

New Perspectives on Measurement Invariance Testing

David Goretzko (Utrecht University) & Philipp Sterner (Ruhr University Bochum)

In this workshop, we will provide an overview of newly developed approaches to analyze measurement invariance and discuss a causal inference framework that allows researchers to reason about how certain covariates impact their measurement models.

Content:

We will start with a brief recap of common methods for measurement invariance testing and important concepts and definitions in this context.

In the second part of the workshop, we will discuss new methodological developments in measurement invariance testing that address different shortcomings of popular strategies such as invariance testing with multigroup CFA. A specific focus will be on recently developed exploratory approaches such as exploratory factor analysis trees (EFA trees; Sterner & Goretzko, 2023) and mixture multi-group EFA (De Roover, 2021; De Roover et al., 2022). These methods can be used to more thoroughly investigate metric (weak) invariance, with regard to measured and unmeasured covariates, respectively. We will also discuss how these EFA-based approaches might be combined with subsequent CFA-based analyses to ultimately establish scalar (strong) invariance.

Afterwards, we will introduce a causal inference framework for studying measurement invariance based on directed acyclic graphs that can be used to conceptualize the measurement process as well as potential influencing factors (e.g., cultural background) that render it non-invariant (e.g., Sterner, Pargent, Deffner, & Goretzko, 2024). Based on theoretical considerations and empirical findings, a causal model can be defined for the measurement process of interest. Such a causal model allows researchers to a) communicate their assumptions about (non-) invariance across specific groups and potentially biasing influences of certain covariates, and b) to derive proper modeling strategies to account for moderating effects of these covariates ensuring meaningful latent mean comparisons.

The workshop lectures will be accompanied by practical exercises, in which participants learn how to apply some of the newly developed methods for measurement invariance assessment as well as how to conceptualize non-invariance in a causal model. For these exercises we will mainly use the open-source software R, but the course materials and lecture components are designed in a software-independent manner, so that participants without deep R knowledge can follow as well.

Prerequisites:

To take part in the practical exercises, bring a laptop with a current version of R installed. Furthermore, the following packages need to be installed: *lavaan*, *mixmgfa* (from GitHub), *EFAtree* (from GitHub), *ggdag*, *partykit*.