

STATISTICS COLLOQUIUM

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TALK: 4:15 PM — SCIENCE CENTER RM. 705

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“Sensitivity Analysis using Enhanced Tipping-Point Displays for Studies with Partially Missing Outcomes”

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ABSTRACT

Analyses of data with missing values often require assumptions about missingness mechanisms that cannot be assessed empirically, highlighting the need for sensitivity analyses. However, universal recommendations for conducting sensitivity analyses in empirical studies are scarce. They are often neglected by practitioners due to the lack of clear guidelines for systematic explorations of alternative assumptions, as well as the typical attendant complexity of missing not at random (MNAR) models.

We propose graphical displays that help visualize and systematize the results of sensitivity analyses, building upon the idea of “tipping-point” analysis for experiments with dichotomous treatment. The resulting “enhanced tipping-point (ETP) displays” are convenient summaries of conclusions drawn from using different modeling assumptions about the missingness mechanisms, applicable to a broad range of outcome distributions. We also describe a systematic way of exploring MNAR models using ETP displays, based on a pattern-mixture factorization of the outcome distribution, and present a set of sensitivity parameters that arises naturally from such a factorization.

The primary goal of the ETP displays is to make formal sensitivity analyses more comprehensible to practitioners, thereby helping them assess the robustness of experiments’ conclusions. The proposed methods provide a new collection of useful tools for the analysis of data sets plagued with missing values.