BOOK REVIEW
Psychophysics: A Practical Introduction (2nd Ed.)

By Frederick A.A. Kingdom & Nicolaas Prins
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According to Merriam-Webster's Dictionary, psychophysics is a branch of psychology concerned with the effect of physical processes on the mental processes of an organism. What this layman's definition does not relay is the strong quantitative tradition of psychophysics that matured in the 20th century and is practiced by today's psychology and neuroscience laboratories in their attempt to understand brain and behavior. As an introductory textbook, *Psychophysics* (2nd ed.) seeks to provide an introduction to both experimental design and analytical techniques used in this field, with a heavy emphasis on the latter. After a brief introduction to the history of psychophysics (Chapter 1), dichotomous experimental classification schemes (e.g., forced-choice vs. nonforced-choice; detection vs. discrimination) (Chapter 2) and Performance-Based and Appearance-Based procedures (Chapter 3), the authors get to the heart of the subject by spending the remaining six chapters detailing quantitative methods (psychometric functions, adaptive methods, signal detection measures, summation measures, scaling methods, and model comparisons). Each chapter contains a section titled "practice" which describes how psychophysicists use a particular methodology, as well as its pros and cons. These sections should be tractable to any undergraduate student who already has a background in statistics and experimental design. However, I would encourage the faculty member to either choose primary source readings or provide students with the opportunity to participate in laboratory exercises that require them to interpret and/or implement the technique used in these sections. Otherwise, like most statistics textbooks I recall consuming as an undergraduate, the information provided may be deemed too abstract for long-term storage.

After each of the "practice" portions, there is a longer, "theory" section that delves into the details regarding mathematical concepts and variations within the broad general concepts described earlier in the chapter. The instructor may find pleasure in reading these details as further background for their lectures and feel that any student who has mathematics through algebra would understand these sections. However, it is likely that only undergraduate students with high intrinsic motivation will take the time to consume, ruminate over, and apply the information provided in this section. The theory sections are wonderful reference sections for graduate students or current practitioners given their clarity, the breadth and depth of the material and the clear graphical representation of concepts. However, I would suggest staving off the desire to require these sections as part of a course's reading assignments.

While my critique of the "theory" sections above may sound harsh, I'd like to shower some high praise on the authors for their development of a MATLAB based software package (Palamedes), which can be used to perform the calculations, graphing, and basic statistical analyses described in the text. The Palamedes toolbox is free to download (http://www.palamedestoolbox.org/) and can be used with either a "bare-bones" version of MATLAB or GNU Octave. The details of Palamedes code are introduced in a series of distinct boxes interdigitated throughout the "practice" and "theory" sections of each chapter. Furthermore, there are several demos in the Palamedes toolbox that provide users with a sense of how concepts can be instantiated and can be used to address some of the exercises at the end of each chapter. These exercises, or permutations of them, could certainly be assigned as homework for an undergraduate course.

As implied above, while I found *Psychophysics* easy to read, I believe that its proper use is in an upper level undergraduate laboratory course that allows students to design and execute psychophysics experiments and introduce students to the use of MATLAB as a programming language. Therefore, I suggest pairing *Psychophysics (2nd ed.)* with *MATLAB for Neuroscientists: An Introduction to Scientific Computing in MATLAB* (see review by Grisham, 2014) so that students leave the course with a strong programming, experimental design, and data analysis background. In an ideal situation, a student would leave this course with an understanding of the practice of psychophysics and a set of pragmatic skills that are sought after by graduate school programs as well as by private and public sector employers.

REFERENCES

Grisham W (2014) A review of MATLAB for Neuroscientists: An Introduction to Scientific Computing in MATLAB (2nd edition). J Undergrad Neurosci Educ 13:R3-R4.

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