SMiP Workshop, Spring 2021

Multiverse Analysis: Taming Modelers' Many Degrees of Freedom

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Description: Any data analysis involves a myriad of decisions, starting from data exclusions and coding to the selection of a statistical framework and type of analysis to the specific settings of the ultimately chosen analysis. Of course, we don't want our ultimate conclusions to depend on these (sometimes only practical or plain arbitrary) decisions. The goal of a multiverse analysis (Steegen, Tuerlinckx, Gelman, & Vanpaemel, 2016; this idea also underlies the currently popular many analysists and blinded collaboration projects) is to analyze data in (ideally) all possible ways in order to make the impact of specific analysis choices on the results transparent—and, hopefully, show that the results and conclusions are robust to the modeling choice. Although simple (albeit time- and resource-consuming) in principle, a multiverse analysis brings many new questions and challenges regarding the integration and comparison of results across different models and underlying statistical frameworks (e.g., Frequentist vs. Bayes). In this workshop, we will identify the many degrees of freedom involved in statistical modeling, find practical solutions for conducting a multiverse analysis, and discuss ways for integrating and comparing results from different models and statistical frameworks into a final conclusion. I will share examples from my own collaborative multiverse analysis of multinomial processing tree (MPT) models but we will focus on issues general to statistical modeling, not specific to MPT modeling. After the first session, your homework will be to conduct your own multiverse analysis on a data set (ideally your own e.g. from your dissertation but I can also provide data) and we will discuss the outcomes and issues encountered in these in the second session.

Reference/first reading on the general concept of a multiverse analysis:

Steegen, S., Tuerlinckx, F., Gelman, A., & Vanpaemel, W. (2016). Increasing transparency through a multiverse analysis. *Perspectives on Psychological Science*, *11*(5), 702-712. https://doi.org/10.1177/1745691616658637