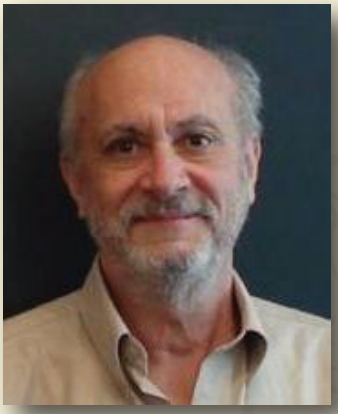
Saw Swee Hock Short Course (5 lectures)

LEARNING INTERVENTIONS THAT WORK



by Professor Donald Rubin

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Department of Statistics
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August 2-6, 2021 (Monday to Friday)

4pm - 5pm (HK time), 10am - 11am (Paris time)

By Zoom: **https://hku.zoom.us/j/93048496485**
Meeting ID: 930 4849 6485

About the Talk

Recent years have seen a virtual explosion of discussion about causality and causal inference from a variety of perspectives. The focus of these five lectures will be on the practical implementation of our learning about which interventions that we can implement actually work, work in the sense of achieving their goals of modifying what happens in the future. The key idea can be expressed in the simple setting of trying to decide which of two interventions, one for example that does nothing to change the status quo (the so-called "control"), the other that does something specifically designed to achieve a different outcome in the future, different from what is anticipated to happen if the control is allowed to occur. This basic situation is faced by any creature with a decision to make. All creatures are faced with the opportunity to learn from past experience about which interventions (i.e., choices) work in the sense of achieving desired outcomes. Humans, however, appear to be unique in having the ability to organize and collect data specifically for the purpose of learning about which future interventions will work to achieve particular goals, rather than simply learning from past experience. The formal structure of this enterprise will be the topic of these five lectures.

The first lecture will address the essential ideas of this conceptualization of causal inference, which has a remarkably recent formal history, roughly a century old. The second lecture will focus on the concept and construction of randomized experiments, where in a controlled setting, the competing interventions are explicitly applied to different groups of randomly selected experimental objects (generally called units), and the results are compared across the groups of units. The randomization is the fundamental basis for inferring the relative causal effects of the different interventions. The third lecture will embed non-randomized (i.e., observational) data in hypothetical randomized experiments as a way to learn about causal effects from data collected without the benefit of randomization; thus, we use the template of a randomized experiment to learn about causal effects from observational studies. Topics such as matching and propensity score methods will be discussed.

The fourth lecture expands the template of the third lecture to the larger class of randomized experiments that are partially "broken" because of complications, such as non-compliance of experimental units with their randomly assigned treatments. This topic includes bridges to the econometric topic of "instrumental variables [IV]" and more general versions of IV, which are applications of "principal stratification" but not IV. These types of applications are particularly relevant when the experimental units are conscious human beings. The final lecture will cover additional complications when learning about causal effects of interventions with humans, such a placebo effects, which occur when experimental units are "blinded" - they know that they might be exposed to either an active intervention or a sham intervention with no actual effect on the outcomes being measured in the study - another situation needing principal stratification because the assumptions underlying IV are inapposite.

About the Speaker

Donald B. Rubin is John L. Loeb Professor of Statistics, Harvard University, where he has been professor since 1983, and Department Chair for 13 of those years. He has been elected to be a Fellow/Member/Honorary Member of: the Woodrow Wilson Society, Guggenheim Memorial Foundation, Alexander von Humboldt Foundation, American Statistical Association, Institute of Mathematical Statistics, International Statistical Institute, American Association for the Advancement of Science, American Academy of Arts and Sciences, European Association of Methodology, the British Academy, and the U.S. National Academy of Sciences. As of 2017, he has authored/coauthored over 400 publications (including ten books), has four joint patents, and for many years has been one of the most highly cited authors in the world, with currently over 200,000 citations and nearly 20,000 in 2016 alone (Google Scholar). He has received honorary doctorate degrees from Otto Friedrich University, Bamberg, Germany; University of Ljubljana, Slovenia; Universidad Santo Tomás, Bogotá, Colombia; Uppsala University, Sweden; and Northwestern University, Evanston, Illinois. He has also received honorary professorships from University of Utrecht, The Netherlands; Shanghai Finance University, China; Nanjing University of Science & Technology, China; Xi'an University of Technology, China; and University of the Free State, Republic of South Africa.

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All interested are welcome

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