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Nicolas Jacquemet and Olivier l'Haridon, *Experimental Economics: Method and Applications*

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Whereas 30 years ago economics, surely at the micro level, was primarily a theoretical discipline, a large portion of it has nowadays turned into an empirical science, with central roles for experimental and behavioral approaches. And, thus, textbooks are needed to cover the new materials. Jacquemet and l'Haridon delivered such a textbook, with much diverse and valuable information ranging from methodological discussions at the highest level to concrete instructions about how to set up a lab, or a time table for the jobs to be done the last week before an experiment.

Similar to this textbook is Bardsley et al. (2010), not only in being of the highest quality, but also in its methodological focus. Whereas Bardsley et al. is primarily targeted towards researchers, the present book also reaches out to students and practitioners, especially through its concrete case studies. Dhami (2016), on the other hand, provides a big and comprehensive theoretical textbook. Moscati (2018) presents preceding history. Other relevant books include Angner (2012), Davis and Holt (1993), Kagel and Roth (1995), Shefrin (2008), Thaler (2015), Tomer (2017), and Wilkinson (2007).

This book consists of four parts. Part I discusses the origin and history of experimental economics (Ch. 1), starting with the classical experiment by Chamberlain in 1948 on demand and supply meeting, perfectioned 15 years later by one of the subjects in his experiment: Vernon Smith. Part I usefully discusses experiments from the perspective of subjects (Ch. 2), which is a good perspective for *experimenters* to get better insights. In passing, the text already brings many good and concrete suggestions for experimenters about all kinds of details of experiments not to be forgotten, concerning screen displays,

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instructions, and so on. And in passing, Ch. 1 has covered the Allais paradox, the prisoner's dilemma, the centipede game, and games with incomplete information, for one reason to illustrate methodological principles, but for another reason because the topics are of interest in their own right. Ch. 2 brings further topics.

Part II is methodological and explains the need for experiments in economics today. Ch. 3 discusses econometric concepts, starting from scratch (so that this book is quite self-contained), including questions of causality and identifiability, and field versus lab. Ch. 4 specifies the interaction between experiments, theoretical models, and reality, raising issues that are relevant to all empirical sciences. Reality is defined from an econometric perspective and, thus, is simply a map from causes to consequences, with the warning that the inputs and outputs are infinite-dimensional. Typical of economics, within the social sciences, is that it heavily uses theoretical models. The dictator game is used to illustrate the concepts discussed.

Part III explains how experiments are to be done. Here internal validity is central; i.e., does the experiment measure what it pretends to measure. Ch. 5, still methodological, covers much ground, always related to internal validity questions, including treatments and controls, misperceptions of the experiment, and learning and reputation. The controversial study of Plott and Zeiler (2005), presented in neutral terms, is analyzed as a debate of internal validity. Section 5.2 presents a balanced discussion of incentives, controversial and central to the field, and Section 5.3 discusses the pros and cons of within- versus between-subject designs. Section 5.4.1 has many detailed recommendations for writing instructions to subjects, such as consistency of terminology and many other recommendations, that every experimenter will want to check out.

Section 5.4.2 is entitled "Never Use Deception" and this is the view forcefully put forward by the authors, in full generality. Here I would have preferred more nuances, and a restriction to experimental economics. There, it is indeed detrimental if deception ever has been used in the relevant lab, because (reliability of) incentives is crucial. But for other fields, such as social psychology, things are different, and deception sometimes cannot be avoided. In my university, my experimental group did not want to forbid their psychological colleagues to do their work. Instead, we set up a separate lab to have the reputation of never ever using deception. Focus 5.6 surveys further differences between economic and psychological experiments.

The illustrations and case studies here, as throughout the book, at the same time clarify the methodological issues discussed, making those tangible, and are of interest on their own. Thus, Ch. 5 finishes with a discussion of belief elicitation that I found particularly interesting, on introspective methods, proper scoring rules, prediction markets, matching probabilities, certainty equivalents, and the Bayesian

truth serum. Unlike many other analyses in the literature, these authors do fully reckon with biases and distortions due to risk and ambiguity attitudes.

Ch. 6 gives concrete recommendations for doing an experiment, starting from the very beginning of setting up a lab with a good waiting room and a fully equipped experimental room with uniform light and many other details, working on instructions two months before, until starting up computers on the day of the experiment. I was glad to see that the authors mostly—although not always—use the efficient term price list, not preceded by the redundant and inefficient "multiple." Ch. 7 provides a subcourse in econometrics in a nutshell, following up on Ch. 3, concise but complete and with all essentials. The case study in Section 7.4 concerns measuring risk attitudes, my own research domain, and I enjoyed how the main ideas are presented efficiently.

As an historical and socio-academic digression, the authors follow the common convention in experimental economics of crediting authors recognized as experimental economists, Holt and Laury (2002), rather than "outsiders," for using choice lists, assuming expected utility, and then fitting parametrically (assuming, e.g., a Constant Relative Risk Aversion utility function) to measure risk aversion. Yet, this has been a common procedure for many decades, and drawbacks have also been known for many decades. The procedure was used for instance in the more comprehensive Cohen, Jaffray, and Said (1987). These authors, like Holt and Laury, used real incentives, but, unlike Holt and Laury, expressed awareness of the deficiencies of expected utility, writing:

> The reason why subjects' risk attitudes are not correctly conveyed by the conventional definitions may simply be that these definitions, despite their intrinsic character, take their origins in the EU [expected utility] model, and therefore share in its deficiencies. (Cohen, Jaffray, and Said, 1987, 10-11)

The survey by Farquhar (1984) gives further references. That socio-academic conventions of this kind occur in every field and every generation again can be inferred from Carver (1918) who, over a century ago, concluded his paper writing:

> But if they think that they have built up a complete system and can dispense with all that has gone before, they must be placed in the class with men in other fields, such as chemistry, physics, medicine, or zoölogy, who, because of some new observations, hasten to announce that all previous work is of no account. (Carver, 1918, 200)

Indeed, if ignoring previous work can be legitimized in any manner, then this saves much reading time and facilitates priority claims, providing irresistible benefits. The authors do cite Cohen et al. and

Farquhar, but, understandably, do not enter the debate on priority as done in this digression.

Part IV concerns what comes after the experiment: what we can learn from it. The time has come to think about external validity (Ch. 8); i.e., to what extent the findings of the experiment speak to relevant real-world facts (Section 8.1.1 offers quite more nuances on the definition). Section 8.4 discusses the importance of replications, well emphasized in the literature today. As a worthy way to end the book, the contributions of experimental economics to our society are discussed (Ch. 9). The authors even allow experimenters to whisper in the ear of the princess. So as not to give away the plot of the story, I leave it to the readers to find out from the book what this metaphor means.

The case studies and illustrations in this book come from individual choice theory and game theory, topics in which the authors are experts. Examples from other fields of economics (labor, macro, finance, …) could have broadened the book. But then, for every work, one can find things left to wish for. The book has been organized along a line well thought through, written by two authors who know the ins and outs because they have been there themselves all the way, and who have been collecting all the essentials for this book from their own experiences over many years. Especially appealing and efficient is how the book each time starts from general methodological principles, turns those into concrete rules, and then moves on to case studies. Those serve the double purpose of making the general principles completely tangible but at the same time, as a bonus, they are of interest in their own right, teaching readers about second-price auctions, the endowment effect, k-level thinking, and numerous other topics. Readers will find their knowledge both broadened and deepened by this valuable book.

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