

29th IOPS Winter Conference, 12-13 December 2019

Conference host: Leiden University

Location: Zaal 1A29, Pieter de la Court, Wassenaarseweg 52, 2333 AK, Leiden. (<https://www.universiteitleiden.nl/en/locations/pieter-de-la-court>)

Hotels: https://www.booking.com/city/nl/leiden.nl.html?aid=303947;label=leiden-nv-wkVo_NK2sKfoHkh4X60QS111932257159:pl:ta:p135:p2%E2%82%AC52:ac:ap1t1:neg:fi:tikwd-276959020:lp1010722:li:dec:dm;ws=&gclid=Cj0KCQjwilLsBRCGARIsAHKQWLMCvUYsiouXvgbGGEwcOYiN0PjK8EkQ5gE-YeYmkQXGjWHVNe0BdlgaAskAEALw_wcB

Prior to the conference – Thursday December 12th

10.30 – 12.00 **IOPS Board meeting** (room 5A19)
11.30 – 12.00 **IOPS PhD student meeting** (room 1A19)
12.00 – 13.00 **Registration and Lunch (FSW Café)**

Program Thursday December 12th

13.00 – 13.05 **Official opening** by Mark de Rooij *Professor of Methodology and Statistics of Psychological Research, Leiden University*

13.05 – 13.30 **Presentation Hilde Augusteijn** *University of Tilburg*
Posterior Probabilities in Meta-Analysis: An Intuitive Approach of Dealing with Publication Bias

13.30 – 13.55 **Presentation Daniela Crisan** *University of Groningen*
Usefulness versus Complexity: Practical Implications of IRT Model Selection

13.55 – 14.20 **Presentation Sanne Willems** *Leiden University*
Optimal Scaling transformations to model non-linear relations in GLMs for categorical and ordinal data

14.20 – 14.45 **Presentation Jacqueline Zadelaar** *University of Amsterdam*
Are Individual Differences Quantitative or Qualitative? An Integrated Behavioral and fMRI MIMIC Approach

14.45 – 15.15 **Break**

15.15 – 15.40 **Presentation Jonas Haslbeck & Oisín Ryan** *University of Amsterdam & Utrecht University*
Recovering Bistable Systems from Psychological Time Series

15.40 – 16.05 **Presentation Richard Artner** *KU Leuven-University of Leuven*
Statistical inference via all-subset regression

- 16.05 – 16.50 **Keynote speaker Elise Dusseldorp** *Leiden University*
Machine learning in psychology – two examples
- 16.50 – 17.10 **Plenary meeting IOPS staff and students**
- 17.10 – 18.15 **Poster session & Drinks**
- Giuseppe Arena** *University of Tilburg* - Modeling memory decay in social network analysis: a Bayesian approach
- Felix Clouth** *University of Tilburg* - Quality of life profiles of colon cancer survivors: A three-step latent class analysis
- Simon Kucharsky** *University of Amsterdam*- Model based real-time testing of habituation
- Marlyne Meijerink** *University of Tilburg* – The study of social interactions over time: A relational event modeling approach
- Anton Olsson Collentine** *University of Tilburg* – False certainty in meta-analysis: Theoretical vagueness in psychology leads to hidden uncertainty in meta-analytic summaries
- Chuenjai Sukpan** *Utrecht University* – How to evaluate *causal dominance* in lagged effect models
- Shiya Wu** *Utrecht University* -Expert Prior Elicitation in Bayesian Adaptive Survey Design.
- Jacqueline Zadelaar** *University of Amsterdam* – Development of Decision Making based on Internal and External Judgement: A Hierarchical Bayesian Approach
- 19.00 **Conference dinner**

Program Friday December 13th

- 09.30 – 10.00 **Registration / Coffee**
- 10.00 – 10.45 **Presentation IOPS Best Paper Award Winner Robbie van Aert**
- 10.45 – 11.05 **Break**
- 11.05 – 11.30 **Presentation Shuai Yuan** *University of Tilburg* – A novel variable selection method in K-means clustering based on Sparse Principal Component Analysis
- 11.30 – 11.55 **Presentation Adela Isvoranu** *University of Amsterdam* – Network Models of Psychosis
- 11.55 – 12.20 **IOPS Best Poster/Presentation Award Ceremony**
- 12.20 – 12.45 **Closing** by Mark de Rooij
- 12.45 **Take away lunch** (FSW Café)

Thursday December 12th

13.05 – 13.30

Posterior Probabilities in Meta-Analysis: An Intuitive Approach of Dealing with Publication Bias Hilde Augusteijn *University of Tilburg*

Summary

Publication bias remains to be a great challenge when conducting a meta-analysis. Without correction, publication bias results in overestimated effect sizes, increased type I error rates, and over- or underestimation of heterogeneity. Methods that do aim at correcting for this bias all have different assumptions, and none of the developed methods perform well under all circumstances. A new method will be introduced, Bayesian Meta-Analytic Snapshot (BMAS), that makes use of both Bayesian and frequentist statistics. BMAS evaluates both the effect size and amount of heterogeneity and corrects for potential publication bias. This new method evaluates the probability of the true effect size being zero, small, medium or large, and the probability of true heterogeneity being zero, small, medium or large, while correcting for publication bias. The approach, which intuitively provides an evaluation of uncertainty in the estimates of effect size and heterogeneity, is illustrated with real-life examples.

Discussant 1: Chuenjai Sukpan

Discussant 2: Sanne Willems

13.30 – 13.55

Usefulness versus Complexity: Practical Implications of IRT Model Selection Daniela Crisan *University of Groningen*

Summary

In the context of Item Response Theory (IRT), an important aspect is model fit evaluation. Statistical models clearly are only (useful) conceptualizations of the reality. A central question is which model to choose among various options available, and also whether model choice makes a sizeable difference for practical decisions. Should a researcher prefer the more complex, but better fitting, model, or does the worse fit of simpler models have a minor influence on practical decision making? To investigate this question, we conducted several studies on the practical consequences of IRT model misfit over the past three years, using both simulated and empirical data. We looked at the effect of using suboptimal items and models in the context of education, personality, and mental health research. We will discuss our findings with respect to outcomes such as score reliability, validity estimates, predictive accuracy, person rank ordering, selection, and classification. The implications of our findings extend to test users and developers in the areas of education, personality, and health.

Discussant 1: Damiano D'Urso

Discussant 2: Bunga Citra Pratiwi

13.55 – 14.20

Optimal Scaling transformations to model non-linear relations in GLMs for categorical and ordinal data

Sanne Willems *Leiden University*

Summary

In Generalized Linear Models (GLMs) it is assumed that there is a linear effect of the predictor variables on the outcome. However, this assumption is often too strict, because in many cases predictors have a non-linear relation with the outcome. As a solution we integrate the Optimal Scaling (OS) methodology into GLMs to non-linearly transform the predictor variables.

Transformations of the predictors have been integrated in GLMs before, e.g. in Generalized Additive Models. However, the OS methodology has several benefits which I will discuss during the presentation. I will show results from analyses on simulated and real data applying Cox' proportional hazards model used in survival analysis and logistic regression.

Discussant 1: Giuseppe Arena
Discussant 2: Marlyne Meijerink

14.20 – 14.45

Are Individual Differences Quantitative or Qualitative? An Integrated Behavioral and fMRI MIMIC Approach

Jacqueline Zadelaar *University of Amsterdam*

Summary

In cognitive neuroscience there is a growing interest in individual differences. We propose the Multiple Indicators Multiple Causes (MIMIC) model of combined behavioral and fMRI data to determine whether such differences are quantitative or qualitative in nature. A simulation study revealed the MIMIC model to perform adequately. Model application was illustrated with a re-analysis of Van Duijvenvoorde et al. (2016) and Blankenstein et al. (2018) decision making data. This showed individual differences in Van Duijvenvoorde et al. (2016) to be qualitative differences in decision strategies: some individuals used an expected value decision strategy, while others used a loss minimizing strategy, distinguished by individual differences in vmPFC activity. Individual differences in Blankenstein et al. (2018) were quantitative differences in risk aversion: more risk averse individuals were characterized by heightened vmPFC activity. We advocate using the MIMIC model to empirically determine, rather than assume, the nature of individual differences in combined behavioral and fMRI datasets.

Discussant 1: to be announced
Discussant 2: Anton Olsson-Collentine

15.15 – 15.40

Recovering Bistable Systems from Psychological Time Series

Jonas Haslbeck & Oisín Ryan *University of Amsterdam & Utrecht University*

Summary

Conceptualizing mental disorders as complex dynamical systems has become a popular framework to study mental disorders. Especially bistable dynamical systems have received much attention, because their properties map well onto many characteristics of mental disorders. While these models were so far mostly used as stylized toy models, the recent surge in psychological time series data promises the ability to recover such models from data. In this paper we investigate how well popular (e.g., the Vector Autoregressive model) and more advanced (e.g., differential equation estimation) data analytic tools are suited to recover bistable dynamical systems from time series. Using a simulated high-frequency time series (measurement every six seconds) as an ideal case we show that while it is possible to recover global dynamics (e.g., position of fixed points, transition probabilities) it is difficult to recover the microdynamics (i.e., moment to moment interactions) of a bistable system. Repeating all analyses with a sampling frequency typical for Experience Sampling Method studies (measurement every 90 minutes) showed that the recovery of the global dynamics was still successful, but no microdynamics could be recovered. These results raise two fundamental issues involved in studying mental disorders from a complex systems perspective: first, it is generally unclear what to conclude from a statistical model about an underlying complex systems model; and second, if the sampling frequency is too low, it is impossible to recover microdynamics. In response to these results we propose a new modeling strategy based on substantively plausible dynamical systems models.

Discussant 1: Erik-Jan van Kesteren
Discussant 2: Iris Yocarini

15.40 – 16.05

Statistical inference via all-subset regression

Richard Artner *KU Leuven-University of Leuven*

Summary

A powerful way to *p*-hack a regression coefficient is the inclusion or the removal of covariates. Fitting all possible regression models for a given set of covariates reveals the sensitivity of the coefficient of interest with respect to the set of covariates (see, e.g., Patel et al., 2015). Having shown the sensitivity of an effect size estimate (and the corresponding *p*-value) via this approach, the researcher has yet to draw conclusions from this multiverse of fitted models. In this talk, we will report on the use of democratic indices (such as the average effect size, the effect size quantiles, the average *p*-value, or the percent of significant *p*-values) and compare them with sensible alternatives such as model selection, model averaging, and model regularization methods. In order to achieve general conclusions, we will explore the idea to partition the space of correlation structures according to the best statistical method via Monte-Carlo simulations and supervised clustering.

Discussant 1: Shuai Yuan

Discussant 2: Shiya Wu

Friday December 13th

11.05 – 11.30

A novel variable selection method in K-means clustering based on Sparse Principal Component Analysis

Shuai Yuan *University of Tilburg*

Summary

K-means clustering is arguably the most widely-applied clustering method because of its efficiency, especially in dealing with large datasets. However, its implicit assumption that all variables contribute equally to the cluster separation is always violated in high-dimensional datasets which potentially include a large amount of confounding variables. Therefore, variable selection method is needed to separate out the confounding variables in K-means clustering and subsequently produce more accurate clustering results. We propose in the current study a novel approach to perform variable selection in K-means clustering based on a special variant of sparse PCA. The model selection procedure to determine the number of confounding variables is also discussed. The performance of the novel approach is compared with standard k-means clustering and some competing methods. We conclude by arguing that variable selection should be considered in existing clustering methods to effectively address the challenges of emerging high-dimensional datasets.

Discussant 1: Hanneke van der Hoef

Discussant 2: Jacqueline Zadelaar

11.30 – 11.55

Network Models of Psychosis

Adela Isvoranu *University of Amsterdam*

Summary

Recent years have seen a rise in the modeling of mental disorders as networks of interacting symptoms. The centerpiece of network modeling lies in the idea that symptoms actively interact with one another, and that the study of their interaction is central to progress in understanding and treating mental disorders. The patterns of interaction can be visualized in a network structure, in which variables (e.g., symptoms, environmental factors, genetic factors) are represented as nodes and the presence of an edge between any two nodes implies the existence of a statistical association, which does not vanish upon controlling for all of the other nodes in the network. This talk will present findings from several network studies in the context of psychotic symptomatology and provide a framework to study (environmental and genetic) risk factors within symptom network models of schizophrenia. The talk will conclude with a discussion on current challenges in the field and a brief presentation of results from a

large-scale simulation study comparing the performance of several estimation algorithms, as to arrive at concrete guidelines for applied researchers in terms of what models are best used for which research questions.

Discussant 1: Felix Clouth

Discussant 2: Sebastián Castro-Alvarez