



THE UNIVERSITY OF  
CHICAGO

DEPARTMENT OF STATISTICS

## Statistics Colloquium

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On the Statistical Complexity of Interactive Decision-Making

MONDAY, May 2, 2022, **at 4:30 PM, via Zoom**

Zoom info sent in weekly email announcement.

### ABSTRACT

A fundamental challenge in interactive learning and decision making, ranging from bandit problems to reinforcement learning, is to provide sample-efficient, adaptive learning algorithms that achieve near-optimal regret. Characterizing the statistical complexity in this setting is challenging due to the interactive nature of the problem. We present a complexity measure, the Decision-Estimation Coefficient, that is proven to be both necessary and sufficient for interactive learning, as well as a unified algorithm design principle, Estimation-to-Decisions, which transforms any algorithm for estimation into an online algorithm for decision making. More broadly, the approach can be viewed as a decision-theoretic analogue of the classical Le Cam theory of statistical estimation; it also unifies a number of existing approaches -- both Bayesian and frequentist.

Joint work with D. Foster, S. Kakade, and J. Qian.