



THE UNIVERSITY OF
CHICAGO

DEPARTMENT OF STATISTICS

Statistics Colloquium

Stephen Bates

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MIT

“Hypothesis testing with information asymmetry”

Monday March 25, 2024, at 11:30 AM

Jones 303, 5747 S. Ellis Avenue

Pre-Seminar refreshments will be served at 11:00 AM in Jones 303

Abstract

Contemporary scientific research is a distributed, collaborative endeavor, carried out by teams of researchers, regulatory institutions, funding agencies, commercial partners, and scientific bodies, all interacting with each other and facing different incentives. To maintain scientific rigor, statistical methods should acknowledge this state of affairs. To this end, we study hypothesis testing when there is an agent (e.g., a researcher or a pharmaceutical company) with a private prior about an unknown parameter and a principal (e.g., a policymaker or regulator) who wishes to make decisions based on the parameter value. The agent chooses whether to run a statistical trial based on their private prior and then the result of the trial is used by the principal to reach a decision. We show how the principal can conduct statistical inference that leverages the information that is revealed by an agent's strategic behavior -- their choice to run a trial or not. In particular, we show how the principal can design a policy to elicit partial information about the agent's private prior beliefs and use this to control the posterior probability of the null. One implication is a simple guideline for the choice of significance threshold in clinical trials: the type-I error level should be set to be strictly less than the cost of the trial divided by the firm's profit if the trial is successful.