34th IOPS/SMiP Summer Conference, 13-14 June 2019

Conference host: Utrecht University
Locations: De Zalen van Zeven, Boothstraat 7, 3512 BT Utrecht
      Utrecht Centrum voor de Kunsten, Domplein 4, 3512 JC Utrecht
Hotels: https://www.visit-utrecht.com/plan-your-trip/hotels

Program Thursday June 13th (De Kerkzaal, De Zalen van Zeven: https://dezalenvanzeven.nl/vergaderen-utrecht/#top)

09.30 – 10.00 **Receipt with coffee and tea**

10.00 – 10.15 **Official Opening**

10.15 – 10.45 **Presentation Duco Veen** *Utrecht University*
       On Elicitation of Prior Information for Latent Change Analysis

10.45 – 11.15 **Presentation Sanne Smid** *Utrecht University*
       The Impact of Default Priors in Bayesian SEM with Small Samples

11.15 – 11.30 **Break**

11.30 – 12.00 **Presentation Jonas Haslbeck** *University of Amsterdam*
       Moderated Network Models

12.00 – 12.30 **Presentation Jolanda Kossakowski** *University of Amsterdam*
       The Race for Causality: A Comparison of Different Techniques for Causal Inference
       Graphs and an Application to Obsessive-Compulsive Disorder

12.30 – 13.30 **Lunch**

13.30 – 14.00 **Presentation Franziska Bott** *University of Mannheim, Germany*
       The Influence of Information Sampling on the Pseudocontingency Effect

14.00 – 14.30 **Presentation Raphael Hartmann** *University of Freiburg, Germany*
       Response Time Extended Multinomial Processing Tree (RT-MPT) Models in R

14.30 – 15.00 **Presentation Tessa Blanken** *VU Amsterdam*
       Insomnia heterogeneity and its link to depression: Insights from an observational,
       prospective, and intervention study

15.00 – 15.30 **Presentation Niels Kukken** *University of Tübingen, Germany*
       Are there two independent evaluative conditioning effects in relational paradigms?
       Dissociating the effects of CS-US pairings and their meaning

15.30 – 16.00 **Break**

16.00 – 17.00 **Invited presentation by COTAN**
       Sixty years of assessing the quality of psychological tests in the Netherlands: then,
       now, and in the future

17.00 – 18.30   **Poster Session**

Xynthia Kavelaars *University of Tilburg* – Making the most of clinical trials: Increasing efficiency using novel Bayesian methods for information sharing within and between trials

Andrea Stoevenbelt *University of Tilburg* - The Application of the Analysis of Covariance in Stereotype Threat Research: Implications of the SAT Covariate and Prominent Moderators.

Mark Verschoor *University of Groningen* - Relationships between family member's values, energy-saving identity, personal norms to save energy, and energy behaviors

Sanne Willems *Leiden University* - Variability in the interpretation of Dutch probability phrases – a risk for miscommunication

Maike Czink *SMiP* - A closer look at the temporal aspects of recovery

Susanne Frick *SMiP* - Comparing information in the multidimensional forced-choice and the true-false format

Kilian Hasselhorn *SMiP* **-** Reactivity effects in ambulatory assessment Effects of participant burden on intraindividual variability

Luisa Horsten *SMiP* **-** The Dark Core of Personality: Dissociating D from Honesty-Humility

David Izydorczyk *SMiP* - Measuring Rule- and Exemplar-based Processes in Judgment

Lea Johannsen *SMiP* **-** Modelling Sequential Dependencies in Reaction Time Data: Extending the Diffusion Decision Model

Stefan Radev *SMiP* **-** Taming the Intractable: Deep Learning for Universal Parameter Estimation

Fabiola Reiber *SMiP* **-** Modeling Non-compliance in the Randomized Response Technique using Unrelated Questions

Nikoletta Symeonidou *SMiP* **-** Emotional source memory: (Why) Are emotional sources remembered better?

Thomas Verliefde *SMiP* **-** Do Acquaintances Elicit Ambivalent Priming Effects?

Monika Wiegelmann *SMiP* **-** Chronotype and work: A longitudinal perspective

Gloria Grommisch *SMiP* **-** Modeling Individual Differences in Emotion Regulation Repertoire in Daily Life with Multilevel Latent Profile Analysis

18.30   **Conference dinner**
Best Paper of 2018 Award

Program Friday June 14th (Torenzaal, Utrecht Centrum voor de Kunsten: https://uck.nl/#)

09.00 – 09.30   **Presentation Maarten Kampert** *Leiden University*
Improved Strategies for Distance Based Clustering of Objects on Subsets of Attributes in High-Dimensional Data

09.30 – 10.00   **Presentation Lieke Voncken** *University of Groningen*
Continuous test norming with GAMLSS

10.00 – 10.15   **Break**

10.15 – 10.45   **Presentation Martin Schnuerch** *University of Mannheim, Germany*
Sequential Hypothesis Tests for Multinomial Processing Tree Models

10.45 – 11.15   **Presentation Mischa von Krause** *University of Heidelberg, Germany*
Using the diffusion model to assess dark personality

11.15 – 11.45   **Presentation Daan van Renswoude** *University of Amsterdam*
Modeling infant eye-movements over real-world scenes

11.45 – 12.45   **Lunch**

12.45 – 13.15   **Presentation Beibei Yuan** *Leiden University*
The δ-machine: Classification based on distances towards prototypes

13.15 – 13.45   **Presentation Anne Voormann** *University of Freiburg, Germany*
Investigating mechanisms underlying paired-word recognition using continuous and discrete-state models

13.45 – 14.45   **Board Meeting with SMiP representatives**
Lokaal 115, UCK

14.15 – 14.45   **PhD Meeting**
Torenzaal, UCK

14.45 – 15.00   **Joint Meeting of Board and PhD's**
IOPS Best Presentation and Poster Award
Torenzaal, UCK

Thursday June 13th

10.15 – 10.45
On Elicitation of Prior Information for Latent Change Analysis
Duco Veen *Utrecht University*

Informative priors can be used in SEM to supplement limited data, obtain more confident parameter estimates, or, simply enable estimation of the model. Expert elicitation, currently limited to simple models, provides a solution to obtain informative priors. We developed a novel approach to elicited expert knowledge for Latent Change Analysis.

Student discussant: Jonas Haslbeck
Staf discussant: Joost van Ginkel

10.45 – 11.15
The Impact of Default Priors in Bayesian SEM with Small Samples
Sanne Smid *Utrecht University*

When Bayesian estimation is used to analyze Structural Equation Models (SEMs), prior distributions need to be specified for all parameters in the model. Many existing software programs offer diffuse default prior distributions, which makes it easier for users to implement a Bayesian approach. However, diffuse default priors can heavily impact the results when samples are small. Hence, diffuse default priors can unintentionally behave as very informative priors when samples are small, and therefore lead to untrustworthy results. In this talk, we discuss the risks associated with the use of default priors in Bayesian SEM when samples are small.

Student discussant: Qianrao Fu
Staf discussant: Marjan Bakker

11.30 – 12.00
Moderated Network Models
Jonas Haslbeck *University of Amsterdam*

Pairwise network models such as the Gaussian Graphical Model (GGM) are a powerful and intuitive way to analyze dependencies in multivariate data. A key assumption of the GGM is that each pairwise interaction is independent of the values of all other variables. However, in psychological research this is often implausible. In this paper, we extend the GGM by allowing each pairwise interaction between two variables to be moderated by (a subset of) all other variables in the model, and thereby introduce a Moderated Network Model (MNM). We show how to construct MNMs and propose an L1-regularized nodewise regression approach to estimate it. We provide performance results in a simulation study and show that MNMs outperform the split-sample based methods Network Comparison Test (NCT) and Fused Graphical Lasso (FGL) in detecting moderation effects. We discuss applications of MNMs in the field of psychopathology and give a brief overview of how to estimate MNMs with the R-package mgm.

Student discussant: Andrea Stoevenbelt
Staf discussant: Henk Kelderman

12.00 – 12.30
The Race for Causality: A Comparison of Different Techniques for Causal Inference Graphs and an Application to Obsessive-Compulsive Disorder
Jolanda Kossakowski *University of Amsterdam*

The quest for causality is one that people have been striving for for decades. We are not only interested in how something may lead to something else, we also want to know why something happens. Establishing a causal relation between two variables can help us in answering that big question of why something happens. Most measures that are used to estimate causal relations

between variables use what is called observational data. These are (empirical) data in which no perturbations have taken place. Although one can use observational data to estimate causal relations, this alone is not enough to properly estimate these relationships between variables. We also need to perturb one or more variables and observe its effect in order to establish causal relations between variables. This means that we also need so-called experimental data to estimate causal relations. These are (empirical) data where some perturbation (intervention) has taken place. In this study, we show how well different algorithms perform when it comes to estimating causal relations. Results show that the invariant causal prediction algorithm and the hidden invariant causal prediction algorithm are very accurate in their estimation of causal relations in data without and with hidden variables. We show the use of these algorithms by applying them to a dataset of patients diagnosed with obsessive-compulsive disorder (OCD). The resulting causal graph reveals multiple cycles between aspects of OCD that may play a role in the maintenance of the disorder. Even though more research has to be conducted to improve the algorithms, we believe that this approach may expose OCD in a new way.

Student discussant:
Staf discussant: Rens van de Schoot

13.30 – 14.00
The Influence of Information Sampling on the Pseudocontingency Effect
Franziska Bott *University of Mannheim, Germany*

In a trivariate decision scenario with two contexts, two options, and two outcomes, successful decision makers should base their choices on the options' probabilities to result in a positive outcome. Yet, research on pseudocontingencies shows that choices may rather be based on skewed base rates of options and outcomes co-varying across contexts (e.g., Fiedler, Freytag, & Meiser, 2009). Pseudocontingencies may even override existing contingencies. While previous research has focused on investigating the effect by presenting predetermined learning trials, this project investigates the role of self-determined information sampling in pseudocontingency inference.

In a series of experiments, we compared predetermined learning to learning from information sampling. When participants were free to decide for each learning trial which context to observe, neither learning trials nor subsequent choice behavior differed in comparison to predetermined learning. However, when sampling information by context and option during learning, an asymmetry between positive contexts with predominantly gains and negative contexts with predominantly losses resulted. Within negative contexts both options were sampled equally often resulting in no preference for any option in a subsequent choice phase. Contrarily, within positive contexts skewed base rates of options are sampled. Moreover, participants preferred the frequently sampled option within positive contexts in line with pseudocontingency research. Still, in the majority of cases, the frequently sampled and chosen option corresponded to the objectively superior option. Therefore, we also compared the influence of the relative sampling frequency and the sampled winning probability of an option within a context on its choice probability in the decision phase.

Student discussant: Sanne Smid
Staf discussant: Ton de Waal

14.00 – 14.30
Response Time Extended Multinomial Processing Tree (RT-MPT) Models in R
Raphael Hartmann *University of Freiburg, Germany*

Since Donders' "method of subtraction" (Donders, 1868) estimating cognitive process completion times has been an active research area. The model class by Klauer and Kellen (2018) called Response Time extended Multinomial Processing Tree (RT-MPT) makes it possible to estimate process completion times for every assumed process of a given MPT model. It also overcomes some disadvantages of traditional MPT models. For example, it can be used in many situations in which an MPT model is not identified, incorporating response times makes the probability estimates for MPT models more accurate, and variants of an MPT model can be tested against each other. So far, the only available source code for modeling RT-MPTs was written in C++. In order to make RT-MPT usable for psychology, we developed the R package "rtmpt" with which it is possible to fit RT-MPT models easily. The package can be used with two established MPT syntaxes and is free and open source. Additionally, it has a number

of useful and new features such as suppressing specific process times, holding process probabilities constant, and changing some prior parameters. The package leads to comparable parameter estimates as the original C++ program by Klauer and Kellen (2018). Furthermore, we show that the Bayesian algorithm of the program is valid.

Student discussant: Duco Veen
Staf discussant: Jean-Paul Fox

14.30 – 15.00
Insomnia heterogeneity and its link to depression: Insights from an observational, prospective, and intervention study
Tessa Blanken *VU Amsterdam*

Background. Insomnia is the second-most prevalent disorder and a primary risk factor for depression. It has proven difficult, however, to pinpoint consistent characteristics of insomnia, suggesting unrecognized heterogeneity. In addition, considerable overlap in the symptoms of insomnia and depression raises questions on their empirically identified relationships: could the increased risk and their co-occurrence largely reflect this symptom overlap? In a series of studies we aimed to unravel insomnia heterogeneity and disentangle the relationship between insomnia and depression.

Methods. First, in an observational study, we performed latent class analysis on N=2224 participants with insomnia for a data-driven identification of subtypes. Second, in a 6-year prospective study in N=768 participants free from lifetime depression, we investigated primary risk factors for depression onset. Third, in an intervention study in N=104 participants with co-occurring insomnia and depression symptoms we investigated sequential and specific treatment effects of cognitive behavioural therapy for insomnia (CBTI). In these final two studies we employed and introduced extensions of network analysis to account for the symptom overlap.

Results. First**,** we identified five insomnia subtypes that were distinguished by their multivariate profile of life history, affect and personality and that, crucially, differed in their risk of comorbid and lifetime depression. Second, we identified difficulty initiating sleep to directly predict first-onset depression, even after accounting for all other baseline depression symptoms. Third, we demonstrated that CBTI most strongly and most directly affected specific sleep complaints.

Discussion. The identification of subtypes of insomnia allows to select patients with the highest risk of depression—crucial for the prevention of depression, for which insomnia was shown to be an independent and primary risk factor. When prevention fails, it was moreover shown that depression symptoms can be alleviated through successful treatment of insomnia. Insomnia is thus a key determinant in the prevention and treatment of depression, providing multiple ways to combat the global burden of disease.

Student discussant: Sanne Willems
Staf discussant: Mark de Rooij

15.00 – 15.30
Are there two independent evaluative conditioning effects in relational paradigms? Dissociating the effects of CS-US pairings and their meaning
Niels Kukken *University of Tübingen, Germany*

Recent research into evaluative conditioning (EC) shows that information about the relationship between the conditioned and unconditioned stimuli can exert strong effects on the size and direction of the EC effect. Additionally, the co-occurrence of these stimuli seems to exert an orthogonal effect on evaluations. This finding has been interpreted as support for two independent types of EC effects. However, previous research devoted to this question relied on aggregated evaluative measures, allowing for alternative interpretations. In four experiments, we developed and validated a multinomial processing tree model that distinguishes effects of the pairings from effects of the meaning of the pairings. Our findings suggest that two independent EC effects contribute to overall evaluative change in a relational EC paradigm. The model that we developed offers a helpful method for future research

in that it allows for an assessment of the effects of manipulations on processes rather than overall performance on an evaluative measure.

Student discussant: Alexandra de Raadt
Staf discussant: Dave Hessen

Friday June 14th

09.00 – 09.30
Improved Strategies for Distance Based Clustering of Objects on Subsets of Attributes in High-Dimensional Data
Maarten Kampert *Leiden University*

The focus in this talk is on clustering of objects in high-dimensional data, given the restriction that the objects do not cluster on all the attributes, not even on a single subset of attributes, but often on different subsets of attributes in the data. With the objective to reveal such a clustering structure, Friedman and Meulman (2004) proposed a framework and a specific algorithm, called COSA. In this talk we will discuss various improvements to the original COSA algorithm. The first improvement targets the optimization strategy for the tuning parameters in COSA. Further, a reformulation of the COSA criterion brings down the number of tuning parameters from two to one, enables incorporation of pre-specified initial weights for the attribute distances and allows for a solution that consists of zero-valued attribute weights. The third improvement consists of a new definition of the COSA distances that yields a better separation between objects from different clusters. We will compare the `old' and the improved COSA with other state of the art methods. The comparison is based on simulated and real omics data sets.

Student discussant: Beibei Yuan
Staf discussant: Marcel van Assen

09.30 – 10.00
Continuous test norming with GAMLSS
Lieke Voncken *University of Groningen*

Psychological tests are widely used to assess individuals in clinical and educational contexts. The test scores are often interpreted relative to the scores of a reference population, for instance the Dutch population of the same age as the testee involved. Those so-called norm-referenced scores were traditionally derived from sample scores in subgroups of age, but nowadays they are derived from test scores considering a continuous function of age.
We recommend to create those continuous test norms with the generalized additive models for location, scale, and shape (GAMLSS) framework, as it allows for a wide range of distribution types and function types. In this way, the median, variation, skewness, and/or kurtosis of the raw score distribution can be modelled as functions of the predictor(s).
The flexibility of the GAMLSS framework allows for accurate norm estimation, but it also presents some challenges. First, a model needs to be selected for every distributional parameter. Second, the flexibility comes with a larger sampling variability. My PhD project involved the development of an automated model selection procedure, a method for expressing the uncertainty due to sampling variability around the normed scores, and a method for making norm estimation more efficient by including prior information. In this talk, a summary of the methods proposed and their performances will be presented.

Student discussant: Fayette Klaassen
Staf discussant: Anton Béguin

10.15 – 10.45
Sequential Hypothesis Tests for Multinomial Processing Tree Models
Martin Schnuerch *University of Mannheim, Germany*

In a seminal article, Riefer and Batchelder (1988) proposed Multinomial Processing Tree (MPT) models to measure latent psychological attributes based on categorical behavioral data. Since then, MPT models have become a powerful and frequently used instrument in various branches of cognitive psychology and social cognition research. Aside from estimation of parameters that represent psychological processes or states underlying responses to cognitive tasks, MPT models also allow for statistical tests on these parameters. So far, such tests have largely relied on Null Hypothesis Significance Testing, mostly ignoring statistical power. We show that proper control of Type 1 and Type

2 error probabilities often requires very large sample sizes in the classical Neyman-Pearson framework. We propose Sequential Probability Ratio Tests (SPRT) as an efficient alternative. Unlike Neyman-Pearson tests, sequential tests continuously monitor the data and terminate when a predefined criterion is met. As a consequence, SPRT typically require only about half of the Neyman-Pearson sample size without compromising error probability control. We illustrate the SPRT approach to statistical inference in MPT models with an example and discuss benefits as well as limitations of the proposed approach.

Student discussant: Shiya Wu
Staf discussant: Elise Dusseldorp

10.45 – 11.15
Using the diffusion model to assess dark personality
Mischa von Krause *University of Heidelberg, Germany*

In recent years, there has been an increase of interest in so so-called dark personality traits, ie. traits that manifest in socially undesirable or even downright malevolent behavior. Such traits were typically assessed using self-report questionnaires, with the most popular instruments trying to assess the Dark Triad of psychopathy, narcissism and Machiavellism. While these instruments have been fundamental in advancing the study of dark personality, they share the problems inherent in all self-report measures, for example the reliance on conscious introspection and easy fakeability. These issues seem especially important given the fact that the traits assessed are by their very definition socially undesirable. We introduce a new instrument based on simple binary decisions under time pressure - does this adjective describe me well? Ratcliff's diffusion model is employed in order to achieve - in the model parameter drift rate - a more pure measure of speed of information uptake in these decisions than simple RTs. The difference in drift rates for "dark" and "light" adjectives is used as an estimate of dark personality. We present initial data that points towards concurrent, incremental and predictive validity of the measures obtained.

Student discussant: Kimberley Lek
Staf discussant: Denny Borsboom

11.15 – 11.45
Modeling infant eye-movements over real-world scenes
Daan van Renswoude *University of Amsterdam*

What factors drive infants' gaze behavior over complex real-world scenes? In adults, scene viewing is characterized as an interplay between low-level perceptual salience (e.g., contrast, color and orientation of pixels) and higher order top-down information such as meaningful objects. This interplay between exogenous and endogenous factors develops in infancy and scene viewing is a suitable paradigm to quantify *how* infants' visual attention develops. In this talk I will present general characteristics of data from scene viewing studies conducted with both infants and adults. In order to explain these general characteristics we developed a simple eye-movement model that can mimic some of the general behaviors observed in the data.

Student discussant:
Staf discussant: Arndt Bröder

12.45 – 13.15
The δ-machine: Classification based on distances towards prototypes
Beibei Yuan *Leiden University*

We introduce the δ-machine, a statistical learning tool for classification based on (dis)similarities between profiles of the observations to profiles of a representation set. In this presentation, we discuss the properties of the δ-machine, investigate the definition of the representation set, and derive variable importance measures and partial dependence plots for the machine. Three choices for constructing the representation set are discussed: the complete training set, a set selected by the clustering algorithm Partitioning Around Medoids (PAM), and a set selected by the K-means clustering. After

computing the pairwise dissimilarities, these dissimilarities take the role as predictors in penalized logistic regression to build classification rules. This procedure leads to linear classification boundaries in the dissimilarity space, but non-linear classification boundaries in the original predictor space. Moreover, we applied two tailored dissimilarity functions to extend the δ-machine to handle mixed type of predictor variables, the adjusted Euclidean dissimilarity function (AEDF) and the adjusted Gower dissimilarity function (AGDF).

We will apply the δ-machine on two empirical data sets, the Mroz data and the Statlog data. For the Mroz data, we will show the non-linear boundaries in the original predictor space which were derived from the δ-machine. For the Statlog data, we compare the δ-machine with five other classification methods. The results showed that the δ-machine was one of the best methods. Moreover, we will show how the performance of the δ-machine changes by applying different types of the representation set. The obtained results showed that when the δ-machine applied the PAM, the results show a good balance between accuracy and interpretability.

Student discussant: Daan van Renswoude
Staf discussant: Daniel Heck

13.15 – 13.45
Investigating mechanisms underlying paired-word recognition using continuous and discrete-state models
Anne Voormann *University of Freiburg, Germany*

In a paired-word recognition task, individuals study single words but have to categorize in a recognition test two randomly paired words regarding position and number of studied words. Past research has shown that performance decreases in a paired-word recognition task compared to a single-word recognition task. However, the source of the performance difference remains uncertain. In the first study, we investigated this research question using two different model classes: discrete-state models and a version of general recognition theory (GRT), a multidimensional signal detection theory. We tested 80 participants in a recognition task, presenting both trials with single words and trials with paired words in the recognition test. Behaviourally, we replicated the previous findings and found that both model classes allocate an overall performance difference between single and paired words to processes of detection and discrimination based on memory evidence. More importantly, the words in paired-word trials are not evaluated independently and the two model classes allocate the dependencies in recognition decisions to different sources. While GRT attributes the dependencies to a spilling-over of memory evidence, the discrete-state model can fully account for them within guessing processes. Overall, model comparisons favour the discrete-state model. A validation study examining whether the findings also transfer to situations where only paired-words are considered will also be presented.

Student discussant:
Staf discussant: