event recorder is the need to be certain of how different behaviors are related to each other and which are mutually exclusive, prior to actually scoring behavior. This chapter carefully walks the user through these important decisions and emphasizes that different focal analysis master files may be created and used with the same raw data files to ask different questions about behavior. The user also learns how to label behaviors as events or states and how to specify which conditional events and states to analyze (e.g., probability of behavior A given the performance of behavior B). This section is perhaps the most important of the entire book because the decisions the user must make at this juncture are key to conducting a proper analysis of behavior.

Chapters 9–11 cover how JWatcher creates individual results files for each data file, calculates summary statistics for each one, and then creates a single summary file for a group of data files that organizes data in a way that can be imported into statistical software packages for further analyses. Tables explaining the meanings for the myriad of abbreviated variable names in the output files are particularly helpful. Chapter 12 provides instructions for substituting or combining key codes so that more detailed coded behaviors (e.g., forage on grass, forage on leaves) can be combined together into one category (forage). The manual is particularly helpful for wading through the different types of files that need to be created because changing key codes requires a cascade of other changes to data analysis files.

Perhaps the single most useful aspect of this book is its discussion of sequential analyses and how to run them in JWatcher. Chapter 13 begins with a long, detailed summary of what sequential analysis does, using the example of snake-scent-application-behavior in ground squirrels. The authors briefly review the literature on different types of sequential analysis that JWatcher is capable of performing (runs, lags, complex sequences, and Markovian analysis) because the nature of the data and the assumptions of each type of analysis will dictate the type of analysis that is most appropriate for the question being asked. Learning about how other researchers have used sequential analysis helps the user decide which type of analysis is best. The chapter then moves into detailed, step-by-step instructions on how to run each analysis. The coverage of these procedures is, necessarily, a bit more detailed than the other sections because most users will not be familiar with the specific features of each test.

Finally, Chapter 15 includes four different outstanding laboratory exercises that use JWatcher to teach students: (1) how to develop their own ethogram and score behavior, (2) the differences between time sampling and continuous recordings, (3) how to conduct sequential analysis, and (4) how to use both sequential analysis and basic analysis to refine research questions from initial pilot data. These exercises use video clips downloadable from the JWatcher website free of charge and would be excellent teaching tools in the classroom.

This manual is a vast improvement over the Version 0.9 Manual available on the JWatcher website, which only covers some basic guidelines for running the software, explains what the individual file types do, and indicates how to analyze results. The online manual has no coverage of the complex sequential analysis functions of JWatcher 1.0. In summary, this book is a necessity for users at all experience levels who wish to quantify behavior using an event recorder. JWatcher software is free of charge and this manual is affordable enough that several copies could be purchased for use in one's research laboratory. The money from the sale of the manual is used to support further development of the software so that the future versions of the program can be offered free of charge.

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