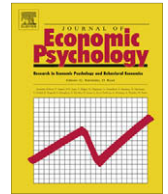




Contents lists available at ScienceDirect

Journal of Economic Psychology

journal homepage: www.elsevier.com/locate/joep

Book Review

A Science of Decision Making: The Legacy of Ward Edwards. J.W. & D.J. Weiss (Eds.). Oxford University Press, New York

Ward Edwards is commonly regarded as the ‘Father’ of behavioral decision making. In two papers – *The Theory of Decision Making* published in *Psychological Bulletin* in 1954 and *Behavioral Decision Theory* published in the *Annual Review of Psychology* in 1961 he founded and then subsequently gave a name to the field. Then in 1963 he introduced psychologists to Bayesian thinking with his paper *Bayesian Statistical Inference for Psychological Research* published in *Psychological Review*. These truly seminal papers have become part of the folklore of the field and their influence can hardly be overstated.

These three papers are contained in this excellent volume alongside 26 of Edwards’s other most important papers and seven new papers written especially for the volume. The new papers are, for the most part, written in conjunction with the editors David and Jie Weiss and other long time collaborators of Ward such as James Shanteau. The Weisses have done a superb job of distilling a research career that spanned seven decades and produced over 200 publications into an accessible and extremely useful book that should be found on the shelf of anyone interested in judgment and decision making research.

A particularly attractive feature of the book is that each paper is prefaced by a brief introduction from the editors which provides some background on how each paper came into being. These introductions serve to bring the papers to life and give the reader some insight into how Edwards’s thinking developed across his career. For example, in the introduction to the 1963 *Bayesian Statistical Inference* paper we discover that Ward had commissioned Harold Lindman, then a graduate student, to write a paper on Bayesian statistics for use in a seminar. After reading the draft, Ward realized the significance of the topic and that it needed to be communicated to a wider audience. He rewrote it, enlisting the help of Savage (a recent recruit to the Michigan faculty at that time) along the way, and after 13 drafts had it in a form ready for publication. We also learn that Ward was puzzled (and perhaps frustrated) by the resistance to Bayesian statistical reasoning in the psychological community. The recent gradual move towards the use of Bayesian techniques would have pleased him (e.g., Lee & Wagenmakers, 2005; Rouder, Speckman, Sun, & Morey, 2009).

The book is divided into four sections: *Behavioral Decision Theory*, *Statistics and Methodology*, *Diagnosis and Multi-attribute Utility*. Each section contains between 5 and 11 separate papers, which together provide a comprehensive coverage of each area. This is a book which does not lend itself to being read from cover-to-cover, but rather as a readily accessible reference work. Thus, when one is faced with the question – ‘I wonder if someone has examined X before?’ (and Ward probably did at some point) – one can check immediately.

The *Behavioral Decision Theory* section begins with the 1954 paper and then traces a course through the early 1960s and 1970s with papers on probability learning, the highly influential work on conservatism (of which more later), and an excursion into the behavior of Las Vegas gamblers. The section finishes with a paper published in 1998 in *American Psychologist* entitled *Hailfinder: Tools for and experience with Bayesian normative modeling*. In the paper Edwards discusses how Bayes Nets – graphic user interfaces which can facilitate the representation of complex inference and decision structures – are invaluable tools for the development of what he calls ‘Bayesian decision theory’. The theory captures the three ‘ideas’ to which Edwards is perhaps most closely associated: Bayes’s Theorem as the fundamental rule of fallible inference, multi-attribute utility as the fundamental technique for evaluating things, and maximization of expected utility as the fundamental technique for making choices. The paper presents a Bayes Net model for predicting the weather (specifically severe summer weather in Eastern Colorado) but throughout the importance of applying the Bayes Net techniques to thinking about human judgment and decision making is emphasized. Ward presciently predicted that the 21st Century would be the Century of Bayes – a prediction that is being borne out in many areas of cognitive science (e.g., the Special Issue of *Trends in Cognitive Science* on Probabilistic models of Cognition, July 2006).

The section on *Statistics and Methodology* follows a similar course to the preceding section, beginning in the early 1960s and ending with three papers written specifically for the volume. The section includes two short but again prescient and insightful single-authored papers. The first from 1965 entitled *Tactical Note on the relation between scientific and statistical hypothesis testing*, pre-empted the current debate on model comparisons by over 40 years (e.g., the Special Issue of *Cognitive Science* on Model Comparison, December 2008). In the paper Edwards emphasizes that no procedure can satisfactorily test the goodness of fit of a single model to data. Therefore procedures which fit several models to the same data set and compare goodness of fit are to be favored.

The second single-authored paper is a real gem from 1983 entitled *Human cognitive capabilities, representativeness and ground rules for research*. The paper traces the focus on errors and illusion in psychological research from the days of Wundt and Titchener through to Edwards's work on conservatism in probabilistic reasoning. Edwards points out that 'somewhat by accident' and 'much to my present regret' he initiated a tradition which purports to show that people are intellectually incompetent and 'irrational'. In a nutshell, the work on conservatism (represented in this volume by a 1966 paper with Phillips) illustrated that people (more specifically college sophomores) did not revise probability estimates in accordance with Bayes's Theorem. Edwards laments that demonstrations of participants getting such problems wrong, pursued perhaps most enthusiastically in the heuristics-and-biases movement of Tversky and Kahneman (e.g., Tversky & Kahneman, 1974), led to the view of 'man as a cognitive cripple'. The key message in Ward's essay is that this conclusion is extremely premature. When methods, materials and participants are selected in such a way as to maximize the chances of observing errors – why should we be surprised when errors occur? Edwards argues that what we should be doing is focusing on developing a taxonomy of intellectual tasks and a taxonomy of expertise and making targeted investigations of the intersection of the two. These are points that have been made elsewhere (e.g., Newell, Lagnado, & Shanks, 2007) but the concise and delightfully clear way in which they are made in this essay resonates powerfully over a quarter of a century after it was written.

The remaining two sections on *Diagnosis* (five papers) and *Multi-attribute Utility* (11 papers) cover an extremely wide range of topics including oral health in geriatrics, social decision making, credit applications, and even mate choice. Readers of this journal might be particularly interested in the paper on credit applications co-authored with Stillwell and Barron. The authors discuss how multi-attribute utility measurement (MAUM) can be used to assist in the evaluation of potential loan recipients. They conclude that eliciting weights for each attribute (e.g., age, previous credit record of the applicant) and combining these in a formal model delivers better decisions than holistic judgments. A finding echoed across many domains (e.g., Dawes, Faust, & Meehl, 1989).

The book closes with three obituaries written by some of Ward's former students and collaborators. These provide a fitting end to this essential collection of papers by presenting the human side of the immensely influential figure that was Ward Edwards.

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Available online 4 June 2009