interuniversity graduate school of Psychometrics and Sociometrics

Annual report 2018

- Leiden University
- University of Amsterdam
- University of Groningen
- Tilburg University
- University of Twente
- Utrecht University
- KUL University of Leuven
- Statistics Netherlands (CBS)
- Psychometric Research Center (Cito)

Contents

Foreword

To our great sorrow, the year 2018 started with the death of our well respected IOPS member prof. dr. Ivo Molenaar. He passed away on February 26, 2018. We are very grateful for his involvement in the establishment of the Interuniversity Research School for Psychometry and Sociometry at the end of the eighties. Ivo Molenaar carried out groundbreaking research in the field of Item-Response-Theory (IRT), in which his work on the Rasch en Mokken model should be mentioned in particular. Thanks to his research in IRT, he became editor-in-chief of *Psychometrika* magazine, and later president of the Psychometric Society. Ivo Molenaar was Professor of Statistical analysis and Measurement theory for the Social Sciences at the University of Groningen, which he remained until 2000. We thank him for his great dedication and commitment to IOPS.

2018 was also the year in which IOPS started to cooperate with the DFG Research Group "Statistical Modeling in Psychology" (SMiP), a transregional collaboration of twelve renowned behavioral researchers from five German universities. The participating researchers of the SMiP group have a strong background in advanced quantitative methods and are experts in diverse substantive fields of psychology addressing cognition and social cognition, motivation and affect as well as individual differences. IOPS is excited about this cooperation and is happy that some IOPS students already successfully participated in several SMIP courses.

In December 2018, the IOPS board was pleased to welcome dr. Katrijn van Deun, successor of prof. dr. Jelte Wicherts (Tilburg University). We thank Jelte Wicherts, who will proceed his career as professor in methodology and chair of the Department of Methodology and Statistics in Tilburg, for his commitment to our graduate school.

This year the IOPS Best Poster Award was won by Olmo van den Akker (Summer 2018) and Esther Maassen (Winter 2018). Johnny van Doorn (Summer 2018) and Sara van Erp (Winter 2018) won the IOPS Best Presentation Award. Jedelyn Cabrieto won the IOPS Best Paper Award, with her paper *Testing for the Presence of Correlation Changes in a Multivariate Time Series: A Permutation Based Approach* published in *Scientific Reports*.

We congratulate the eighteen students who defended their thesis successfully. With three projects left unfinished, the number of IOPS students in 2018 increased to 67.

On behalf of the IOPS board,
Rob Meijer

1 Introduction

1.1 Background

The Interuniversity Graduate School of Psychometrics and Sociometrics (IOPS) is an institute for the advanced dissertation training in psychometrics and sociometrics of PhD students in The Netherlands and Belgium. Additionally, it coordinates high-quality research taking place in these fields, and its staff members consist of internationally esteemed experts.

Since its inception in 1987, IOPS has become a cornerstone of the psychometric and sociometric community in the Netherlands and Belgium, and it has contributed to the development of several generations of psychometricians and sociometricians. It is commonly held that to be an active member of the psychometric and sociometric academic community in the Netherlands and Belgium means participating in IOPS, and PhD students working on topics related to psychometrics and sociometrics are almost always encouraged by their supervisors to become a member of IOPS since it is beneficial for the PhD student. Many former IOPS student members have become internationally renowned psychometricians and sociometricians, and many of these alumni continue to be affiliated with IOPS and contribute by providing courses for IOPS students or acting as reviewers for research proposals.

1.2 Role of IOPS (contrasted with local graduate schools)

Psychometrics and sociometrics are rather specialized topics. Therefore, IOPS fills an important role in providing both a community for persons working on related research topics, and an educational platform that is able to provide courses, conferences, and specialized support that PhD students working on psychometrics and sociometrics would not be able to obtain at their own university. IOPS does not replace the role of local graduate schools that exist at the university where the PhD student works. IOPS aims to supplement the services provided by local graduate schools, it does not aim at fulfilling the managerial role of those local graduate schools. That is, IOPS PhD students are still expected to take part in their local graduate schools, and to adhere to the rules that are specified by these graduate schools. This also means that the supervision and management of participating PhD students is still taken to be the responsibility of the university of the student, and is a role that is not fulfilled by IOPS.

Thus, IOPS supplements the services of these local graduate schools in areas where these graduate schools are unable to provide the students with services they need (i.e., specialized education on all areas of psychometrics and sociometrics, and a social research platform where students and researchers working on psychometrics and sociometrics can interact). This is a contribution that both former and current IOPS PhD students evaluate positively, and that many see as an important part of their professional development as psychometric or sociometric researchers. IOPS success and importance as an inter-university graduate school is also reflected in the fact that in September 2013

it was awarded by NWO with a NWO Graduate Program grant, which provided funding for four extra IOPS PhD positions on various topics in psychometrics and sociometrics.

1.3 Aims and activities of IOPS

The main aims of IOPS are to support the development of young researchers and the execution of high-quality research in psychometrics and sociometrics in the Netherlands and Belgium.

1.3.1 Activities

To achieve the aims mentioned above, IOPS undertakes the following activities:

- Providing multiple postgraduate courses on a variety of topics in psychometrics and sociometrics, taught by subject matter experts at participating universities and institutions (see Section 3.1).
- Providing PhD students with the opportunity of participating in the IOPS postgraduate program, which consists of a coherent set of courses and is rewarded with the IOPS certificate (see Section 3.3).
- Organizing biannual IOPS conferences at which both IOPS PhD students and international experts can present their research.
- Providing a network for both PhD students and researchers in psychometrics and sociometrics that facilitates interuniversity collaborations and informs its members of relevant news in the field (e.g., conferences and job openings). This also improves the transition of PhD students into relevant job positions after the PhD has been completed (see Section 1.3.3).
- Offering support from a students' councilor in case a PhD student encounters a conflict with their supervisor regarding the contents of the research that cannot be solved at the faculty. Conflicts in the area of human resources or confidential personal matters are to be solved by the counselor of the students' faculty.

1.3.2 Quality of PhD research

The quality of PhD research is ensured by:

- The admission procedure: review of the proposal and approval by the board (part 1.3)
- At least one of the supervisors is IOPS staff member, so the content quality of the research is being monitored.
- The requirements for the IOPS certificate, including being a discussant twice and review of a proposal twice (part 3.3)
- The research has to be concluded with an approved dissertation.

1.3.3 Connecting PhD students to the labour market

IOPS aims at optimizing the position of participating PhD students on the labour market after the completion of their PhD. It does so by providing:

- the IOPS certificate, which communicates to future employers that the student has successfully completed the IOPS PhD postgraduate program.
- a networking platform by means of the biannual conferences, which are also attended by IOPS staff.
- information (on the website and via emails) about relevant job openings.

Additionally, many stakeholders of psychometrics and sociometrics participate in IOPS, which means that after participation in IOPS, PhD students have obtained important connections both in academic and more applied areas related to their expertise. The main participating institutes are Cito and Statistics Netherlands (CBS).

1.4 Admittance to the IOPS postgraduate program

Any PhD student in the Netherlands and Belgium can apply for admittance to the IOPS program, on condition that the following criteria are met:

- The student is in possession of a Master's degree (or equivalent) in a field related to psychometrics or sociometrics.
- He or she is registered as a PhD student at one of the universities in the Netherlands or Belgium, or he or she has a supervisor that is a staff member of IOPS.
- The research that the student performs or will perform towards achieving the title of PhD can be classified as being psychometric or sociometric research.
- The student has composed a research proposal for evaluation by the IOPS board that shows that the research is of sufficient quality.
- The student has composed a feasible educational plan that satisfies the criteria of the IOPS program (see Section 3.3).

If a student believes that these criteria can be met, he/she can submit an application to the secretary of IOPS. This application consists of the student's application detailing the research that the student will perform, and an educational plan that lists the IOPS courses that the student plans to follow and the period in which they will follow these courses.

After receiving the student's application, this is sent out for review by two IOPS staff members and two PhD student IOPS members (all four selected such that their research expertise matches the topic of the proposed research and they are not involved in the project). These four reviewers critically evaluate the entire proposal. Proposals accepted by NWO will only be reviewed by two PhD students and judged generally by the director. If necessary, the reviewers provide feedback on both the research proposal and the educational plan. Only in the case that the proposal is not accepted at once, the PhD student revises the proposal. On the basis of their comments and the possibly revised proposal, the reviewers formulate a recommendation to the IOPS board about whether the student

should be admitted to IOPS based on the application as it has been submitted. After this, the board reviews the application at the upcoming board meeting, After discussing the proposal and the four reviews, the board members decide on whether the student should be admitted to the IOPS program. After the board has reached its decision, the secretary notifies the student and their main supervisor of the decision.

More information about the requirements and review process can be found on the IOPS website: http://www.iops.nl/students/becoming-an-iops-student/guidelines-for-applicants-appointed-as-phd-student/

1.5 Affiliated student membership

If a student does not meet the required criteria to be admitted to the IOPS postgraduate program, or if a student does not intend on becoming a member of the program, a student can ask to be registered as an affiliated student member of IOPS. As an affiliated student member, the option to follow IOPS courses and attend the biannual IOPS conferences will be given. However, affiliated student members do not receive the IOPS certificate after the completion of their PhD project. In addition, as opposed to the regular IOPS PhD students, they do not pay an annual participation fee but they pay for each course/conference separately

2 Organization

2.1 History

The present interuniversity school for psychometrics and sociometrics (IOPS) goes back to a national platform for collaboration in research and education active since the seventies, formalized in the "Nederlandse Stichting voor Psychometrie" (Dutch Foundation for Psychometrics, an advisory body for ZWO, as NWO was then called). IOPS was officially founded as an institute for advanced dissertation training on June 24th, 1987. IOPS then obtained a starting grant of the Ministry of Education in 1987 for a period of five years. The Royal Dutch Academy of Arts and Sciences (KNAW, ECOS committee) officially reaccredited IOPS as an interuniversity graduate school in 1994, 1999, and 2004.

Until 2000, the University of Amsterdam was commissioner ("penvoerder"), and after that the University of Leiden took over the responsibility. Since February 2014 the University of Groningen is commissioner of IOPS.

In 2010, when the KNAW accreditation period ended, the Board of IOPS considered the changes in the organization of PhD training in the Netherlands brought about by the policy change of the Association of Universities in the Netherlands with the effect that all universities started developing their own systems of local Graduate Schools. Because psychometrics and sociometrics are relatively small and highly specialized areas of expertise, it was clear that national collaboration would remain of utmost importance for IOPS to stay on the front-edge of methodological research, and therefore the Board decided to continue IOPS activities as a national platform of research and PhD training, but now under a new, less formal construction. A new Agreement of Cooperation between the participating faculties was drafted, and formally established in 2011 for the duration of four years. An adjusted Agreement of Cooperation has been established in 2015.

2.2 Participating and cooperating institutes

The partners in the Agreement of Cooperation are the academic groups of seven universities (from the Netherlands and Belgium) and the two non-academic institutes are listed in the table below. The non-academic partners CBS and CITO have strong ties with several of the academic groups, and also bring in PhD projects.

In 1994, the establishment of graduate schools and the rearrangement of staff members, caused IOPS to introduce a new category of staff for those who - for formal reasons - could not be a regular IOPS staff member: the associated staff members, working at cooperating institutes. The requirements for associated staff members are identical to those of regular staff members. PhD students of these associated staff members can be admitted to IOPS as an external dissertation

student. The cooperating institutes have no representative in the board. Article 8 in the Agreement provides the conditions under which associated research groups can become full participant.

In the table below, all participating and cooperating universities and institutes, with the number of student and staff members per academic group/institute are listed.
(Information as of 31-12-2018)

Participating institutes			
Name institute	*# students*	*# prospective students*	*# staff*
Leiden University, Faculty of Social and Behavioural Sciences			
▪ Methodology and Statistics Unit, Institute of Psychology	6	0	8
▪ Education and Child Studies, Institute of Education	0	0	1
▪ Statistical Science for the Life and Behavioural Sciences, Mathematical Institute	3	0	1
University of Amsterdam, Faculty of Social and Behavioural Sciences			
▪ Psychological Methods, Department of Psychology	11	0	8
▪ Developmental Psychology, Department of Psychology	4	0	4
▪ Work and Organizational Psychology, Department of Psychology	0	0	0
▪ Methods and Statistics, Department of Development and Education	3	0	7
University of Groningen, Faculty of Behavioural and Social Sciences			
▪ Psychometrics and Statistics, Department of Psychology	10	0	8
▪ Theoretical Sociology, Department of Sociology	0	0	2
University of Twente, Faculty Behavioural, Management and Social Science (BMS)			
▪ Department of Research Methodology, Measurement and Data Analysis (OMD)	2	0	4
Tilburg University, Tilburg School of Social and Behavioural Sciences			
▪ Methodology and Statistics	21	0	23
Utrecht University, Faculty of Social and Behavioural Sciences			
▪ Methodology and Statistics	14	1	19
KU Leuven, University of Leuven, Belgium, Faculty of Psychology and Educational Sciences			
▪ Research Group of Quantitative Psychology and Individual Differences	8	0	4
Statistics Netherlands (CBS), Den Haag	0	0	2
Psychometric Research Center (Cito), Arnhem	0	0	4
Cooperating institutes			

University of Groningen, Faculty of Behavioural and Social Sciences			
▪ Department of Education	0	0	3
VU University Amsterdam, Faculty of Psychology and Education			
▪ Department of Clinical Psychology	0	0	1
▪ Department of Biological Psychology	0	0	1
Maastricht University, Fac. of Health, Medicine and Life Sciences & Fac. of Psychology & Neuroscience			
▪ Department of Methodology and Statistics	0	0	5
▪ Department of Psychiatry and Neuropsychology			1
Erasmus University Rotterdam			
▪ Department of Econometrics	0	0	1
▪ Department of Psychology, Education & Child Studies	1	0	4
Wageningen University			
▪ Research Methodology Group	0	0	1

2.3 Board and office

The structure and organization of IOPS are formalized in articles 3-6 of the Agreement of Cooperation. The most important units are the IOPS board and the secretarial office.

The governing Board of IOPS consists of seven members delegated by the participating universities and two representatives of the participating research institutes. Board meetings are also attended by two representatives of the IOPS PhD students, appointed by the IOPS PhD students for a period of two years. The board has the ultimate responsibility with regard to the research programme, educational programme, and finances.

The institute director is also chairman, he/she is elected from the representatives of the seven participating universities

The Board delegates daily matters to its Chair, who runs the Secretarial Office, and communicates its policies and decisions in a general meeting of scientific staff and students twice a year.

Members IOPS Board

In December 2018, the board was pleased to welcome Dr Katrijn van Deun, successor of Prof. Jelte Wicherts (Tilburg University). We thank Jelte Wicherts for his commitment to our graduate school. On 31 December 2018 the Board consisted of:

- Prof. R.R. (Rob) Meijer, Chair, University of Groningen
- Prof. D. (Denny) Borsboom, University of Amsterdam
- Prof. M.J. (Mark) de Rooij, Leiden University
- Dr G.J.A. (Jean-Paul) Fox, University of Twente
- Dr K. (Katrijn) van Deun, Tilburg University
- Prof. H.J.A. (Herbert) Hoijtink, Utrecht University
- Prof. F. (Francis) Tuerlinckx, KU Leuven-University of Leuven
- Dr A.A. (Anton) Béguin, CITO (National Institute for Educational Measurement)

- Prof. A.G. (Ton) de Waal, CBS (Statistics Netherlands)

PhD representatives

Fayette Klaassen (Utrecht University) was appointed first representative, after being assistant representative in 2017.
Lieke Voncken (University of Groningen) was appointed assistant PhD student representative.

Office

The Chair of the Board runs the Secretarial Office, and is supported by an Executive Secretary. The RUG-based office is responsible for the preparation and execution of IOPS policies, activities, and Annual Reports. The Executive Secretary assists the Chair and the Board, and runs the IOPS website, the student administration and manages the digital archive. She also assists the local groups in the organization of conferences and courses. Since March 1st, 2018, the Executive Secretary of IOPS is dr. Laurien Hansma. Finances are handled by the Financial Department (FSSC) of the University of Groningen.

Secretary: **dr. Laurien Hansma**
E-Mail: secretariaat.iops@rug.nl
Web: www.iops.nl
Phone: 050 36 32 668
Address: University of Groningen
Faculty of Social and Behavioral Sciences
Grote Kruisstraat 2/1
9712 TS Groningen, The Netherlands

2.4 Cooperation with Related Master programmes

All academic board members are in direct contact with the directors of the related Master programmes. Although there are six different locally organized Master programmes, there is close collaboration with the programme directors and a considerable degree of coordination between them. The reason is that the faculty members who are charged with teaching responsibilities in the IOPS PhD programme also occupy central roles in education and management of the local Master programmes. In several cases, there is even a personal union between IOPS scientific staff members and directors of Master programmes. Generally, collegial ties are flexible, but directors of Master programmes take binding decisions with respect to the Master phase, and the IOPS Board takes binding decisions with respect to the PhD education activities IOPS has to offer. In practice, cooperation is very smooth.

2.5 Board & plenary meetings

In 2018 board meetings were held on 14 June and 13 December and a Spring and Autumn session by email.

Plenary meetings for all IOPS members (staff and PhD students) are held twice a year during the IOPS conferences. In 2018 two plenary meetings took place, one on 14 June, and one on 13 December.

2.6 Archive

The IOPS archives the following:

- Registration of new PhD students *(aanmelddossier)*
  - registration form, including an educational plan
  - reviews, possibly response to the reviews and the recommendation of the reviewers
- The transition of number of PhD students
  - new students (*instroom*)
  - leaving students (*uitloop*), both due to completing their PhD and dropping out,
- Courses
  - the grades for all the students in that year's course
  - evaluations of the courses

  (Note: IOPS gives instructions to the teachers how and when to do this and checks whether the grades and evaluations are received.)

All data are archived in Groningen on the local workspace Y/staff/gmw/IOPS/…

3 The IOPS post graduate programme

The IOPS post-graduate programme consists of the educational programme and the research training programme. After succesfully completing the post-graduate programme, the IOPS PhD candidate will receive the IOPS certificate.

3.1 Educational programme

3.1.1 IOPS curriculum

During the period as an IOPS PhD student, the student needs to participate in the IOPS curriculum. Every participating university organizes at least one course. These courses include two mandatory courses ("What is psychometrics" and "Statistical Consulting to Behavioral Scientists") and multiple elective courses. All courses are free for IOPS students (it is included in the annual contribution fee). Courses are open for non-IOPS members, but IOPS-members have priority. An overview of the IOPS curriculum can be found in the table below and on the IOPS website.

Month	Course	University	EC	Even years	Odd years
January	Generalized latent variable modeling	TU	1		2019, 2021…
January	Statistical Learning	LU	2	2018, 2020…	2017 only
February	What is Psychometrics?	UA	2	2018, 2020…	2019, 2021…
March	Statistical Consulting to Behavioral Scientists	UA & LU	3		2019, 2021…
April	Meta-analysis Transparency in Science	UM UG	1 1	2018, 2020…	2019, 2021…
May	Applied Bayesian Statistics	UU	2	2018, 2020…	2019, 2021…
June					
July					
August					
September	Survey Design	UU	2	2018, 2020…	2019, 2020…
October	Bayesian Item Response Modelling	UT	2	2018, 2020…	
November	Optimization & Numerical Methods	UL	2	2018, 2020…	2019, 2021…
December					

Note. UA: University of Amsterdam; UM: University of Maastricht; UU: Utrecht University; UT: University of Twente; UL: University of Leuven; TU: Tilburg University; UG: University of Groningen; LU: Leiden University.

3.1.2 Courses in 2018

In 2018 seven courses of the IOPS curriculum were organized:

1. **Statistical Learning** (elective)

Leiden University, 24-26 January, 2018
Lecturers: Dr M. Fokkema, Dr T. Wilderjans, Prof. M. de Rooij

2. **Meta-Analysis** (elective)
   University of Maastricht, 3-5 December 2018
   Lecturer: Dr W. Viechtbauer
3. **What is Psychometrics?** (mandatory)
   University of Amsterdam, 22-24 May, 2018
   Coordinator: Prof. D. Borsboom
4. **Applied Bayesian Statistics** (elective)
   Utrecht University, April 30 – May 4, 2018
   Lecturers: Prof. H. Hoijtink, Dr Milica Miočević, Dr E. Hamaker, Dr Caspar van Lissa, Kimberley Lek & Lion Behrens
5. **Survey Design** (elective)
   Utrecht University, 3-6 September, 2017
   Lecturers: Dr P. Lugtig & Dr B. Struminskaya
6. **Bayesian Item Response Modeling** (elective)
   University of Twente, 18-19 October 2018
   Lecturer: Prof. J.P. Fox
7. **Optimization & Numerical Methods in Statistics** (elective)
   KU Leuven-University of Leuven , 21-22 November, 2017
   Lecturers: Prof G. Molenberghs, Prof F. Tuerlinckx, Dr K. van Deun & Dr T. Wilderjans

3.1.3 Number of IOPS students per course

In the table below the numbers of IOPS students that participated in IOPS courses in the period 2013 - 2018 are stated.

IOPS Course	2013	2014	2015	2016	2017	2018
Generalized latent variable modeling (TiU)			20		20	
Statistical Learning (UL)					24	13
What is psychometrics? (UvA)	10		24	20	14	17
Advising on research methods (UvA)	n.a.		14			
Statistical Consulting to Behavioral Scientists (UL, UvA)					8	
Applied Bayesian Statistics (UU)	n.a.	10	5	n.a.	n.a.	3
Optimization & Numerical Methods in Statistics,(KU L)	13	6	22	18	16	2
Meta-Analysis (UM)		5		7		5
Analysis of Measurement Instruments (UT)		6				
Survey Design (UU)	8			4	3	4
Bayesian Item Response Modeling				9		7
Transparency in Science					3	

3.1.4 Examination

Courses differ in the requirements that need to be met to receive the course credit (EC): essay exams, multiple-choice exams, assignments, computer practical, and individual presentations are being used.

3.1.5 Course evaluation

All individual courses are evaluated by evaluation forms that are administered to the participants at the end of every course. The results of these evaluations are discussed at the board meeting. Two IOPS representative PhD students also attend this meetings.

3.2 Research training programme

The research-training program consists of reviewing research proposals of fellow students and the participation in IOPS conferences.

3.2.1 Peer review

With the exception of PhD projects funded via NWO, FWO and ERC, which are reviewed by two PhD students only, each new proposal submitted to the IOPS is reviewed by two IOPS PhD students and two IOPS staff members. This implies that every student has to review a proposal twice. Participating in the IOPS review process is intended to make the IOPS PhD student acquainted with the peer-review process.

3.2.2 Conferences: aims and programme

The conferences are intended for the IOPS PhD students to

- practice in presenting his/her research (poster and oral presentation) in a conference setting
- practice in having public discussions after a conference presentation
- practice in acting as 'discussant' and start the academic discussion after an oral presentation
- get feedback on his/her research from experts in the field
- develop a social network
- get to know the field of psychometrics and sociometrics in a broader perspective.

The IOPS biannual conferences takes place in June and December and are organized by the participating universities in turns. Each conference programme consists of the following elements:

- student poster presentations
- student oral presentations
- presentation by IOPS staff members
- presentation by an international expert outside IOPS (optional)
- conference dinner

Awards at the conferences:

- At each conference, a prize is awarded to the best student presentation and the best student poster. The Board has established these prizes to emphasize the importance of the presentations at the conferences.
- Once a year, at the summer conference, a prize is awarded for the best single research article by an IOPS PhD student that has been published or accepted for publication in the previous year. Papers in internationally peer-reviewed journals will be given more weight than chapters in books. The award is sponsored by the Foundation for the Advancement of Data Theory.

3.2.3 Conferences in 2018

- **33rd IOPS Summer Conference**, 14 and 15 June 2018, University of Amsterdam.
  See appendix 2 for the programme.
- **28th IOPS Winter Conference**, 13 and 14 December 2018, Cito, Arnhem.
  See appendix 3 for the programme.

3.3 IOPS certificate

A student is eligible for the IOPS certificate when the research project is completed and he/she have met the requirements of the IOPS post-graduate programme.

Educational requirements

The PhD student should complete

- the two mandatory courses ("What is psychometrics" and "Statistical Consulting to Behavioral Scientists"), which are 5 EC in total. Exemption for these courses can be granted in case an equivalent course has been completed earlier. [exemption for What is Psychometrics is not possible]
- elective IOPS courses up to at least 5 EC (exemption is not possible).

Research requirements

All students are required to

- review two research proposals of fellow students
- attend at least four IOPS conferences
- present twice at an IOPS conference: a poster at the start of the project and an oral presentation at the end of the project
- have been discussant at an IOPS conference twice.

4 Students and their projects

4.1 Introduction

Applicants for the IOPS dissertation training must have a Master's degree in one of the following disciplines. Behavioural Sciences, Technical Sciences, Mathematics or Econometrics. They are appointed as PhD student, or as an indirectly financed PhD student. PhD students within IOPS are financed by internal research funds of the participating institutes, NWO (Netherlands Foundation of Scientific Research) or European funding, or other external funds of third parties.

4.2 Admissions, deregistrations and dissertations

	2011	2012	2013	2014	2015	2016	2017	2018
Student admissions	15	22	18	14	21	20	11	27
Premature deregistrations	2	0	0	2	2	1	2	3
Dissertations	9	17	7	12	11	17	11	18
Projects that exceeded the project time limit on 31 December	4	3	4	5	11	8	7	8
Students on 31 December	48	53	61	60	62	65	61	67

Dissertations in 2018

1. Joost **Agelink van Rentergem** (University of Amsterdam) – *Statistical Advances in Clinical Neuropsychology*
2. Yasin **Altinisik** (Utrecht University) – *Evaluation of inequality constrained hypotheses using an Akaike-type information criterion*
3. Kirsten **Bulteel** (KU Leuven-Univeristy of Leuven) – *Multivariate time series, vector autoregressive models and dynamic networks in psychology: Extensions and reflections*
4. Jedelyn **Cabrieto** (KU Leuven-University of Leuven) – *Capturing time-varying response patterning and synchronicity through Switching PCA models*
5. Laura **Dekkers** (University of Amsterdam) – *On Axioms of Choice: A Mathematical Modelling Approach to Study Variability in Decision Making*
6. Dino **Dittrich** (Tilburg University) – *The grass is not always greener in the neighbor's yard: Bayesian and frequentist inference methods for network autocorrelated data*
7. Paulette **Flore** (Tilburg University) – *Stereotype Threat and Differential Item Functioning: A critical Assessment*

8. Abe **Hofman** (University of Amsterdam) – *Psychometric Analyses of Computer Adaptive Practice Data: A New Window on Cognitive Development*
9. Merijn **Mestdagh** (KU Leuven-University of Leuven) – *Prediction and machine learning: Explorations in psychological methodology*
10. Michèle **Nuijten** (Tilburg University) – *Research on research: a meta-scientific study of problems and solutions in psychological science*
11. Annemiek **Punter** (Twente University) – *Improving the modelling of response variation in international large-scale assessments*
12. Aniek **Sies** (KU Leuven-University of Leuven) - *Towards precision medicine: Identifying relevant treatment-subgroup interactions and estimating optimal tree-based treatment regimes from randomized clinical trial data*
13. Robbie **van Aert** (Tilburg University) – *Meta-analysis: Shortcomings and potential*
14. Claudia **van Borkulo** (University of Amsterdam) – *Symptom network models in depression research: From methodological exploration to clinical application*
15. Mattis **van den Bergh** (Tilburg University) – *Latent Class Trees*
16. Leonie **van Grootel** (Utrecht University) – *Where No Reviewer Has Gone Before: Exploring the Potential of Mixed Studies Reviewing*
17. Davide **Vidotto** (Tilburg University) – *Bayesian Latent Class Models for the Multiple Imputation of Cross-Sectional, Multilevel and Longitudinal Categorical Data*
18. Hail Michael **Worku** (University of Leiden) – *Multivariate logistic regression using the ideal point classification model*

New projects in 2018

1. Richard **Artner** (KU Leuven-University of Leuven) – *Methods for estimating and improving the Replicability of Psychological Science*
2. Sebastián **Castro Alvarez** (University of Groningen) – *ImpoRTant: developing item repsonse theory to analyze intensive longitudinal data*
3. Aline **Claesen** (KU Leuven-University of Leuven) – *Methods for estimating and improving the Replicability of Psychological Science*
4. Anja Franziska **Ernst** (University of Groningen) – *Dynamic clustering: Classifying people through ecological momentary assessment*
5. Sarahanne **Field** (University of Groningen) – *Let's learn to walk before we try to run: Towards characterizing the causes of poor reproducibility*
6. Qianrao **Fu** (Utrecht University) – *Executing Replications Studies using informative Hypotheses*
7. Rosember **Guerra Urzola** (Tilburg University) – *A huge scale optimization approach to joint data modeling in the social and behavioral sciences*
8. Matthias **Haucke** (University of Groningen): *Tackling the reproducibility problem: Discovering causes of low replicability and mechanisms to improve the scientific process*
9. Xynthia **Kavelaars** (Tilburg University) – *Making the most of clinical trials: Increasing efficiency using novel Bayesian methods for information-sharing within and between trials*

10. Konrad **Klotzke** (Twente University) – *Marginal Joint-Modelling of Response Accuracy and Response Times*
11. Laura **Kolbe** (University of Amsterdam) – *Non-standard applications of structural equation modeling in child development and education research*
12. Gaby **Lunansky** (University of Amsterdam) – A Theoretical Network Model of Psychological Resilience
13. Esther **Maassen** (Tilburg University) – *Structural equation modeling as an antidote to selective outcome reporting*
14. Marlyne **Meijerink** (Tilburg University) – *Confirmatory methods for time-sensitive social processes*
15. Malileh **Namazkhan** (University of Groningen) – *Statistical Modelling of Energy Saving Measures*
16. Soogeun **Park** (Tilburg University) – *Big Data in the Social Sciences: Statistical methods for multi-source high- dimensional data*
17. Bunga **Citra Pratiwi** (University of Leiden) – *Predictive Validity of Psychological Tests from a Statistical Learning Perspective*
18. Rianne **Schouten** (Utrecht University – external) – *About the evaluation of missing data methodologies*
19. Andrea H. **Stoevenbelt** (Tilburg University) – *Psychometrics and statistics of stereotype threat*
20. Debby **ten Hove** (University of Amsterdam) – *A comprehensive framework for estimating and interpreting interrater reliability for dependent data*
21. Olmo R. **van den Akker** (Tilburg University) – *Preregistration and the "failed study"*
22. Hanneke **van der Hoef** (University of Groningen) – *Cluster analysis in educational research: Best practice guidelines for finding groups*
23. Wouter S. **van Loon** (University of Leiden) – *Stacked Domain Learning for multi-domain data: A new ensemble method*
24. Mark **Verschoor** (University of Groningen) – *A dynamical network model for energy household use*
25. Wai **Wong** (KU Leuven-University of Leuven): *Statistical challenges in Experience Sampling Research*
26. Shiya **Wu** (Utrecht University) – *Bayesian Adaptive Survey Design*
27. Shuai **Yuan** (Tilburg University) – *Identifying Group Differences in Large-scale Multi-block Data*

Projects in progress beyond the project time limit

On December 31st 2018, the projects of the following PhD students are still in progress, but have exceeded the project time limit. Therefore, these projects are no longer mentioned in the list of projects.

1. Jolien **Cremers** (Utrecht University) – *Circular data in longitudinal designs*
2. Chris **Hartgerink** (Tilburg University) – *Detecting potential data fabrication in the social sciences*
3. Maarten **Kampert** (University of Leiden) – *Distance-based analysis of (gen)omics data*

4. Xinru **Li** (University of Leiden) – *Meta-CART: An integration of classi cation and regression trees into meta-analysis*
5. Kees **Mulder** (Utrecht University) – *Bayesian analysis of circular data in between-subjects designs*
6. Alexander O. **Savi** (University of Amsterdam) – *Experimentation in online education: Increasing return on investment through A/B testing*
7. Riet **van Bork** (University of Amsterdam) – *Empirical methods to distinguish network from latent variable constructs*
8. Eva **Zijlmans** (Tilburg University) – *Solutions for some psychometric problems of the reliability of psychological measurements*

Projects left unfinished

1. Vincent J.C. **Buurman** (University of Leiden) – *PCA with Optimal Scaling and Regularization*
2. Wai **Wong** (Maastricht University) – *Reliability of within-person associations in ESM data*
3. Sarahanne **Field** (University of Groningen) – *Let's learn to walk before we try to run: Towards characterizing the causes of poor reproducibility*

4.2 Dissertations

Joost Agelink van Rentergem
Statistical Advances in Clinical Neuropsychology

27 March 2018
University of Amsterdam, Brain and Cognition
Supervisors: Prof. dr. Ben Schmand, prof. dr. Hilde Huizenga, prof. dr. Jaap Murre
Financed by NWO MaGW
1 September 2013 - 1 September 2017

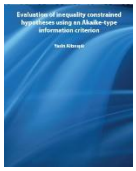
Summary of thesis
The goal of the ANDI-project is to design and make available methodologically state-of-the-art, user-friendly univariate and multivariate methods to compare individual patients to normative data. That is, a database of normative data is created by combining healthy control group data from several neuropsychological research groups in the Netherlands and Belgium, sophisticated techniques are developed to perform normative comparisons, and a website is developed that allows clinicians and researchers to easily make comparisons between data from potential patients and the normative database. Some of the methodological challenges in this project are in

- variance in test scores between different sources of data, i.e. the multilevel structure of the database,
- different kinds of missing data that such a composite database would entail,

- visualization of the results for clinical practice.

Yasin Altinisik

Evaluation of inequality constrained hypotheses using an Akaike-type information criterion



2 February 2018
Utrecht University, Methods and Statistics
Supervisor: Prof. dr. Herbert Hoijtink, prof. dr. Tineke Oldehinkel, prof. dr. Jos van Berkum, prof. dr. Marian Joels, dr. Rinke Klein Entink, dr. Rebecca Kuiper
Financed by NWO
20 February 2014 – 20 March 2018

Summary of thesis

The Akaike information criterion (AIC) is one of the best known information criteria that can be used to evaluate hypotheses containing only equality restrictions on model parameters. The GORIC is a generalization of the AIC that can be utilized to evaluate hypotheses containing equality and/or inequality restrictions on model parameters, but only for normal linear models. This book proposes a new information criterion, the GORICA, that mimics the performance of the GORIC on selecting the best hypothesis in a set of competing hypotheses for normal linear models. The GORICA can be used to evaluate (in)equality constrained hypotheses under a broad range of statistical models: generalized linear models, generalized linear mixed models, structural equation models, and contingency tables. The GORICA is an useful method in evaluating (in)equality constrained hypotheses, because the hypotheses under evaluation can contain either linear restrictions on model parameters or non-linear restrictions on model parameters. For example, the GORICA can be used to evaluate hypotheses containing (in)equality restrictions on odds ratios, which are formulated using non-linear functions of cell probabilities in the context of contingency tables. The GORICA evaluation of (in)equality constrained hypotheses is flexible in the sense that it only requires the estimates of model parameters used in the specification of the hypotheses under evaluation and their covariance matrix as input. These inputs can be obtained using a suitable estimation method such as maximum likelihood estimation, nonparametric bootstrapping, and Gibbs sampling.

Kirsten Bulteel

Multivariate time series, vector autoregressive models and dynamic networks in psychology: Extensions and reflections

26 September 2018
KU Leuven-University of Leuven, Methodology of Educational
Supervisors: Prof. dr. Eva Ceulemans, Prof. dr. Francis Tuerlinckx
Financed by FWO
1 October 2013 – 1 October 2017

Summary of thesis

Many disciplines in the behavioral sciences involve the study of dyadic relations. For example, one can think of the interactions that take place between mother and child or within romantic couples. Given dyadic data, interesting research questions pertain to who causes what. For instance, are the parents steering the behavior of the children, or is it exactly the opposite? Or is the relation in fact bidirectional? To fully grasp such interpersonal processes, the dyad is best recognized as a dynamic system. Modeling dyadic dynamics is quite challenging, however, because many variables may be involved and because interaction patterns may be different in specific subgroups.

In the envisaged project, we deal with these challenges by developing a dynamic network modeling framework for dyadic time series data. This approach produces an easy-to-read visualization of the results of the analysis, unraveling the structure of the interaction pattern. In a next step, the proposed methodology will be extended to handle a large number of variables. Furthermore, a clusterwise version of the network approach will be developed to reveal subgroups of dyads with similar interaction patterns. Finally, we will promote the use of the new network tools by developing software and by applying them to empirical data sets in close collaboration with substantive researchers.

Jedelyn Cabrieto

Capturing time-varying response patterning and synchronicity through Switching PCA models

21 September 2018
KU Leuven-University of Leuven, Quantitative Psychology and Individual Differences
Supervisors: Prof. dr. Eva Ceulemans, prof. dr. Francis Tuerlincks, prof. dr. Peter Kuppens
Financed by KU Leuven
1 October 2014 – 1 October 2018

Summary of thesis

Functionalist definitions of emotions state that they consist of synchronized or patterned changes in multiple experiential, physiological, and behavioral response channels which enable the organism to quickly and efficiently cope with environmental threats or opportunities. Yet, detecting response patterning and synchronicity in empirical data represents a formidable challenge (Gross, 2010). Indeed, while technological advances have enabled the collection of intensive time-series data on multiple response channels, the development of suited statistical tools is lagging behind, as some key challenges that come with the complex nature of the research questions and associated data, are not easy to address. Specifically, methods are needed that can determine when and what exactly changes (e.g., mean level, covariation), which subsystems (e.g., experiential, behavioral, physiological, neurological) are involved and in what way, and how this differs across individuals.

The aim of this project is to tackle these challenges by developing a new modeling framework for capturing time-varying response patterning and synchronicity that combines the key principles of regime-switching models and principal component analysis. The framework will be applied to empirical data and disseminated to substantive researchers by, amongst others, building easy-to-use software.

Laura Dekkers

On Axioms of Choice: A Mathematical Modelling Approach to Study Variability in Decision Making

28 June 2018
University of Amsterdam, Developmental Psychology
Supervisors: Prof. dr. H.M. Huizenga, dr. B.R.J. Jansen
Financed by University of Amsterdam
1 September 2013 - 1 September 2017

Summary of thesis

The overarching aim of this thesis is to do some right to the complexity of human decision making and the study thereof. Specifically, this thesis includes three examples of how to advance the study of, and to increase insight in, *individual and contextual variability* in *decision making* under risk. The focus of each study is on candidate psychological constructs and factors that are assumed to be involved in, or to influence, variability in decision making. The psychological constructs of interest cannot be directly observed or measured; these are conceptualized as *latent variables*, derived by adopting a *mathematical modelling approach*.
Results across the example studies yield both *conceptual* and *methodological* conclusions. With respect to the former, novel candidate psychological constructs and factors are indicated that may be relevant in studying variability in decision making under risk, among both adolescents and adults. In addition, the relevance of the framework of the adaptive decision maker is underscored. With respect to the latter, the benefits are shown of adopting a latent variable conceptualization of psychological constructs and of applying mathematical modelling. Moreover, specific aspects of study measures are indicated that should be taken into consideration in order to optimize the choice of measures in studying variability in decision making under risk.

Dino Dittrich

The grass is not always greener in the neighbor's yard: Bayesian and frequentist inference methods for network autocorrelated data

30 November 2018
Tilburg School of Social and Behavioral Sciences, Methodology and Statistics
Supervisors: Prof. dr. J.K. Vermunt, prof. dr. R.T.A.J. Leenders, dr. J. Mulder
Financed by Tilburg University
1 June 2014 – 1 January 2018

Summary of thesis

People do not live in isolation. Instead, we constantly interact with others, which affects our actions, opinions, or well-being. Throughout the last decades, the network autocorrelation model has been the workhorse for modeling network influence on individual behavior. In the network autocorrelation model, actor observations for a variable of interest are allowed to be correlated, where a network autocorrelation parameter represents and quantifies the strength of a network influence on the variable of interest. More precisely, an actor's observation is assumed to be a function not only of a set of

explanatory variables but also of the observations for the actor's neighbors, i.e., other actors in the network this actor is tied to.
In this thesis, we develop a fully Bayesian framework to estimate the network autocorrelation model and to test multiple hypotheses on the network autocorrelation parameter(s) against each other. Taking the Bayesian route hereto has at least three attractive features that are not shared by classical statistical methods such as maximum likelihood estimation and null hypothesis significance testing. First, the Bayesian approach enables researchers to include previous empirical information about the network autocorrelation parameter through a prior distribution, which may attenuate the underestimation of the network autocorrelation parameter associated with maximum likelihood estimation of the model. Concomitantly, we also derive Bayesian default procedures for situations in which such prior information is completely unavailable. Second, Bayesian techniques do not rely on asymptotic approximations when estimating uncertainty and performing inference about the network autocorrelation parameter but yield accurate results even in case of small networks. Third, using Bayes factors as opposed to null hypothesis significance testing, researchers can test any number of hypotheses on the network autocorrelation parameter and quantify the amount of relative evidence in the data for each tested hypothesis. We provide several such Bayes factors and generalize the presented methodology to test order hypotheses on multiple network autocorrelation parameters, representing the strength of multiple influence mechanisms that may have some connection to the variable of interest.
Furthermore, we introduce a discrete exponential family model to analyze network autocorrelated count data for which the network autocorrelation model itself is not well-suited. This novel model permits principled statistical inference without making any potentially limiting distributional assumptions on the marginal or conditional counts but is flexible enough to accommodate a wide range of count patterns.
In sum, the methods developed in this thesis allow researchers studying network influence to quantify and test the strength of network influence(s) on a variable of interest in ways that go beyond the current state of the art.

Paulette Flore
Stereotype Threat and Differential Item Functioning: A critical Assessment

7 March 2018
Tilburg School of Social and Behavioral Sciences, Methodology and Statistics
Supervisors: Prof. dr. J.K. Vermunt, prof. dr. J.M. Wicherts
Financed by: NWO Talent grant
1 September 2013 - 1 September 2017

Summary of thesis
Do gender stereotypes lead to performance decrement on math tests for girls or women? Psychologists across the world have tried to answer this question using experiments for the last two decades. In these experiments a group of students is exposed to *stereotype threat* before making a math test. Stereotype threat can be made salient in different ways, for instance by informing participants that “boys and girls do not perform equally well on this math test”. In a control condition a second group of students do not get to read this, or they are informed that “boys and girls perform equally well on this math test”. Female students often underperform on a math test when they are exposed to stereotype threat, while male students are not influenced.

In my dissertation we study stereotype threat literature and popular research methods with a critical eye. We need to be critical, because some problems in the psychological literature could have distorted research findings in the past, like publication bias (results are biased by selectively publishing studies with exciting results), and a lack of replicability (being able to replicate the findings of the original study by means of a new study) and reproducibility (coming to the same conclusions as the original researchers by reanalyzing the existing dataset). Moreover, stereotype threat researchers mostly study whether performance decrements on the math test occur on average scores. In my dissertation I go beyond averages, and study group differences caused by stereotype threat for specific math questions. With statistical models we study whether girls influenced by stereotype threat score lower on specific math questions than girls in the control condition (controlled for math ability), we call this Differential Item Functioning (DIF).

In Chapter 2 of my dissertation we summarize existing stereotype threat studies conducted in elementary, middle and high schools across the globe by means of a meta-analysis. We found a negative influence of stereotype threat on math performance, even though the differences between the groups were small. Tests for publication bias implied that the results are somewhat distorted due to selective publishing. In Chapter 3 we carried out a large stereotype threat replication study in Dutch high schools. More than 2,000 students participated in this study. We did not find evidence for a stereotype threat effect on math performance in this study. In Chapter 4 we study used DIF methods and reporting practices in 200 articles. We conclude that the amount of detail in reports on DIF analyses is often insufficient, which is problematic for reproducibility. It is striking that researchers who study DIF with multiple statistical methods, often find divergent results. Finally, in Chapter 5 we reanalyze data of 10 stereotype threat experiments. We found no systematic differences in stereotype threat effects for difficult or easy questions. The amount of unanswered math questions was high in some of the studies, which reflects the strong time pressure students had to work under. We suggest as alternative explanation for performance decrements that female students in the stereotype threat condition work slower or give up more easily than female students in the control condition. A DIF analysis on our own dataset does not show any differences in performance on specific items for the female students in the different experimental groups. We recommend researchers and policy makers to be critical when interpreting outcomes in stereotype threat and DIF literature. In the future, large scale systematic replication studies could answer many of the pending questions regarding the stereotype threat effect.

Abe Hofman

Psychometric Analyses of Computer Adaptive Practice Data: A New Window on Cognitive Development

20 April 2018
University of Amsterdam, Psychological Methods
Supervisors: Prof. dr. H.L.J. van der Maas, dr. I. Visser, dr. B.R.J. Jansen
Financed by NWO Research Talent grant
1 September 2012 – 1 September 2017

Summary of thesis

Large longitudinal data sets are required to answer fundamental questions on cognitive development and learning. To capture the developmental patterns, data should be collected while children learn. Math

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Garden, a web-based adaptive training and monitoring system, is developed to do so, and includes a set of games that students use to practice different skills (e.g., multiplication and proportional reasoning).
The popularity of Math Garden provides researchers with an invaluable data set. The research in the current thesis can be categorized by three different approaches. The first approach is based on analyses of parameters that follow from the system. Following this approach, in Chapter 2 we analyze parameters of the counting game to investigate enumeration strategies. A second approach is aimed at understanding the cognitive strategies by analyzing 'raw' data with models that can capture more detailed processes. In Chapter 3 and 4, we study the rules that children use to solve items from the balance-scale and multiplication task. The third approach concerns longitudinal studies. We investigate the links between the development of different skills (Chapter 5), developmental processes of learning to touch type (Chapter 6), and present different learning analytics that provide descriptives of times-series of responses to single items (Chapter 7).
This dissertation builds on and extends earlier research with Math Garden. The examples in this dissertation go beyond snapshots of what develops and show the dynamics of development. Our results show that Math Garden data, although not easy to analyze, provide a new window on cognitive development.

Merijn Mestdagh
Prediction and machine learning: Explorations in psychological methodology

19 September 2018
KU Leuven-University of Leuven, Quantitative Psychology
Supervisors: Prof. Dr. Francis Tuerlinckx, Dr. Peter Kuppens, Prof. Dr. Denny Borsboom
Financed by FWO
1 October 2013 – 1 October 2017

Summary of thesis
Unraveling the within-person dynamics of psychological processes is increasingly seen as holding the key to understanding complex social and emotional phenomena as diverse as the formation of attitudes, the development of psychopathological symptoms, and the motivation of behavior. Recently, it has been suggested that such within-person dynamics operate as a network of thoughts, emotions, attitudes and physiological changes. As a result, researchers have started to generate large amounts of within-persons multivariate time series. However, the explosion of data stands in stark contrast to the relative lack of availability of mathematical tools suited to make sense of the resulting complex and noisy data. In this project, we will extend state of the art engineering methods to make them suitable for extracting meaningful within-person dynamical networks. First, we will build on existing linear models that are already capable of dealing with within-person data, but are however not yet appropriate to model larger systems or infer networks. To build more realistic models we will also turn to non-linear network identification techniques. Second, we will show how these models can be applied in practice. In particular, using the identified models it will be studied how these within-person networks can be optimally influenced and controlled.
Throughout the project we will work towards the implementation of the developed techniques into user-friendly software packages.

Michèle Nuijten

Research on research: a meta-scientific study of problems and solutions in psychological science

30 May 2018
Tilburg School of Social and Behavioral Sciences, Methodology and Statstistics
Supervisors: Prof. dr. J.M. Wicherts, prof. dr. M.A.L.M. van Assen
Financed by NWO Vidi grant nr 452-11-004
1 September 2012 – 1 September 2017

Summary of thesis

Psychology is facing a "replication crisis". Many psychological findings could not be replicated in novel samples, which lead to the growing concern that many published findings are overly optimistic or even false. In this dissertation, we investigated potential indicators of problems in the published psychological literature.
In Part I of this dissertation, we looked at inconsistencies in reported statistical results in published psychology papers. To facilitate our research, we developed the free tool *statcheck*; a "spellchecker" for statistics. In Part II, we investigated bias in published effect sizes. We showed that in the presence of publication bias, the overestimation of effects can become worse if you combine studies. Indeed, in meta-analyses from the social sciences we found strong evidence that published effects are overestimated. These are worrying findings, and it is important to think about concrete solutions to improve the quality of psychological research. Some of the solutions we propose are preregistration, replication, and transparency. We argue that to select the best strategies to improve psychological science, we need research on research: *meta-research*.

Annemiek Punter

Improving the modelling of response variation in international large-scale assessments

19 December 2018
University of Twente, Measurement and Data Analysis
Supervisors: Prof. dr. C.A.W. Glas, prof. dr. ir. T.J.H.M. Eggen, dr. M.R.M. Meelissen
Financed by IEA
1 January 2015 – 12 December 2017

Summary of thesis

International large-scale assessments (ILSAs) play a major role in the evaluation of educational systems. These projects are characterized by the standardized assessment of student achievement and the collection of contextual data by means of curriculum, student, teacher, school, and home questionnaires. Together, the resulting high-quality data on student achievement and contextual factors provide great opportunities for more theory-oriented educational effectiveness research, particularly in international contexts. To ensure the validity of analyses based on these data, particularly relating to measurement invariance across (sub)populations, efforts must be made to evaluate response behaviour across (sub)populations of interest. A lack of measurement invariance characterized by these differences in response behaviour, is called differential item functioning (DIF).

This thesis presents five studies that contribute to research in the field of education by deploying ILSA data in research areas where the availability of standardized data from multiple countries offers new research opportunities. Topics addressed are: computer and information literacy, parental involvement and reading literacy, and language demand in testing mathematics. Also, in each chapter methods for identifying and handling potential DIF in the framework of item response theory are explored.
The studies in this thesis show how DIF analyses can be insightful by benefiting from the synergy between a methodological focus on validity and a focus on more substantive research questions. More than simply a task to tick off before the "real" questions are investigated, DIF analyses can lead to insights into effects underlying test results. Throughout the studies in this thesis it is therefore shown how, in studies with a substantive interest in comparing groups, the study of validity on both test and questionnaire items should be integrated into the methodology. Though no clear-cut one-method-fits-all strategy is presented here, the thesis shows that there are many ways to approach the issue.

Aniek Sies

Towards precision medicine: Identifying relevant treatment-subgroup interactions and estimating optimal tree-based treatment regimes from randomized clinical trial data

5 October 2018
KU Leuven-University of Leuven, Quantitative Psychology and Individual Differences
Supervisors: Prof. dr. Johan Vlaeyen, prof. dr. Eva Ceulemans, prof. dr. Iven van Mechelen
Financed by Ku Leuven-Univeristy of Leuven
October 2014 – October 2018

Summary of thesis

When multiple treatment alternatives are available for a certain problem or disease, one may wish to look for a treatment regime, which is a decision rule that specifies for each patient the preferred treatment given his or her pretreatment characteristics. An important challenge is to find optimal treatment regimes, which are the ones leading to the greatest benefit if the entire population would be subjected to them. An interesting class of treatment regimes is that of the tree-based ones, because they provide a straightforward and most insightful representation of the decision structure underlying the associated regimes.
Recently, several methods for the construction of tree-based regimes have been proposed. Up to now, however, only partial information is available concerning their absolute and relative performance. To address this issue, my first project will be to compare and evaluate four tree-based methods by means of a simulation study. There is some preliminary evidence that skewness and outliers might influence the performance of these methods. I will look into this to get a better understanding of how and why these properties play a role. Subsequently, I will examine to what extent the methods' performance would be improved by robustifying them in one way or another.
A second project relates to the outcome variables on which the treatment regimes are based. Many existing tree-based methods can only handle continuous outcomes. Extending these methods in a way they can handle categorical outcomes as well, is part of my second project. Another part of it will be dealing with multiple outcome variables.

Robbie van Aert

Meta-analysis: Shortcomings and potential

6 July 2018
Tilburg School of Social and Behavioral Sciences, Methodology and Statstistics
Supervisors: Prof. dr. K. Sijtsma, prof. dr. M.A.L.M. van Assen, prof. dr. J.M. Wicherts
Financed by NWO Research Talent grant
1 September 2013 – 1 September 2017

Summary of thesis

More and more scientific research gets published nowadays, asking for statistical methods that enable researchers to get an overview of the literature in a particular research field. For that purpose, meta-analysis methods were developed that can be used for statistically combining the effect sizes from independent primary studies on the same topic. My dissertation focuses on two issues that are crucial when conducting a meta-analysis: publication bias and heterogeneity in primary studies' true effect sizes. Accurate estimation of both the meta-analytic effect size as well as the between-study variance in true effect size is crucial since the results of meta-analyses are often used for policy making. Publication bias distorts the results of a meta-analysis since it refers to situations where publication of a primary study depends on its results.

We developed new meta-analysis methods, *p*-uniform and *p*-uniform*, which estimate effect sizes corrected for publication bias and also test for publication bias. Although the methods perform well in many conditions, these and the other existing methods are shown not to perform well when researchers use questionable research practices. Additionally, when publication bias is absent or limited, traditional methods that do not correct for publication bias outperform *p*-uniform and *p*-uniform*. Surprisingly, we found no strong evidence for the presence of publication bias in our pre-registered study on the presence of publication bias in a large-scale data set consisting of 83 meta-analyses and 499 systematic reviews published in the fields of psychology and medicine.

We also developed two methods for meta-analyzing a statistically significant published original study and a replication of that study, which reflects a situation often encountered by researchers. One method is a frequentist whereas the other method is a Bayesian statistical method. Both methods are shown to perform better than traditional meta-analytic methods that do not take the statistical significance of the original study into account. Analytical studies of both methods also show that sometimes the original

study is better discarded for optimal estimation of the true effect size. Finally, we developed a program for determining the required sample size in a replication analogous to power analysis in null hypothesis testing. Computing the required sample size with the method revealed that large sample sizes (approximately 650 participants) are required to be able to distinguish a zero from a small true effect. Finally, in the last two chapters we derived a new multi-step estimator for the between-study variance in primary studies' true effect sizes, and examined the statistical properties of two methods (*Q*-profile and generalized *Q*-statistic method) to compute the confidence interval of the between-study variance in true effect size. We proved that the multi-step estimator converges to the Paule-Mandel estimator which is nowadays one of the recommended methods to estimate the between-study variance in true effect sizes. Two Monte-Carlo simulation studies showed that the coverage probabilities of *Q*-profile and generalized *Q*-statistic method can be substantially below the nominal coverage rate if the assumptions underlying the random-effects meta-analysis model were violated.

Claudia van Borkulo

Symptom network models in depression research: From methodological exploration to clinical application

17 January 2018
University of Amsterdam, Psychological Methods
Supervisors: Prof. dr. Robert A. Schoevers, prof. dr. Denny Borsboom
Financed by UMCG and University of Amsterdam
1 November 2012 – 1 November 2016

Summary of thesis

According to the network perspective on psychopathology, mental disorders can be viewed as a network of causally interacting symptoms. With the network approach in mind, hypotheses can be formulated about psychopathology and treatment.
The starting point of Claudia van Borkulo's thesis is based on two central questions: "Why do some people develop a depressive episode, while others do not?" and "Why do some patients recover, while others do not?" She investigated these questions from a network perspective. To be able to do that, she first developed the required methodology: *eLasso* (implemented in R-package IsingFit) to infer the network structure from binary data and the *Network Comparison Test* (NCT; implemented in R-package NetworkComparisonTest) to statistically compare networks. In several validation studies, she showed that *eLasso* is a computational efficient method that performs well under various circumstances in psychology and psychiatry research. Also, NCT can detect differences under various circumstances. Subsequently, she applied the methods to empirical data. She showed that the density of patients' symptom network was associated with the course of depression. Also, centrality of the depression symptoms of healthy individuals seems to have a predictive value for developing depression. Although these results pertain to group-level networks – thereby making it unclear what the results mean to an individual – they provide interesting starting points for future research.

Mattis van den Bergh

Latent Class Trees

5 January 2018
Tilburg School of Social and Behavioral Sciences, Methodology and Statstistics
Supervisors: Prof. dr. J.K. Vermunt, dr. V.D. Schmittmann
Financed by NWO Vici
1 May 2014 – 1 September 2017

Summary of thesis

Latent Class Analysis is used to identify unobserved homogeneous groups within a data set. However, it can be quite difficult to determine the number of classes. Often the number of classes is expanded by estimating a new model with more classes until some fit measure does not improve further with the addition of more classes. However, it can be very hard to have a substantive argument for the number of classes, while different fit measures can indicate a different optimal number of classes. Moreover, when a fit measure indicates a number of classes that is much larger than desired by the researcher this number is often reduced to still have interpretable classes. This completely ignores the fit of the model. With Latent Class Tree analysis there are more options for substantive argumentation of the number of latent classes because the number of classes is expanded by splitting classes and therefore the conditional independence assumption is met in a stepwise manner. This results in a hierarchical tree structure of latent classes.

Leonie van Grootel

Where No Reviewer Has Gone Before: Exploring the Potential of Mixed Studies Reviewing

25 May 2018
Utrecht University, Methods & Statistics
Supervisors: Prof. dr. J. Hox, dr. H.R. Boeije, dr. F. van Wesel
Financed by Utrecht University
1 August 2011 – 1 August 2017

Summary of thesis

The evidence-based movement has led to a large number of systematic reviews being produced (Dixon-Woods, et al., 2006; Petticrew & Roberts, 2006). Systematic reviews are used to determine effectiveness by aggregating the outcomes of evaluation studies, mainly randomized clinical trials (RCT's). This approach has proven valuable in providing evidence for the question: 'What works best to reduce problem X?'. Systematic reviews are characterised by explicit methods to the task, such as comprehensive searching, quality assessment of scientific studies and advanced analytical tools i.e. meta-analysis.
In policy-making and professional practice the need was felt to address other issues in addition to effectiveness, for example, how programs are received by target groups, how the program's processes are linked to input and output, and what facilitates and obstructs implementation (Lomas, 2005; Dixon-Woods, et al., 2011). As a rule these questions match a qualitative methodology that is suited to describe and understand people's experiences, considerations and decisions (Barbour, 2000; Harden et al., 2004). At the same time, qualitative research is often small-scaled and used to examine a specific, local context. However, when the available qualitative studies in a specific area are systematically synthesized, much more knowledge can be obtained than a single qualitative study can ever provide. The synthesis then

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covers larger and more diverse samples and more dimensions of the topic of interest (e.g. Van Wesel, Boeije, Alisic & Drost, in press).
By conducting a quantitative and a qualitative review on one topic, more and complementary knowledge can be gained when these reviews are integrated. This PhD-project focuses on the integration of quantitative and qualitative methods on the review level. Three methods that integrate evidence from qualitative and quantitative reviews are evaluated and further developed. The first method is based on the EPPI-approach, in which views of participants on the issue at hand are juxtaposed against effectiveness of an intervention. In the second method, the outcomes of the quantitative review will serve as a starting point of an exploration of the relations with the outcomes of the qualitative review. The third method consists of a Bayesian meta-analysis, in which we will use the outcomes of the qualitative review as starting point for the meta-analysis.
The project focuses on the development of synthesis methods, but the application of the project is on educational science. The topic of both reviews is collaborative learning in primary and secondary education.

Davide Vidotto

Bayesian Latent Class Models for the Multiple Imputation of Cross-Sectional, Multilevel and Longitudinal Categorical Data

2 March 2018
Tilburg School of Social and Behavioral Sciences, MTO
Supervisor: Prof. dr. J.K. Vermunt
Financed by NWO Research Talent Grant
1 September 2013 – 1 September 2017

This dissertation investigates the use of *latent class* (or *mixture*) models for Multiple Imputation (MI). MI is a technique that enables the retrieval of parameter estimates and the performance of statistical inference in the presence of missing data in a dataset. While missing data may represent an issue for standard statistical analysis (e.g., they can introduce bias and loss of power in the final or substantive analysis), MI seeks to fix the problem by replacing the missing data with plausible imputed data, predicted by means of an imputation model. Repeating the replacements (or imputations) several times allows the uncertainty of the imputed values to be taken into account, and leads to valid inferences.
In this context, the choice of the imputation model is crucial: it should not only preserve all the relevant relationships needed for a specific analysis of interest (e.g., the main effects of a regression reflect the relationships between the outcome and the predictors), but it should be able also to reflect overall relationships present in the data, in such a way to allow to carry out further analyses with other (more complex) kinds of associations (e.g., interaction terms represent the simultaneous relationship between two predictors and the outcome). Thus, in MI we are interested in the predictions produced by the imputation model – and how they reflect relationships among variables – rather than in interpreting its parameter values. The broader the imputation model, the better it can capture important relationships in the data. As a consequence, overfitting the data with the imputation model is of smaller concern than underfitting: while an underfitting model might ignore important relationships of the data, an overfitting one takes into account all relevant relationships, as well as sample-specific fluctuations. As a result, in the former case the model could produce too poor imputations, while in the latter case the relevant relationships are preserved by the model.
The thesis deals in particular with the MI of missing categorical data; while methods for continuous data have been extensively explored, in the literature there is a lack of MI models for categorical data. With

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categorical data, the focus is on retrieving relevant associations in the joint distribution of the categorical variables of a dataset. The saturated log-linear model, which takes into account all theoretically possible associations of the data, is a typical choice in this context. However, saturated log-linear models are computationally appealing only with a small number of items. As a solution, recent proposals for the MI of categorical data include the use of either latent class analysis (frequentist framework) or the Dirichlet Process Mixture of Multinomial Distributions (Bayesian framework) as imputation models, which both belong to the family of mixture models. Unlike MI via saturated log-linear models, MI through latent class models can be performed on datasets containing a large number of variables by means of the \textit{local independence} assumption, which assumes independence between variables once their distribution is conditioned on the latent classes.

In order to reflect all the necessary variability for the imputations, the imputation model should be tailored for the design used to collect and analyze the data. For instance, cross-sectional data need a model that takes all relevant associations among items into account; with multilevel data, in which several lower-level units are nested within higher-level units (such as students nested within schools), correlations and dependencies arising from units of the same group must be also accounted for; with longitudinal data, variables are observed over time for the same units, and auto-correlations and lagged relationships are likely to arise. Ignoring these aspects of the data may lead to underfitting and, as a consequence, to biased (and/or too stable) post-imputation inferences. The purpose of this thesis is to propose and investigate different types of latent class models for the MI of categorical data; each of these types of models are tailored for the design chosen for the data collection and analysis. Thus, Chapter 2 of the thesis offered a review of the latent class models present in the literature for the MI of cross-sectional categorical data. Chapter 3 investigated in detail the behavior of Bayesian latent class models for the MI of cross-sectional data. Chapter 4 examined the behavior of Multilevel latent class models for the MI of multilevel data. Lastly, Chapter 5 assessed the performance of the Mixture latent Markov model for the imputation of longitudinal data. Simulation and empirical studies reported in the chapters show good behavior of the imputation models under analysis, in terms of bias and coverage rates of the substantive models. The imputation models presented in the thesis have been developed under a Bayesian framework and estimated by means of the Gibbs sampler. Bayesian analysis is well-suited for MI, since it automatically accounts for the variability caused by both the missing data distribution and the parameter uncertainty. Another purpose of the thesis was to find a way to perform model selection which is suitable for MI. With mixture models, model selection is equivalent to detecting the number of components (or classes) to be used at the imputation stage. To achieve this, we exploited a feature of the Gibbs sampler run in combination with mixture models: with a preliminary run of the sampler (and with a particular setting of the prior distribution of the mixture components), it is possible to obtain a (posterior) distribution of the number of classes actually occupied by the data. As a general approach, we chose the maximum of this distribution in order to perform the imputations, in such a way to use the broadest possible imputation model.

Several extensions of the models proposed in this dissertation are possible. The main one concerns the measurement scale of the variables assumed by the models: while in social and behavioral sciences categorical scales are frequently used in questionnaires, variables measured with mixed types of scales (i.e., continuous and categorical) can be frequently found in different contexts. The mixture models described above can be easily modified to accommodate for both kinds of measurement scales (e.g., by assuming mixtures of Normal and Multinomial distributions), but their performance must be evaluated in future research. Multilevel latent class models can also be adjusted to account for more than two levels in the hierarchy, while mixture latent Markov models can be extended to include second or higher-level orders of lagged relationships.

Haile Michael Worku

Multivariate logistic regression using the ideal point classification model

20 December 2018
Leiden University, Methodology and Statistics
Supervisors: Prof. dr. M. de Rooij, prof. dr. W.J. Heiser, prof. dr. P. Spinhoven
Financed by Leiden University
1 October 2010 – 1 October 2015

Summary of thesis
Multivariate categorical data, with multiple dependent variables and one or more independent variables, are often collected in the social sciences. However, only limited tools are available for the analysis of such data. The methodology that is available makes unverifiable assumptions or requires the independent variables to be categorized, with all negative consequences. In this project new methodology is proposed, based on the ideal point classification model, which requires a minimal set of assumptions and takes the data as it is. Essential tools for the evaluation of effects and for the design of empirical studies will also be proposed.

4.3 New projects

Richard Artner – Methods for estimating and improving the replicability of psychological science

KU Leuven-University of Leuven, Quantitative Psychology and Individual Differences Supervisors: Prof. dr. F. Tuerlinckx, dr. W. Vanpaemel Financed by KU Leuven-University of Leuven
1 October 2017 – 30 September 2023

Summary
The replication crisis is arguably the biggest challenge psychology faces at the moment. The aim of this project is to improve research practices in order to achieve higher confidence in future psychological research. This research will focus on two major methodological problems. The first problem is the huge amount of choices a researcher can make before, during and after analyzing the data, often referred to as "Researcher degrees of freedom", resulting in a wide array of different conclusions. This problem can be addressed by preregistration on the one hand and by multiverse methods on the other. Preregistration is specifically relevant in order to avoid p-hacking with methods like, for instance, Hypothesizing After Results are Known (HARKing). Preregistration becomes more and more advocated and is made possible via platforms such as the Open Science Framework (OCS). However, preregistration needs to be evaluated and improved. The multiverse method, is a means to assess the influence of certain choices in the operationalization of hypotheses on the conclusions (e.g. p-values, effect sizes). The multiverse is applicable on the data level, however, the focus in this project lies on the model level. Results are often sensitive to small changes in the model assumptions. The model multiverse is a set of reasonable models for a certain research question. By looking at the variation of the relationship(s) of interest over the multiverse, the sensitivity of conclusions to arbitrary decisions can be assessed. The second problem is that Null Hypothesis Significance Testing (NHST) is still the dominant approach for hypothesis evaluation in psychology. NHST has a myriad of documented problems. Bayesian approaches may be able to counter some of these issues. This project targets generalizable comparisons of the traditional approach with Bayesian approaches, the Bayes Factor in particular, by analyzing real datasets as well as by running well-designed simulation studies.

Sebastián Castro Alvarez – *ImoRTant: developing item response theory to analyze intensive longitudinal data*

University of Groningen, Psychometrics and Statistics
Supervisors: Prof. dr. R.R. Meijer, dr. L. Bringmann, dr. J. Tendeiro
Financed by University of Groningen
1 September 2018 – 31 August 2121

Summary

The popularity of intensive longitudinal methods such as ecological momentary assessment and daily diary has increased substantially during the last years. Through these methods, researchers aim to capture the dynamical nature of psychological processes (e.g., mood or anxiety). In general, the data collected through intensive longitudinal methods are analyzed with statistical procedures based on multilevel or dynamic structural equation analysis. Yet, information about the validity and reliability of the items and tests used is usually not provided by the current statistical procedures. In order to overcome this drawback, this project aims to develop an item response theory model that will be suitable to analyze intensive longitudinal data. Furthermore, we also plan to extend and apply other common features of the item response theory framework such as person-fit statistics and item bias measures. Alongside, an R package that implements the new methods will be developed to facilitate its use.

Aline Claesen – Methods for estimating and improving the replicability of psychological science

KU Leuven-University of Leuven, Quantitative Psychology and Individual Differences Supervisors: Prof. dr. F. Tuerlinckx, dr. W. Vanpaemel Financed by KU Leuven-University of Leuven
1 October 2017 – 30 September 2023

Summary
The replication crisis is arguably the biggest challenge psychology faces at the moment. The aim of this project is to improve research practices in order to achieve higher confidence in future psychological research. This research will focus on two major methodological problems. The first problem is the huge amount of choices a researcher can make before, during and after analyzing the data, often referred to as "Researcher degrees of freedom", resulting in a wide array of different conclusions. This problem can be addressed by preregistration on the one hand and by multiverse methods on the other. Preregistration is specifically relevant in order to avoid p-hacking with methods like, for instance, Hypothesizing After Results are Known (HARKing). Preregistration becomes more and more advocated and is made possible via platforms such as the Open Science Framework (OCS). However, preregistration needs to be evaluated and improved. The multiverse method, is a means to assess the influence of certain choices in the operationalization of hypotheses on the conclusions (e.g. p-values, effect sizes). The multiverse is applicable on the data level, however, the focus in this project lies on the model level. Results are often sensitive to small changes in the model assumptions. The model multiverse is a set of reasonable models for a certain research question. By looking at the variation of the relationship(s) of interest over the multiverse, the sensitivity of conclusions to arbitrary decisions can be assessed. The second problem is that Null Hypothesis Significance Testing (NHST) is still the dominant approach for hypothesis evaluation in psychology. NHST has a myriad of documented problems. Bayesian approaches may be able to counter some of these issues. This project targets generalizable comparisons of the traditional approach with Bayesian approaches, the Bayes Factor in particular, by analyzing real datasets as well as by running well-designed simulation studies.

Anja Franziska Ernst – *Dynamic clustering: Classifying people through ecological momentary assessment*

University of Groningen

Psychometrics & Statistics
Supervisors: Prof. dr. M.E. Timmerman, prof. dr. C.J. Albers
Financed by NWO
1 September 2017 – 31 August 2021

Summary
Time series analysis gained large popularity in psychological research. Adequate psychological time series models describe and predict individual dynamics, while maintaining the generalisability of dynamics to populations of individuals. The currently available approaches fail to cover both: It either focusses on each single individual separately –losing the population of individuals – or on all individuals jointly –losing the unique individual dynamics. We propose to bridge this methodological gap via dynamic cluster modelling. Its value for psychology will be demonstrated by answering two clinically relevant leading questions. Software will be made available for an easy application of the methodology developed.

Sarahanne Field – *Let's learn to walk before we try to run: Towards characterizing the causes of poor reproducibility*

University of Groningen, Psychometrics & Statistics
Supervisors: Prof. dr. H.A.L. Kiers, prof. dr. E.J. Wagenmakers
Financed by NWO Research Talent Grant
1 September 2017 – 30 August 2021

Summary
As a first step, potential causes of poor reproducibility will be systematically identified (e.g., publication bias, missing data handling procedure, sample size). Also, an indication will be obtained as to how often these play a role in practice. But to answer the question which factors cause low replication success, we first have to answer the questions: How is a "successful replication" defined? and, what definitions and ensuing designs are employed for replication studies? These questions will be dealt with in Pillar 1 of this project.
Once the definitions of replication success (and the associated study designs) have been established, and the factors possibly influencing replication success have been identified, the next question is: How (and how strongly) do different factors affect replication success, according to the various definitions of replication success? The objective of Pillar 2 is to answer these questions through the execution of empirical experiments and simulation studies.
Finally, the aim of Pillar 3 is to translate the results obtained under Pillar 2 into concrete recommendations for setting up original studies with increased potential for replication success, as well as recommendations for setting up replication studies with improved replication success (depending on the actual replication goal).
The main research questions of this project are:
1. What characteristics of studies predict replication success in psychology?

2. How can we improve research methods in order to improve replication success in psychology?

Qianrao Fu – *Executing Replications Studies using informative Hypotheses*

Utrecht University, Methodology and Statistics
Supervisor: Prof. dr. H. Hoijtink
Financed by China Scholarship Council (CSC)
1 September 2017 – 31 August 2021

Summary
Using Bayes factor based evaluation of informative hypotheses in the context of replication studies is a topic that has not been studied or investigated. This PhD project will develop a fully elaborated approach for replication studies using informative hypotheses. The project will consist of four sub-projects: Preregistration (a preregistration module will be developed that will be implemented in the software package JASP (https://jasp-stats.org/)); Translation (To facilitate this translation, an elicitation protocol will be developed.); Computation (generalized Xin Gu's work so that any informative hypothesis can then be evaluated for any statistical model); Implementation (the determination of the sample size of the replication study).

Rosember Guerra Urzola – ***A huge scale optimization approach to joint data modeling in the social and behavioral sciences***

Tilburg School of Social of Behavioral Sciences, Methodology and Statistics
Supervisors: Prof. dr. K. Sijtsma, dr. K. van Deun, dr. J.C. Vera Lizcano
Financed by Data Science Tilburg University
1 September 2018 – 1 September 2022

Summary
Almost any aspect of human behavior has become measurable and many of us leave clear digital footprints when blogging, posting tweets and pictures, connecting with others through the social media, being tracking in time and space, having media records with a full DNA-scan. Consequently, social science research has moved from a data-poor discipline to a data-rich one and survey data of groups. To give an example, in study of obesity as the result of the interplay between genetic constitution and environmental factors, socio demographic, health related and questionnaire data are used (Boyd et al., 2013). The aim of such integration approaches is to generate knowledge about the common driving mechanisms beneath each of the sources. Multivariate methods like principal component analysis and partial least squares became a standard in bioinformatics, the pioneering discipline when it comes to the use of large-scale data. Recently, these have been extended with variable selection (Witten, Tibshirani, & Hastie, 2009), and combinations thereof (Gu & Van Deun, 2016). From a modeling point of view, these methods are attractive, and they work well with data consisting of a limited of variables. Yet, in case of large number of variables, computational short cuts are used to address the issue of computational time (Friedman, Hastie, & Tibshirani, 2010) and there is not one, but many (near) optimal solutions. Hence, biased and non-unique solution are obtained. The aim of this project is to develop a novel statistical and computational tool that tackle to solve the stability issue generate by the existence of multiples solutions. Moreover, to address the problem of biased solutions, an optimization algorithm that dynamically choose the variable to be considered will be proposed. Finally, we will apply the methods to real social and behavioral science problems.

Matthias Haucke – ***Tackling the reproducibility problem: Discovering causer of low replicability and mechanisms to improve the scientific process***

University of Groningen, Psychometrics & Statistics
Supervisors: Prof. dr. H.A.L. Kiers, dr. D. van Ravenzwaaij, dr. R. Hoekstra
Financed by University of Groningen
1 October 2017 – 30 September 2021

Summary
In this project we have three objectives. First, we will study some possible causes of low rate of successful replication studies. Second, we will apply and evaluate a Bayesian statistics based tool for diagnosing studies that are in need of replication. Finally, we aim to conduct replication studies by using advanced techniques and apply those to earlier spotted studies.

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

Utrecht University, Methodology & Statistics
Supervisors: Prof. dr. M.C. Kaptein, dr. ir. J. Mulder
Financed by NWO Research Talent Program
1 July 2018 – 31 June 2022

Summary
Randomized controlled trials (RCTs) are considered the gold standard to investigate effectiveness of new treatments. However, as treatments become more personalized and address smaller subpopulations it becomes increasingly hard to setup powerful trials. We solve this problem by developing novel methods that 1) combine data from different endpoints within a trial, 2) include evidence from similar trials using different endpoints, and 3) include evidence from similar trials conducted on different groups of patients.

We will develop and evaluate a Bayesian framework for information sharing within and between trials to advance the efficiency of RCTs.

Konrad Klotzke – ***Marginal Joint-Modelling of Reponse Accuracy and Response Times***

Twente University, Research Methodology, Measurement and Data Analysis
Supervisor: Prof. ir. J.P. Fox
Financed by University of Twente
1 July 2017 – 1 July 2020

Summary

Current approaches in psychometrics to integrate response accuracy (RA) and response times (RTs) in a single joint-model are limited by assuming a fixed correlation between a test-taker's ability and working speed across the whole test. In a new marginal joint-model, the latent ability and speed parameters are integrated out. An explicitly modelled covariance structure is introduced to explain the correlation between a test-taker's RA, RTs and the cross-correlation between RA and RTs. The cross-correlation between RA and RTs may change over the course of the test, thus allowing to model a variable speed-accuracy trade-off. The joint-model's covariance structure is extended to allow multidimensionality in the relationship between RA, respectively RTs. Groups of test-takers can be nested in clusters and covariates measured at different hierarchical levels of the model can be included. Parameter estimation is compared to existing means for joint-modelling of RA and RTs. Hypotheses about the (cross-) covariance parameters and the mean structure can be evaluated with Bayes factor testing. For Bayesian model selection, performance of the Bayes factors is compared to the Bayesian information criterion (BIC). Educational data is utilized to demonstrate how speededness, change in ability and multidimensionality can be investigated in the marginal modelling framework.

Laura Kolbe – *Non-standard applications of structural equation modeling in child development and education research*

University of Amsterdam, Methods and Statistics
Supervisors: Prof. dr. F.J. Oort, dr. T.D. Jorgensen, dr. S. Jak
Financed by University of Amsterdam
1 September 2017 – 1 September 2020

Summary

Structural equation modeling (SEM) is becoming one of the central and arguably most popular statistical techniques in the social sciences. Many classical and modern techniques, such as regression analysis, analysis of variance, factor analysis, and item response theory can be formulated as structural equation models. Using fit-indices, researchers can evaluate whether the specified SEM model is a good representation of the data. Obviously, researchers do not want to reject a well-fitting model or accept an ill-fitting model. Therefore, it is important to know the statistical behavior of existing fit-indices across different conditions, and to develop new fit-indices in cases where the existing fit-indices do not behave well. SEM is constantly evolving and extended to be used in non-standard situations, such as multigroup data, categorical data, and meta-analytic data. This PhD project concerns the evaluation of model fit in such non-standard situations.

Gaby Lunansky – *A theoretical network model of psychological resilience*

University of Amsterdam, Psychology
Supervisors: Prof. dr. Denny Borsboom, dr. Claudia van Borkulo
Financed by ERC grant Denny Borsboom
1 September 2017 – 1 September 2021

Summary

The goal of this project is to develop a generally applicable theoretical network model of psychological resilience. This theoretical model will be developed combining existing knowledge on resilience from both complexity sciences and the psychological clinical practice. With this theoretical model we will take the first conceptual steps and provide methodological tools for gaining a better understanding of the complex dynamics constituting psychological resilience. This project aims to: (a) generate a new theoretical framework for helping researchers in the clinical field studying the complex dynamics of psychological resilience; (b) expand the existing literature on network models of psychopathology with new insights from complexity sciences; (c) develop novel ways of including these insights from a modeling perspective to the existing network models of psychopathology; and thereby (d) building a conceptual bridge between the clinical and complexity field, providing thinking tools and useful analogies with corresponding modeling approaches for researchers to work together on pressing questions regarding psychological resilience.

Esther Maassen – *Structural equation modeling as an antidote to selective outcome reporting*

Tilburg School of Social and Behavioral Sciences, Methodology and Statistics
Supervisors: Prof. dr. J.M. Wicherts, prof. dr. M.A.L.M. van Assen
Financed by ERC Consolidator Grant
1 September 2017 – 31 August 2021

Summary

A prevalent concern in psychology is the issue of selective reporting of dependent variables or outcome measures. It is expected that many researchers, when confronted with diverging significance results, to be tempted to focus only on those dependent variables that show significance, leading to selective outcome reporting. Selective outcome reporting based on significance obscures effects that are smaller yet potentially relevant for theory or practice, and inflates effect sizes in meta-analyses of combined effects. As an antidote to selective outcome reporting, a Multi-Group Confirmatory Factor Analysis (MGCFA) model with mean structure and measurement invariance constraints can be fitted on means and covariances within conditions, which makes focusing only on those dependent variables that show significance unnecessary. In this project we use MGCFA with mean structure as a method for analyzing multivariate experimental data, develop it for various common experimental designs and mediation analyses, study small sample behavior and power to detect violations of invariance and latent effects, disseminate the method by developing useful software, and illustrate the method by submitting it to real data.

Marlyne Meijerink – *Confirmatory methods for time-sensitive social processes*

Tilburg School of Social and Behavioral Sciences, Methodology and Statistics
Supervisors: Prof. dr. R.T.A.J. Leenders, dr. ir. J. Mulder
Financed by NWO Vidi grant J. Mulder 2017
1 September 2018 – 1 September 2022

Summary

The recently proposed *Relational Event Model* (REM; Butts, 2008) yields a promising new approach for modeling social interaction data by properly incorporating the timing and ordering of events. At this stage, however, the REM is still in a preliminary stage of development, and therefore, our understanding of time-sensitive social processes remains limited. The general objective of this and other related projects is to build upon the REM framework to develop a general Bayesian statistical framework for analyzing social interaction

data and to test and build theories on time-sensitive social interaction processes. Within this general objective, this project is devoted to parameter estimation and hypothesis testing in the Bayesian relational event model (BREM). (1) Shrinkage priors will be developed for the BREM to fit models with many covariates where non-existing effects are shrunk towards zero while true large effects are maintained. (2) Bayes factors will be developed to test order hypotheses about the relative importance of dynamic network effects. (3) A two-step procedure will be developed to assess the network dynamics on outcome variables (e.g., success rate of working projects or student grades in classrooms). First the effects of network dynamics in different teams will be estimated, and second, the outcome variables of interest (e.g., team performance) will be regressed to the estimated effects. (4) The new methods will be applied to the relational event histories with 800,000 interactions between students and teachers in 650 classrooms and the event history of 80,000 information sharing events between employees in organizations to learn about the relative importance of drivers of interaction structures, and to investigate how network drivers influence team performance and student grades.

Malileh Namazkhan – *Statistical Modelling of Energy Saving Measures*

University of Groningen, Psychometrics and Statistics
Supervisors: Prof. dr. E.M. Steg, prof. dr. C.J. Albers
Financed by TKi Urban Energy project ENPREGA
April 2017 – March 2021

Summary
To reduce households' energy consumption, using cost-effective energy saving measures such as insulation, solar panels and heat recovery systems will be beneficial for consumers, the energy industry and the environment.
It requires a precise understanding of the energy consumption patterns of households and a deep insight on house characteristics, household demographics, psychological variables, as well as external factors influencing energy consumption such as the weather, energy prices, inflation, etc.

Soogeun Park – *Big Data in the Social Sciences: Statistical methods for multi-source high-dimensional data*

Tilburg School of Social and Behavioral Sciences, Methodology and Statistics
Supervisors: Prof. dr. J.K. Vermunt, prof. dr. E. Ceulemans, dr. K. van Deun
Financed by NWO Vidi grant K. van Deun 2015
1 September 2017 – 31 August 2021

Summary
Social science research has entered the era of big data: Many detailed measurements are taken and multiple sources of information are used to unravel complex multivariate relations. For example, in studying obesity as the outcome of environmental and genetic influences, researchers increasingly collect survey, dietary, biomarker and genetic data from the same individuals. Such novel integrated research can inform us on health strategies to prevent obesity.
Although linked more-variables-than-samples (called high-dimensional) multi-source data form an extremely rich resource for research, extracting meaningful and integrated

information is challenging and not appropriately addressed by current statistical methods. A first problem is that relevant information is hidden in a bulk of irrelevant variables with a high risk of finding incidental associations. Second, the sources are often very heterogeneous, which may obscure apparent links between the shared mechanisms. Hence, a statistical framework is needed to select the relevant groups of variables within each source and link them throughout data sources.
Principal component methods are particularly powerful for high-dimensional data. In this project, I will contribute to the development of a new framework by extending principal component analysis to common components defined by relevant clusters of variables. We use it both for exploration and outcome modelling of linked high-dimensional social sciences and epigenetic data. The results of this project will be relevant for any researcher confronted with linked high-dimensional data. The advanced component analysis method will be a widely applicable and novel method for knowledge extraction also allowing for more accurate predictions in many social science contexts with big data. In addition, the proposed empirical study will generate important insights on the gene-environment interaction in socially relevant outcomes like obesity.

Bunga Citra Pratiwi – *Predictive Validity of Psychological Tests from a Statistical Learning Perspective*

Leiden University, Methodology and Statistics
Supervisors: Prof. dr. m. de Rooij, dr. E. Dusseldorp
Financed by Leiden University and Parnassia Groep
1 September 2017 – 31 August 2021

Summary

Predictive validity is usually established by finding a relationship between test score *X* in the first measurement and a criterion test score Y on the second measurement (r_{XY}). This measure is obtained within a specific sample and does not give a good indication on how accurate test scores of *X* will forecast the criterion *Y* for new individuals. If the goal of a test is to predict future performance, a different coefficient of predictive validity which focuses on measuring prediction accuracy rather than a measure of association. In this project we propose a new definition of predictive validity using a statistical learning perspective, that is, being the out of sample predictive accuracy of a prediction rule of test items. In establishing predictive validity, there are two aspects that should be considered:

1. the way we construct a prediction rule from a set of items of the test, and
2. the out-of-sample predictive accuracy of this prediction rule.

We will closely study the influence of known concepts such as reliability, on predictive validity given our new definition and their impact on applied situations such as in high stakes testing.

Rianne Schouten – *About the evaluation of missing data methodologies*

Utrecht University, Methodology and Statistics
Supervisors: Prof. dr. Stef van Buuren, dr. Gerko Vink
Financed by: external PhD candidate
1 September 2017 – 31 August 2021

Summary
Many datasets suffer from incompleteness and fortunately, many missing data methods exist. In order to find reliable analysis results, choosing an appropriate missing data method is essential. Fortunately, we know quite a lot about the mathematical consequences of missing data methodologies (Rubin, 1976, 1987; Schafer & Graham, 2002), about what to do in special cases such as surveys with small sample sizes and about how to perform longitudinal data analysis and multilevel analysis with incomplete data.

However, all this research has been focusing on the performance of missing data methods in the context of finding statistical inferences and little is known about the effect of missing data (methods) in other analysis contexts. An example of such a different analysis context is the field of data science. There, the aim of data analysis is generally to predict the value (or category) of an output variable (James, Witten, Hastie, & Tibshirani, 2014). Translation of missing data theory to situations where prediction is the main purpose of data analysis seems to occur only sporadically. And remarkably, the few missing data methods that are discussed in the context of prediction models (Hastie et al., 2009) are particularly those methods that scientific researchers would find inappropriate for statistical inference making (i.e. listwise deletion, mean imputation).

With my research, I intent to form a bridge between two fundamentally different worlds that both encounter missing data. In the domain of statistical inference making, it is common to study the effects of missing data (methods) by means of simulations, but not much is known about the possibility to generalize those findings to the context of prediction. Following Schafer and Graham (2002, p.149) who said that “A missing value treatment cannot be properly evaluated apart from the modeling, estimation, or testing procedure in which it is embedded", I am wondering whether evaluations and their conclusions will change when analysis’ aims change from statistical inference making to prediction?

Andrea Stoevenbelt – *Psychometrics and statistics of stereotype threat*

Tilburg School of Social and Behavioral Sciences, Methodology and Statistics
Supervisors: Prof. dr. J.M. Wicherts, dr. P.C. Flore
Financed by NWO and Tilburg University
1 September 2017 – 31 August 2021

Summary
The gender gap in mathematics test performance is widely debated, and stereotype threat is often used to (partly) explain it. Stereotype threat theory states that women underperform on math tests after having been made aware of the negative stereotype stating that women are bad at mathematics. Numerous studies on the effect have been published, but concerns exist about the robustness of the effect as studies are often underpowered or make use of substandard or unregistered and hence potentially biased analysis techniques. The goals of this project are to shed light on the robustness of the effect, study implications of violations of popular analysis techniques used in stereotype threat research, and to study how performance decrements on math tests related to missingness. First, we will conduct a large-scale registered replication of a seminal stereotype threat study (Johns, Schmader, & Martens, 2005). Next, we will critically assess prevalence and implications of violations of assumptions underlying ANCOVA analyses that are often used in stereotype threat research. Third, we will build on earlier work that highlighted that slower working speed of threatened women might help explain the effect. We use missingness propensity models to study missing data patterns in the large-scale data obtained from the RRR.

Debby ten Hove – *A comprehensive framework for estimating and interpreting interrater reliability for dependent data*

University of Amsterdam, Child Development and Education
Supervisors: Prof. dr. L.A. van der Ark, dr. T.D. Jorgensen
Financed by The Graduate School of Child Development and the Research Institute of Child Development and Education (University of Amsterdam
1 September 2018 – 31 August 2022

Summary
Interrater reliability (IRR), which involves the degree to which ratings are independent of raters, is imperative in social and behavioral research. It bounds the validity of measures, and serves as an indicator for measurement precision and loss of statistical power in subsequent analyses. Multiple conceptualizations and associated coefficients are available to assess the IRR. General guidelines on selecting such a coefficient are based on data characteristics, and the interpretation of the estimated IRR is typically based on arbitrary benchmarks. We argue that choosing and interpreting an IRR coefficient should be guided by the use of a measure in the primary analyses. Moreover, existing IRR coefficients ignore the nested structure of (inter)dependent data, which may result in biased estimates, and be uninformative concerning the IRR at different components of (inter)dependent data. This PhD project aims to assess which IRR coefficients are useful in a research setting, investigate what these measures imply for factors such as measurement precision and statistical power, and develop and test IRR coefficients for (inter)dependent data.

Olmo van den Akker – *Preregistration and the "failed study"*

Tilburg School of Social and Behavioral Sciences, Methodology and Statistics
Supervisors: Prof. dr. J.M. Wicherts, prof. dr. M.A.L.M. van Assen, dr. M. Bakker
Financed by ERC
1 September 2017 – 31 August 2021

Summary
The goal of my project is to improve (psychological) science by attempting to assess, prevent, and correct for biases due to (1) the erroneous interpretation of statistical results and (2) the tendency to value significant results more than nonsignificant results (i.e. publication bias). I will try and reach this goal by:

- Surveying psychological researchers' views on registered reports and developing ways to improve researchers' implementation of registered reports.
- Surveying psychological researchers on their interpretations of papers with multiple (non)significant results and developing ways to improve the accuracy of those interpretations.
- Surveying psychological researchers on their interpretations of non-significant results and developing ways to improve the accuracy of those interpretations.
- Surveying psychological researchers on their interpretations of meta-analytic results and developing ways to improve the accuracy of those interpretations.

Hanneke van der Hoef – *Cluster analysis in educational research: Best practice guidelines for finding groups*

University of Groningen, Psychometrics and Statistics
Supervisors: Prof. dr. M.E. Timmerman, dr. M.J. Warrens
Financed by University of Groningen
1 September 2018 – 31 August 2022

Summary

To find groups (clusters, profiles) in data researchers commonly use cluster analysis, a powerful statistical approach for unraveling patterns in complex data. Applying cluster analysis requires making various decisions, such as selecting a clustering method, choosing the variables, choosing the (dis-)similarity measure, and determining the number of clusters. To make cluster analysis more accessible for researchers, there is a need for guidelines on how specific requirements of the application can be connected with the available methods. Guidelines on cluster methodology and strategy should be developed given a specific application or domain. In this project, the focus is on the application of cluster analysis in educational research, where there is an emerging need to identify academic ability profiles of primary school students. The identification of such profiles may help improve appropriate school selection and facilitate tailored curricula.
The aim of this research project is to develop best practice guidelines for applying cluster analysis in educational research. First, a systematic review will be conducted to provide both a quantitative and qualitative overview of how cluster analysis has been applied to identify academic ability profiles in students. The subprojects hereafter will then focus on the major steps of the clustering procedure: selecting variables, determining the number of clusters, choosing a clustering method, and treating outliers. Project output will be shared with both academia and educational practice via several papers in peer-reviewed journals, conference contributions, R code, a white paper, and a workshop.

Wouter van Loon – *Stacked Domain Learning for multi-domain data: A new ensemble method*

Leiden University, Methodology and Statistics
Supervisors: Prof. dr. M.J. de Rooij, dr. M. Fokkema, dr. E.M.L. Dusseldorp, dr. B.T. Szabo
Financed by Leiden University and Leiden Centre of Data Science
15 May 2017 – 14 May 2021

Summary

In health research, more and more often data are collected from different domains such as questionnaires, structural MRI, functional MRI, EEG, genetics, metabolomics, etc. These different domains of data may be further divided into sub-domains. For example, many different sets of features can be computed from fMRI data alone. Combining data from multiple domains may lead to increased accuracy in the early diagnosis of e.g. Alzheimer's disease. Furthermore, identification of important domains can lead to simpler, more interpretable diagnostic models.
Currently, most multi-domain data is analyzed through concatenation: simply putting the features from all domains into one large matrix, and fitting a single model on the complete data. We propose an alternative called Stacked Domain Learning, which works by training a model on each domain separately and then using a meta-learner to optimally combine the predictions of the domain-specific models.
Stacked Domain Learning is a highly flexible method. We will study different configurations of the method and compare their performance with existing methods using both simulations and real data examples. Additionally, we will investigate how to deal with intrinsic differences (e.g. measurement error) between the

domains, and how to discover cross-domain interactions. The developed methods will be shared in the form of R packages.

Mark Verschoor – *A dynamical network model for energy household use*

University of Groningen, Environmental Psychology
Supervisors: Prof. dr. Linda Steg, prof. dr. Casper Albers
Financed by University of Groningen
1 September 2017 – 31 August 2021

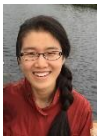
Summary
We will create a dynamical network model that is explains household energy use, taking into account characteristics of and interactions between different household members. For this, we will take into account relevant house characteristics and socio-demographics (e.g., household size, household income, age and gender of household members), and psychological variables (e.g., environmental attitudes, social norms). Extending current research, we will measure psychological variables for all household members and take into account possible differences between household members. We will measure these variables, and household energy use, several times to model dynamics due to changes over time.

Wai Wong – *Statistical challenges in Experience Sampling Research*

KU Leuven-University of Leuven, Center for Contextual Psychiatry
Supervisors: Prof. dr. Inez Myin-Germeys, dr. Wolfgang Viechtbauer, prof. dr. Geert Verbeke
Financed by Center for Contextual Psychiatry
1 September 2017 – 31 August 2021

Summary
Ambulatory assessment techniques such as the Experience Sampling Methodology or Ecological Momentary Assessment are increasingly being used in mental health research and in clinical practice. However, ESM yields a large number of repeated measurements of multiple variables for either single individuals or entire groups. The analysis of such data therefore poses particular challenges and many statistical issues remain to be investigated. The Center for Contextual Psychiatry - together with the research group of Quantitative Psychology and Individual Differences (Faculty of Psychology) - is setting up a series of statistical studies specifically disentangling these issues. We aim to (1) develop methods for the analysis of data arising in the context of ESM studies, (2) provide statistical guidelines for researchers conducting ESM studies, and (3) provide solutions to the common experience sampling methodological issues with thorough statistical analysis. The PhD student will take a leading role in these studies.

Shiya Wu – *Bayesian Adaptive Survey Design*



Utrecht University, Methodology & Statistics
Supervisors: Prof. dr. J.G. Schouten, dr. M. Moerbeek
Financed by Utrecht University
26 October 2017 – October 2020

Summary
The increasing effort and costs required to achieve survey response have led to a stronger focus on survey data collection and the rise of adaptive survey design. Adaptive survey design, by means of monitoring before or during data collection, allow for adaption of survey design features to strata identified based on auxiliary information, in contrast to non-adaptive or uniform designs. In other words, each population stratum will receive a different treatment such that survey designs are tailored to optimize response rates. In the survey context, adaptive survey designs provide a flexible mathematical framework to obtain a tradeoff between survey quality and costs, given a specified quality as the objective and under cost and quality as constraints. The optimal strategies can be found through specialized computer programs. To support this endeavour, the dissertation research will focus on prior elicitation and design optimization in a Bayesian context, which give an opportunity to include data collection from expert knowledge and historic survey data, to reveal uncertainty at some extent, and even to formulate complicated cost and quality indicators.

Shuai Yuan – ***Identifying Group Differences in Large-scale Multi-block Data***

Tilburg School of Social and Behavioral Sciences, Methodology and Statistics
Supervisors: Prof. dr. J.K. Vermunt, dr. K. van Deun, dr. K. de Roover
Financed by NWO Research Talent Grant
1 October 2017 – 30 September 2021

Summary
The main theme of my project is clustering analysis on multi-source data. Psychological studies more and more often yield multi-source data, which consists of novel blocks of data (e.g. genetic data) and traditional blocks of data (e.g. survey data) collected from the same sample. Such data is (or at least has the potential to be) the trash trove for researches, in that they could not only reveal complex social mechanisms where several influences act together, but moreover offers insights into the differences in such mechanisms between unknown subgroups. Such insights will be invaluable in practical researches. For example, it could suggest effective intervention for a certain target group. The development of valid multi-source clustering method is challenging, however, since the appropriate methods should at least achieve three critical goals: (1) correctly detect the subgroups in the samples, (2) successfully identify the group-specific mechanisms and (3) capable of dealing with potential high-dimensional data. Aiming at tackling these important challenges, in the current project, we will develop and disseminate novel statistical tools that 1) find the different sets of linked variables that underlie complex social phenomena where several influences are at play and 2) predict an outcome based on such diverse sets of linked variables.

4.4 Running projects

Hilde Augusteijn
Getting it right with meta-analysis: Assessing heterogeneity and moderator effect in the presence of publication bias and p-hacking
MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University
Supervisors: Prof. M.A.L.M. Van Assen, Prof. K. Sijtsma & Prof. J.M. Wicherts
Financed by NWO
1 September 2015 – 1 September 2019

Frank Bais
Respondent profiles and questionaire profiles in mixed-mode surveys
Methodology and Statistics, Faculty of Social Sciences, Utrecht University
Supervisors: Prof. J.J. Hox, Dr J.G. Schouten & Dr V. Toepoel
Financed by Utrecht University
1 January 2014 – 1 January 2018

Nitin Bhushan
PhD Network dynamics of households' energy consumption after interventions
Psychometrie & Statistiek, Fac. BSS, University of Groningen
Supervisors: Prof. E.M. Steg, Dr C.J. Albers & Prof. R.R. Meijer
Financed by NWO and University of Groningen
1 September 2015 – 1 September 2018

Tessa Blanken
From heterogeneous insomnia to homogeneous subtypes – and beyond: how do different subtypes of insomnia relate to (first-) onset depression?
Netherlands Institute for Neuroscience, Sleep & Cognition / University of Amsterdam
Supervisors Prof. Eus van Someren & Prof. Denny Borsboom
Financed by ERC
1 October 2015 – 1 January 2020

Nadja Bodner
Boolean Networks
Quantitative Psychology & Individual Differences, Faculty of Psychology and Educational Sciences, KU Leuven-University of Leuven
Supervisors: Prof. Eva Ceulemans, Prof. Francis Tuerlinckx & Dr Guy Bosmans
Financed by FWO
1 October 2016 – 1 October 2020

Laura Boeschoten
Consistent Estimates for Categorical Data based on a Mix of Administrative Data Sources and Surveys
MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University
Supervisors: Prof. A.G. De Waal, Prof. J.K. Vermunt & Dr D.L. Oberski
Financed by Tilburg University
1 March 2015 – 1 March 2019

Jolien Cremers
Circular data in longitudinal designs
Methods & Statistics, Faculty of Social Sciences, Utrecht University
Supervisors: Prof. Herbert Hoijtink & Dr Irene Klugkist
Financed by NWO Vidi
September 2014 – 1 September 2018

Daniela Crisan
Practical Implications of the Mist of Item Response Theory Models
Psychometrics and Statistics, Faculty of Behavioural and Social Sciences
University of Groningen
Supervisors: Prof. Rob Meijer & Dr Jorge Tendeiro
Financed by University of Groningen
1 September 2015 – 1 September 2019

Elise Crompvoets
Pairwise comparisons within education
MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University (in collaboration with CITO)
Supervisors: Prof.dr. K. Sijtsma & Dr. A. Béguin
Financed by Tilburg University and CITO
1 September 2016-1 September 2020

Mathijs Deen
Resampling methodology for longitudinal data analysis
Methodology and Statistics Unit, Institute of Psychology, Faculty of Social and Behavioural Sciences, Leiden University
Supervisors: Prof. M.J. de Rooij & Prof. W.J. Heiser
Financed by Leiden University / Parnassia Groep
1 August 2013 - 1 August 2019

Alexandra De Raadt
Properties of Cohen's kappa
Educational Sciences, Faculty of Behavioural and Social Sciences, University of Groningen
Supervisors: Prof. R.J. Bosker & Dr M. Warrens
Financed by University of Groningen
1 October 2015 – 1 October 2019

Niek C. de Schipper
Big data in the Social Sciences: Statistical methods for multi-source high-dimensional data
Netherlands Institute for Neuroscience, Sleep & Cognition / University of Amsterdam
Supervisors Prof.dr. J.K. Vermunt & Dr. K. van Deun
Financed by NWO Vidi Grant K. van Deun 2015
1 September 2016 – 1 September 2020

Jeffrey Durieux
Clusterwise Independent Component Analysis for multi-subject (resting-state) fMRI data
Methodology and Statistics Unit, Institute of Psychology, Faculty of Social and Behavioral Sciences, Leiden University
Supervisors: Dr Tom F. Wilderjans & Prof. Serge A.R.B. Rombouts
Financed by NWO
1 September 2016 – 1 September 2021

Anne Elevelt
Smart(phone) surveys
Methodology & Statistics, Faculty of Social and Behavioral Sciences, Utrecht University
Supervisors: Prof.dr. P.G.M. van der Heijden, Dr. P.J. Lugtig, Dr. V. Toepoel
Financed by Utrecht University
1 September 2016 – 31 August 2020

Giulio Flore
Predictive Unfolding Models for Single-Peaked Items with Binary and Graded Response Data
Methodology and Statistics, Social and Behavioural Sciences, Leiden University
Supervisors Prof. W.J. Heiser & Prof. M.J. de Rooij
Financed by Leiden University
14 February 2015 – 14 February 2019

Zhengguo Gu
Monitoring Individual Change in Mental Health Care and Education
MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University
Supervisors: Prof. K. Sijtsma & Dr W. Emons
Financed by Tilburg University
1 September 2015 – 1 September 2019

Sofia Gvaladze
Capturing time-varying multivariate dynamics through principal component analysis based methods
Methodology of Educational Research, Faculty of Psychology and Educational Sciences, KU Leuven-University of Leuven
Supervisors: Prof. Eva Ceulemans, Prof. Francis Tuerlinckx & Dr Peter Kuppens
Financed by
2016 – 2020

Chris Hartgerink
Detecting potential data fabrication in the social sciences
MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University
Supervisors: Prof. J.K. Vermunt, Prof. J.M. Wicherts, Dr M.A.L.M. Van Assen
Financed by Tilburg University
1 September 2014 – 1 September 2018

Jonas Haslbeck
Modeling Dynamics in Psychopathology
Psychological Methods, Faculty of Social and Behavioural Sciences
Supervisors: Prof.dr. D. Borsboom & Dr. L.J. Waldorp
Financed by ERC
1 December 2015-30 November 2019

Thomas Husken
Event history analysis for population size estimation of elusive populations
Methodology and Statistics, Faculty of Social Sciences, Utrecht University
Supervisors: Dr M.J.L.F. Cruyff & Prof. P.G.M van der Heijden
Financed by Utrecht University
1 September 2015 – 1 September 2019

Adela Isvoranu
Psychosis: Towards a Dynamical Systems Approach
Psychological Research Methods, Faculty of Social and Behavioural Sciences, University of Amsterdam
Supervisors: Prof. Denny Borsboom & Prof. Jim van Os
Financed by NWO
1 September 2016– 1 September 2020

Maarten Kampert
Distance based analysis on (gen)omics data
Mathematical & Applied Statistics Group, collaboration with Netherlands Metabolomics Center (Leiden Univ.), Dept. of Biological Psychology (VU Univ. Amsterdam), Biometris (Wageningen University & Research Center; WUR)
Supervisor: Prof. J.J. Meulman
Financed by IBM / SPSS Leiden
1 December 2012 - 1 December 2018

Fayette Klaassen
Hypotheses formulation, evaluation, updating and replication for experimental univariate within person data
Methodology and Statistics, Faculty of Social Sciences, Utrecht University
Supervisors: Prof. Herbert Hoijtink & Prof. Irene Klugkist
Financed by NWO Talent Grant and Utrecht University
1 September 2015 – 1 September 2019

Letty Koopman
Scaling methods for multilevel test data
Department of Child Development and Education, Faculty of Social and Behavioural Sciences, University of Amsterdam
Supervisors: Prof.dr. L.A. van der Ark & Dr. B.J.H. Zijlstra
Financed by NWO Research Talent Grant
1 November 2016-31 October 2020

Jolanda Kossakowski
The PsychoGraph: Developing a Seismograph for Psychology
Psychological Research Methods, Faculty of Social and Behavioural Sciences, University of Amsterdam
Supervisors: Prof. Han L.J. Van der Maas & Dr Lourens J. Waldorp
Financed by UvA & Yield
1 October 2015 – 1 October 2019

Joost Kruis - *Developing Process Measurement Models with Broad Applicability*
Psychological Methods, Faculty of Social and Behavioural Sciences, University of Amsterdam
Supervisors Prof. Han Van der Maas, Prof. Gunter Maris & Dr Dylan Molenaar
Financed by NWO Graduate Programme 2013 (IOPS)
1 September 2015– 1 September 2020

Jules Kruijswijk
On Hierarchical Structures in the Multi-Armed Bandit Problem
MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University
Supervisors: Prof.dr. J.K. Vermunt & Dr. M. Kaptein
Financed by MTO
1 September 2016-31 August 2020

Kimberley Lek - *How to hedge our bets in educational testing: combining test results with teacher expertise*
Methodology and Statistics, Faculty of Social Sciences, Utrecht University
Supervisors: Dr Rens Van de Schoot & Prof. Herbert Hoijtink
Financed by NWO Talent Grant
1 September 2015 – 1 September 2019

Xinru Li
Meta-CART: An integration of classifcation and regression trees into meta-analysis
Mathematical Institute, Leiden University
Supervisors: Prof. Jacqueline J. Meulman & Dr Elise Dusseldorp
Financed by Leiden University
1 November 2014 – 1 November 2018

Paul Lodder
Latent variable prediction models in clinical and medical psychology
Methodology & Statistics / Medical & Clinical Psychology, Tilburg School of Social and Behavioral Sciences, Tilburg University
Supervisors: Prof.dr. J. Denollet, Prof. J.M. Wicherts, Dr. W. Emons
Financed by Tilburg University
1 April 2016-1 April 2020

Tim Loosens
Statistical modelling of emotion dynamics
Quantitative Psychology and Individual Differences, Faculty of Psychology and Educational Sciences, KU Leuven-University of Leuven
Supervisors: Prof. Francis Tuerlinckx & Dr Stijn Verdonck
Financed by
2016 - 2020

Kees Mulder
Bayesian analysis of circular data in between-subjects designs
Methods & Statistics, Faculty of Social Sciences, Utrecht University
Supervisors: Prof. Herbert Hoijtink & Dr Irene Klugkist
Financed by NWO-Vidi
1 September 2014 – 1 September 2018

Annemiek Punter

Psychometric modeling of cultural bias in International Large-Scale Assessments

Research Methodology, Measurement and Data Analysis, Faculty of Behavioural Sciences, University of Twente
Supervisors Prof. C.A.W. Glas, Prof. T.J.H.M. Eggen & Dr M.R.M. Meelissen
Financed by IEA (Int. Association for Evaluation of Educational Achievement)
1 January 2015 – 1 January 2018

Oisin Ryan

Not straightforward: Mediation and networks in continuous time

Methodology and Statistics, Faculty of Social Sciences, Utrecht University
Supervisors: Dr E.L. Hamaker & Prof. P.G.M. Van der Heijden
Financed by NWO Research Talent
1 September 2015 – 1 September 2019

Alexander Savi

Experimentation in online education: Increasing return on investment through A/B testing

Psychological Methods, Social and Behavioural Sciences, University of Amsterdam
Supervisors: Prof. Gunter J.K. Maris & Prof. Han L.J. van der Maas
Financed by NWO
1 February 2014 – 1 February 2018

Sanne Smid

The use of expert data in Bayesian Latent Growth Curve Models with a distal outcome

Methodology and Statistics, Faculty of Social Sciences, Utrecht University
Supervisors: Prof.H. Hoijtink & Dr R. van de Schoot
Financed by NWO
1 January 2016 – 1 January 2020

Pia Tio

SPANC: Simultaneous Principal and Network Components model for integration of multi-source data

MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University
Supervisors: Prof. J.K. Vermunt, Prof. D. Borsboom, Dr K. van Deun & Dr L. Waldorp
Financed by NWO-Aspasia (Van Deun)/ERC-Consolidator (Borsboom)
1 Februari 2016 – 1 February 2020

Monika Vaheoja

Application of IRT equating on high-stakes testing in Applied Universities of Teacher Education. Errors and error-analysis in the consistency and stability of pass/fail decision in tests with different sample sizes

Research Methodology, Measurement and Data Analysis, University of Twente
Supervisors: Prof.dr. T.J.H.M. Eggen & Dr. N.D. Verhelst
Financed by Vereniging Hogescholen, project 10voordeleraar
1 November 2016-1 October 2020

Riet Van Bork - ***Empirical methods to distinguish network from latent variable constructs***

Psychological Methods, Social and Behavioural Sciences, University of Amsterdam
Supervisors: Dr Mijke Rhemtulla & Prof. Denny Borsboom
Financed by UvA and European Research Council
1 November 2014 – 1 November 2018

Johnny Van Doorn

Bayesian inference for ordinal data in psychology

Psychological Methods, Social and Behavioural Sciences, University of Amsterdam
Supervisors: Prof. E.J. Wagemakers & Dr M. Marsman
Financed by NWO Graduate Programme
1 September 2015 – 1 March 2020

Sara Van Erp

Advancing structural equation modeling with unbiased Bayesian methods

Methodology and Statistics, Tilburg School of Social and Behavioral Sciences, Tilburg University
Supervisors: Prof. J.K. Vermunt, Dr J. Mulder & Dr D.L. Oberski
Financed by NWO Research Talent Grant
1 September 2015 – 1 September 2019

Erik-Jan van Kesteren

New Dimensions in Social Science: Extending Structural Equation Models to Accomodate Novel Data Sources

Methodology & Statistics, Faculty of Social Science, Utrecht University
Supervisors: Prof.dr. I. Klugkist & Dr. D.L. Oberski
Financed by NWO Talent Grant
1 September 2017-1 September 2022

Daan Van Renswoude

Gaze-Patterns Tell the Tale: A Model-Based Approach to Free-Scene Viewing in Infancy

Developmental Psychology, Social and Behavioural Sciences, University of Amsterdam
Supervisors: Prof. M. Raijmakers, Dr I. Visser
Financed by YIELD
1 September 2015 – 1 September 2019

Duco Veen

Elicitation of expert information: Modelling latent growth models with prior expert information and evaluating predictions

Methodology and Statistics, Faculty of Social Sciences, Utrecht University
Supervisors Prof. Dr. Herbert Hoijtink and Dr. Rens van de Schoot
Financed by NWO – VIDI grant Van de Schoot
1 August 2016 – 1 August 2020

Leonie V.D.E. Vogelsmeier

Understanding between – and within – person differences in experience sampling measurements using mixture factor analysis

Methodology & Statistics, Tilburg School of Social and Behavioral Sciences, Tilburg University
Supervisors: Prof.dr. J.K. Vermunt & Dr. K. de Roover
Financed by NWO Research Talent Grant
1 July 2017 – 30 June 2021

Lieke Voncken

Norming Methods for Psychological Tests

Psychometrics and Statistics, Faculty of Behavioural and Social Sciences, University of Groningen
Supervisors: Prof. Marieke E. Timmerman & Dr Casper J. Albers
Financed by University of Groningen
1 September 2015 – 1 September 2019

Lisa Wijsen

The History of Psychometrics: Tools, Trends and Turning points

Psychological Methods, Social and Behavioural Sciences, University of Amsterdam
Supervisors: Prof. Denny Borsboom & Prof. Willem Heiser
Financed by NWO Graduate Programme
1 September 2015 – 1 March 2020

Sanne Willems

New Approaches in Survival Analysis

Mathematical Institute, Statistical Science for the Life and Behavioral Sciences, Leiden University
Supervisors Prof. Dr. J.J. Meulman & Dr. M. Fiocco
Financed by
1 September 2014 – 1 September 2018

Iris Yocarini

Psychometric evaluation of combining tests in a higher education context

Institute of Psychology, Faculty of Social Sciences, Erasmus University Rotterdam
Supervisors: Prof. L. Arends, Dr S. Bouwmeester & Dr G. Smeets
Financed by Erasmus University Rotterdam
1 April 2015 – 1 April 2019

Beibei Yuan

The δ-machine: A new competitive and interpretable classifier based on dissimilarities

Methodology and Statistics, Institute of Psychology, Faculty of Social and Behavioural Sciences, Leiden University
Supervisors: Prof. M.J de Rooij & Prof. W.J. Heiser
Financed by NWO Graduate Programme 2013 (IOPS)
1 October 2015 – 1 October 2019

Jacqueline N. Zadelaar

Why speeding on your scooter is a good idea: Decision strategies in childhood and adolescence

Developmental Psychology, Faculty of Social and Behavioural Sciences, University of Amsterdam
Supervisors: Prof.dr. H.M. Huizenga, Dr. L.J. Waldorp, Dr. W.D. Weeda
Financed by NWO VICI
1 October 2016-30 September 2020

Eva Zijlmans

Solutions for some psychometric problems of the reliability of psychological measurements

MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University
Supervisors: Prof. Dr. K. Sijtsma, Dr. J. Tijmstra & Dr. L.A. van der Ark
Financed by Tilburg University
1 September 2014 – 1 September 2018

Mariëlle Zondervan-Zwijnenburg

Formalization and evaluation of prior knowledge based on prior/posterior predictive inference

Methods & Statistics, Faculty of Social Sciences, Utrecht University
Supervisors: Prof. H. Hoijtink, Dr A. G. J. Van de Schoot
Financed by NWO Gravitation
1 July 2014 – 1 March 2019

5 Staff

As described in paragraph 2.2, the IOPS staff members belong to the participating (regular staff) and cooperating (associated staff) institutes. There are two categories of staff members: junior and senior staff members. Both require acknowledgment in their field according to, among others, international publications. Junior staff members have obtained their PhD less than five years ago, and do not necessarily have (co-)responsibility of dissertation research. Senior staff members do have (co-)responsibility of dissertation research.

5.1 Professorships

- Prof. Wolf **Vanpaemel** (senior) – KU Leuven-University of Leuven

5.2 Staff changes

Junior staff members admitted to IOPS in 2018

- Dr Paulette **Flore** – Tilburg University
- Dr Erwin **Nagelkerke** – Tilburg University
- Dr Susan **Niessen** – University of Groningen
- Dr Michèle **Nuijten** – Tilburg University
- Dr Robbie **Van Aert** – Tilburg University
- Dr Mattis **Van den Bergh** – Tilburg University

Junior staff members leaving IOPS in 2018

- Dr Verena **Schmittmann** – Tilburg University
- Dr Gabriela **Koppenol-Gonzalez** – Erasmus University Rotterdam
- Dr Zsuzsa **Bakk** – Leiden University
- Dr Maryam Safarkhani – Utrecht University
- Dr Floryt Van Wesel – Utrecht University

Senior staff members leaving IOPS in 2018

Staff movements within IOPS in 2018

- Dr Angelique **Cramer** – from junior to senior

Emeritus status

IOPS proudly keeps in touch with its emeritus members.
No staff members entered the emeritus status in 2018.

	1 Januari 2018	31 December 2018
Junior staff members	41	44
Senior staff members	71	72
Honorary emeritus members	20	19

5.3 Staff members

Leiden University

Institute of Psychology, Methodology and Statistics Unit

- Prof. Mark **De Rooij** (senior): rooijm@fsw.leidenuniv.nl
- Dr Elise **Dusseldorp** (senior): elise.dusseldorp@fsw.leidenuniv.nl
- Dr Marjolein **Fokkema** (junior): m.fokkema@fsw.leidenuniv.nl
- Prof. Henk **Kelderman** (senior): h.kelderman@fsw.leidenuniv.nl
- Dr Joost **Van Ginkel** (junior): jginkel@fsw.leidenuniv.nl
- Dr Mathilde **Verdam** (junior): m.g.e.verdam@fse.leidenuniv.nl
- Dr Wouter **Weeda** (junior): w.d.weeda@fsw.leidenuniv.nl
- Dr. Tom **Wilderjans** (senior): t.f.wilderjans@fsw.leidenuniv.nl

Institute of Education and Child Studies

- Dr Marian **Hickendorff** (junior): hickendorff@fsw.leidenuniv.nl

Mathematical Institute

- Prof. Jacqueline **Meulman** (senior): jmeulman@math.leidenuniv.nl

University of Amsterdam

Department of Psychology - Methodology

- Prof. Denny **Borsboom** (senior): d.borsboom@uva.nl
- Dr Raoul **Grasman** (senior): r.p.p.p.grasman@uva.nl
- Dr Maarten **Marsman** (junior) - m.marsman@uva.nl
- Dr Dylan **Molenaar** (junior): d.molenaar@uva.nl
- Prof. Han **Van der Maas** (senior): h.l.j.vandermaas@uva.nl
- Prof. Eric-Jan **Wagenmakers** (senior): e.m.wagenmakers@uva.nl
- Dr Lourens **Waldorp** (senior): l.j.waldorp@uva.nl
- Dr Robert **Zwitser** (junior): r.j.zwitser@uva.nl

Department of Psychology - Developmental Psychology

- Prof. Hilde **Huizenga** (senior): h.m.huizenga@uva.nl
- Dr Brenda **Jansen** (senior): b.r.j.jansen@uva.nl
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6 Scientific awards and grants

6.1 Awards and grants honored to IOPS staff members

6.1.1 Scientific awards

6.1.2 NWO Grants

NWO Veni, Vidi, Vici grants
These are part of the NWO Innovational Research Incentives Scheme [*Vernieuwingsimpuls*]

De Roover, K. (2017), Tilburg University	Lack of measurement invariance in multilevel data: A cluster-based solution for making valid attribute comparisons	Veni	2017-2020	€250.000
Huizenga, H. (2013), University of Amsterdam	Why speeding on your scooter is a good idea: decision strategies in childhood and adolescence	Vici	1 Sept 2013 – 31 Aug 2019	€1.500.000
Klugkist, I. (2013), Utrecht University	A Different Angle: New Tools for Circular Data	Vidi	November 2013 – November 2018	€800.000
Kuiper, R.M. (2016), Utrecht University	Studying time-lagged effects using ESM-data: Statistics lag behind, it is time to go continuously	Veni	December 2016 December 2020	€250.000
Molenaar, D. (2015), University of Amsterdam	Within-subjects Approaches to the Analysis of Responses and Response Times to Psychometric Tests	Veni	1 Oct. 2015 – 1 Oct. 2019	€250.000
Mulder, J. (2013), Tilburg University	Testing competing theories	Veni	2013 - 2018	€250.000
Mulder, J. (2017), Tilburg University	Statistical Modeling of Dynamic Social Networks Using Relational Event Histories	Vidi	2018-2022	€800.000
Ravenzwaaij, D. van, University of Groningen	Back to Bayesics: Solving the Reproducibility Crisis in Biomedicine	Vidi	Nov 2018 – Nov 2023	€800.000
Van Deun, K. (2016), Tilburg University	Big Data in the Social SciencesL Statistical methods for multi-source high-dimensional data	Vidi	2016-2021	€800.000
Wagenmakers, E.J. (2017), University of Amsterdam	Monitoring evidential flow	Vici	September 2017 – September 2022	€1.500.000

NWO Aspasia grants

With the Aspasia grants, NWO stimulates the promotion of female researchers in higher ranking.

Hickendorff, M. (2016), Leiden University	Developing a classroom observation instrument (Sep 2016 – April 2018)	€13.500
Van Deun, K. (2016), Tilburg University	Big Data in the Social Sciences: Statistical methods for multi-source high-dimensional data	€200.000

NWO Open Competition grants

The Open Competition is subsidy program for the advancement of innovative and high-quality scientific research in the social and behavioral sciences.

NWO Research Talent grants

NWO Research Talent is a responsive mode funding scheme, which offers talented and ambitious young researchers a platform to pursue a scientific career and carry out high-quality PhD research.

Assen, M. van (2015), Tilburg University	Getting it right with meta-analysis: Assessing heterogeneity and moderator effects in the presence of publication bias and p-hacking	PhD student Hilde Augusteijn	1 Sept. 2015 – 1 Sept. 2020	€210.000
Borsboom, D. & J. Van Os (2016), UvA Amsterdam	Psychosis: Towards a Dynamical Systems Approach	PhD student Adela **Isvoranu**	1 Sept. 2016 - 1 Sept. 2020	
Hamaker, E. & Van der Heijden, P. (2015), Utrecht Un.	Not straightforward: Mediation and networks in continuous time	PhD student Oísin **Ryan**	1 Sept. 2015 - 1 Sept. 2019	€219.170
Hoijtink, H. (2015), Utrecht Un.	How to hedge our bets in educational testing: combining test results with teacher expertise	PhD student Kimberly **Lek**	1 Sept. 2015 - 1 Sept. 2019	€219.170
Kaptein, M.C., J. **Mulder** (2018), Tilburg University	Making the most of clinical trials: Increasing efficiency using novel Bayesian methods for information sharing within and between trials	PhD student Xynthia **Kavelaars**	2018 – 2022	€
Kucharsky, Simon	Inferring Cognitive Strategies from Eye-movement Sequences: A Bayesian Model-based Approach		1 Dec. 2018 – 30 Nov. 2022	€228,413
Snijders, T.A.B., Wittek, R. & **Van Duijn, M**.	The co-evolution of well-being and the kinship	PhD student De Bel, V.	1 Sep 2015 - 1 Sep 2019	€219.170

(2015), Un. of Groningen	network after parental divorce.			
Stefan, Angelika	Bayes Factor Design Analysis for the Efficient Collection of Informative Data		1 Nov. 2018 – 30 Oct. 2022	€232,563
Van der Ark, L.A. & B.J.H. Zijlstra (2016) UvA Amsterdam	Scaling methods for multilevel test data	PhD student Letty **Koopman**	1 Nov. 2016 – 1 Nov. 2020	€168.735
Timmerman, M.E. & **Albers**, C.J., University of Groningen	Onderzoekstalent 2017 *Dynamic clustering: Classifying people through ecological momentary assessment*		2017	€224.201
Vermunt, J.K. **Mulder, J**. (2015), Tilburg University	Advancing structural equation modeling with unbiased Bayesian methods	PhD student Sara **van Erp**	1 Sept. 2015 – 1 Sept. 2019	€210.000
Vermunt, J.K., K. **de Roover** (2017), Tilburg University	Understanding between- and within-person differences in experience sampling measurements using mixture factor analysis	PhD student Leonie **Vogelsmeier**	2017 – 2021	€224.000
Vermunt, J.K., K. **van Deun** (2017), Tilburg University	Identifying Group Differences in Large-Scale Multi-block Data	PhD student Shuai **Yuan**	2017 – 2021	€224.201
Wagenmakers, E.J. (2017), University of Amsterdam	Blinded Analysis as a Cure for the Crisis of Confidence	PhD student Alexandra **Sarafoglou**	2017-2021	€224.201
Wilderjans, T.F. & Rombouts, S.A.R.B. (2016) Leiden University	Clusterwise Independent Component Analysis for multi-subject (resting state) fMRI data	PhD student Jeffrey **Durieux**	1 Sept. 2016 – 1 Sept. 2021	€219.474
Other NWO grants				
Hoijtink, H.	Individual development: Why some children thrive and others don't	PI in NOW Gravity Grant	2012-2022	€540.000
Marsman, M. (2017), University of Amsterdam	The psychometrics of learning	NWO Innovational Research Incentives Scheme Veni	2017 -	€250.000
Timmerman, M.E., De Bildt, A., De Wolff, M. Theunissen, M.	Programmalijn 3a: hulpmiddelen *De validiteit van de SDQ voor signalering van psychosociale problemen onder*		2016	€217.943

	12-17 jarigen in de JGZ			
Van Schaik, J.E. & **Raijmakers, M.E.J**. (2016).	The Element of Surprise: Variability as the trigger of science conceptualization and transfer in kindergartners	NRO-Postdocs in Education Research	2016-2019	€147.240
Veenstra, R., Dijkstra, J.K., Vollebergh, W., Harakeh, Z., **Van Duijn, M.,** & Steglich,C. (2013)	Social networks processes and social development of children and adolescents	NWO-PROO	2013 -	€717.326

Wicherts, J.M., P. **Flore** (2017), Tilburg University	Registered Replication Report Stereotype threat	Replicate Grant	2018 – 2019	

6.1.3 International grants

International grants				
Altinisik, Y., **Kuiper**, R.M. & **Hoijtink**, H. (2014), Utrecht Un.	Research replication through the evaluation of prior knowledge in the form of informative hypotheses and sparse big data models	Turkish Government	2014-2018	€50.000
Borsboom, D. (2015) UvA	ERC Consolidator grant for the project "Psychosystems: Consolidating Network Approached to Psychopathology"	European Research Council (ERC)	2016-2020	€2.000.000
Meijer,R.R., **Niessen, A.S.M.** & **Tendeiro, J.N.**	A Bayesian approach to admission testing	Law School Admission Council	1-1-2018-31-12-2-018	$ 64.000
Niessen, A.S.M. & **Meijer, R.R.**	Perceived Fairness and Consequential Validity of Admission Testing: The Influence of SES and Gender	Cambridge Assessment Funded Research Programme	01-08-2017-01-06-2018	£ 14.252
De Waal, T. (2018), CBS	EU-grant: imputation under known totals	European Commission	2018-2019	€50.000
De Waal, T. (2018), CBS	Third Specific Grant Agreement of the "ESSnet on quality of multisource statistics": "Quality Guidelines for Multisource Statistics"	European Commission	2018-2019	€36.400
Lugtig, P.J., **Toepoel**, V.	Funding for developing the infrastructure of the Gender and Generations Programme	GGP (ERC-grant)	1-1-2017-1-1-2019	€80.000
Mulder, J. (2017), Tilburg University	The Time is Now: Understandig Social Network Dynamics Using Relational Event Histories	ERC starting grant	2018 – 2023	€1.500.000
Schouten, B. (2018), CBS-UU	Eurostat multi-beneficiary grant for project @HBS, App-assisted data collection of household expenditure	European Commission	2018-2019	
Wagenmakers, E.J. (2017), University of Amsterdam	A unified framework for the assessment and application of cognitive modeling	European Research Council (ERC)	December 2017 – December 2022	€2.500.000

Wicherts, J.M. (2016), Tilburg University	IMPROVE: Innovative Methods for Psychology: Reproducible, Open, Valid, and Efficient	European Research Council (ERC)	2017 – 2022	€2.000.000

Grants awarded to KU Leuven-University of Leuven

Ceulemans, E., **Bosmans**, G.. & **Tuerlinckx**, F. (2015)	De studie van dyadische interactiepatronen: Een Booleaanse netwerkbenadering	Fund Scientific Research (FWO), Flanders, Belgium	1 Jan 2016 – 31 Dec 2019	€219.367
Tuerlinckx, F., **Ceulemans**, E., **Kuppens**, P., **Van Mechelen**, I., & **Vanpaemel**, W. (2013)	Formal models of the affective system: Dynamics, exogenous inputs and relation to subjective well-being.	GOA grant. Special Research Fund, KU Leuven-University of Leuven	1 Jan 2015 – 31 Dec 2019	€1.250.000
Tuerlinckx, F. (co-promotor) (2015)	TquanT	UK National Agency for Erasmus+	1 Sept 2015-31 Aug 2018	€27.765
Verdonck, S., **Tuerlinkx**, F. (2016)	Postdoc grant	Fund Scientific Research (FWO), Flanders, Belgium	1 Oct 2016-30 Sep 2019	3 years of postdoc salary
Verduyn, P., **Van Mechelen**, I. (2012)	Postdoc grant	Fund Scientific Research (FWO), Flanders, Belgium	1 Oct 2012-31 Oct 2018	6 years of postdoc salary

Other Grants

Albers, C.J.	TKi Urban Energy (Topsector Energie) *ENPREGA: Energieprestatiegarantie*	Rijksdienst voor Ondernemend Nederland	2016	€193.000
Bringmann, L.F., Kreienkamp, J., Epstude, K. & De Jonge, P. (2018)	Cultural Adaptation in Real Life: A Dynamic Approach to Psychological Needs in Intercultural Contact	PhD Fund, Behavioral & Social Sciences, University of Groningen	2018	€133.000
Bringmann, L.F., Castro Alvaraz, S., Tendeiro, J.N. & Meijer, R.R. (2018)	ImpoRTant: Developing item response theory to analyze intensive longitudinal data	PhD Fund, Behavioral & Social Sciences, University of Groningen	2018	€133.000
Bringmann, L.F. (2018)	organizing the expert meeting Psychological Networks & Time Series Models: Improving the Analyses of Complex Clinical Data	Faculty Support Grant, Department of Psychology, University of Groningen	2018	€8140
De Rooij, M.	Stacked Domain Learning for multi-domain data: a new ensemble method	Leiden Data Science Research Program (PhD student Wouter van Loon)	2017-2021	€100.000
Jansen, B.R.J., Salemink, E., & Wiers, R. (2014), UvA Amsterdam	The missing factor in math anxiety: The role and modification of cognitive biases and executive functioning	Interne AIO-competitie Ontwikkelingspsychologie	2014-2018	€200.000

Meijer, J., Imandt, M., Snoek, M., Van Blankenstein, F.M. & **Van der Ark**, L.A. (2015)	Voorspellende waarde, effecten en onderliggende mechanismen van selectieprocedures in de lerarenopleidingen	Research fund granted by Nationaal Regieorgaan Onderwijsonderzoek (NRO)	1 Feb 2016 31 Jan 2020	€598.200
Meijer, R.R., den Hartigh, J.R., Frencken, W., van Yperen, N.	De voetbalselectie: herkenning en selectie van potentie	Koninklijk Nederlandse Voetbal Bond	01-09-2017-31-08-2021	€80.000
Niessen, A.S.M. & **Meijer, R.R**.	Evaluatie selectieprocedure RIO-opleiding	Raad voor de Rechtspraak	01-01-2018-01-11-2018	€39.000
Raijmakers, M.E.J., Denessen, E. & Huizinga, M. (2018)	De opbrengst van onderzoekend leren (OL) voor kinderen met een speciale onderwijsbehoefte	NRO – Praktijkgerichte thematische overzichtsartikelen	2018	€47.000
Sachisthal, M., Peetsma, T., Van der Maas, L.J. & Raijmakers, M.E.J.	ASAP Science – Motivation in Science Video Watching: The Role of Individual Differences and Video Characteristics.	PhD grant awarded by the Yield Research Priority Area, University of Amsterdam	2016-2020	€200.000
Sijtsma, K., **Vera Lizcano**, J.C., **Van Deun**, K.	A huge scale optimization approach to joint data	Data science grant (Tilburg University) PhD	2018-2022	

	modeling in the social and behavioral sciences	student Rosember **Guerra**		
Vera **Toepoel** (2016), Utrecht Un)	Knowledge Clips in Statistics	Project for designing video's to educate in statistics together with Peter Lugtig, Rens van der Schoot, Marieke Westeneng en Leonie van Tichem		
Van Renswoude, D., **Raijmakers**, M. & **Visser**, I.	Gaze-Patterns Tell the Tale: A Model-Based Approach to Free-Scene Viewing in Infancy	PhD Project granted by the research priority area Yield and the Psychology Research Institute from the University of Amsterdam	2016-2020	€200.000
Van der Heijden, P. & **Cruyff,** M. (Utrecht Un.)	Event history analysis for population size estimation of elusive populations	Grant for International PhD project, funded by the faculty of Social and Behavioural Sciences	1 Sept. 2015 1 Sept. 2019	€200.000
Van der Heijden, P. & **Cruyff,** M. (Utrecht Un.)	Nota omvangschattingen Huiselijk Geweld en Kindermishandeling met vangst-hervangst methoden	WODC-CBS	Jul 2017-1 feb 2018	€53.860
Van der Heijden, P. (Utrecht Un.)	Applied Data Science	PhD-traject A. Bagheri	15 dec 2017-16 dec 2021	€100.000 van ITS Universiteit Utrecht en €50.000 van UMCU en €50.000 van M&S Utrecht
Van der Heijden, P. (Utrecht Un.)	Opstartfinanciering focusgebied Applied Data Science	Betaald door de faculteit Sociale Wetenschappen (Utrecht Un.)	1 aug 2017-1 apr 2018	€100.000
Van der Heijden, P. (Utrecht Un.)	PhD-traject “Respondent Profiles and Questionnaire Profiles is Surveys”	PhD-traject Frank Bais	1 jan 2014-1 jan 2018	€100.000 van CBS en €100.000 van M&S Utrecht
Visser, I., Colonnesi, C., Rodeburg, R., Van Oostrom, K. & Möller, E.	Infant Early Self-regulation, Attention and Joint-Attention Difficulties as Predictors of Later Self-Regulation Problems	PhD project granted by the research priority area Yield from the University of Amsterdam	2018-2022	215 KE
Wijngaards, L. (Utrecht Un.)	Matchingsproject		1 jan 2013-1 mrt 2018	€350.000

6.2 Awards and grants honored to IOPS PhD students

6.2.1 Scientific awards

In 2018, the following IOPS PhD students were honored with a scientific award:

- Lianne **Ippel**: Best PhD thesis, International General Online Research Conference, 2018
- Jedelyn **Cabrieto**: IOPS Best Paper Award, 2018
- Olmo **Van den Akker**: IOPS Posteraward, summer 2018
- Johnny **Van Doorn**: IOPS Presentationaward, summer 2018
- Esther **Maassen**: IOPS Posteraward, winter 2018
- Sara **Van Erp**: IOPS Presentationaward, winter 2018
- Sacha **Epskamp** (Recipient): IMPS dissertation prize, 2018

6.2.2 Grants

- Joost **Kruis** (Recipient): Travel grant International Meeting of the Psychometric Society (IMPS), 2018

7 Research output

7.1 Scientific publication

7.1.1 Dissertations by IOPS PhD students

Altinisik, Y. (2018). *Evaluation of Inequality Constrained Hypotheses Using an Akaike-Type Information Criterion* Utrecht University.

Boevé, A.J. (2018). Implementing assessment innovations in higher education. [Groningen]: Rijksuniversiteit Groningen. Dekkers, L. M. S. On axioms of choice: A mathematical modelling approach to study variability in decision making.

Dittrich, D. (2018). *The grass is not always greener in the neighbor's yard: Bayesian and frequentist inference methods for network autocorrelated data*. s.l.: Proefschriftmaken.

Flore, P. (2018). *Stereotype threat and differential item functioning: A critical assessment*. Enschede: Gildeprint Drukkerijen.

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7.1.7 Conference contribution (proceeding)

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Béguin, A.A (2018). Invloed van de clustering van leerlingen op de meetfout van IRT modellen. Paper presented at the 45th annual conference of VOR (ORD), Nijmegen, the Netherlands.

Béguin, A.A. (2018). Can auxiliary information improve decisions in formal assessments. Paper presented at the 44th conference of the International Association for Educational Assessment (IAEA), Oxford, UK.

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Crompvoets, E. & Béguin, A.A. (2018). Adaptive pairwise comparison for educational measurement. Paper presented at the 19th annual AEA-Europe conference, Arnhem, the Netherlands.

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7.2 Professional publication

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7.2.1 Article in journal

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7.2.2 Report

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Egberink, I.J.L. (2018, Jun). COTAN Addendum mbt Normering Referentieniveaus: versie 14-06-2018.

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7.3 Popular publications

Albers, C. | NUcheckt: Onwaarschijnlijke voorspelling FvD over Nederlandse bevolking16/09/2018NU.nl (National), Netherlands, Webhttps://www.nu.nl/nucheckt/5462960/nucheckt-onwaarschijnlijke-voorspelling-fvd-nederlandse-bevolking.html.

Albers, C. | University Library Open Access Newsletter28/03/2018University Library Open Access Newsletter, Netherlands, Webhttps://www.rug.nl/library/open-access/oa-nieuwsbrief/2018-04-interview-casper-albers-open-peer-review-peerj.

Albers, C. | Wie wint er straks het goud: de beste schaatser of wie het meest geluk heeft?14/02/2018De Correspondent (National), Netherlands, Webhttps://decorrespondent.nl/7949/wie-wint-er-straks-het-goud-de-beste-schaatser-of-wie-het-meest-geluk-heeft/3219794277480-d7db7b5a.

Albers, C. & Namazkhan, M. | Samen kennis en innovaties ontwikkelen: big data01/03/2018Netherlands, Otherhttps://www.rug.nl/society-business/industry-relations/rug_ir_big_data-def-18030101-folder.pdf.

Albers, C. | 'Sociale druk twintigers steeg met 33 procent.' Klopt dit wel?14/05/2018De Volkskrant (National), Netherlands, Printhttps://www.volkskrant.nl/wetenschap/-sociale-druk-twintigers-steeg-met-33-procent-klopt-dit-wel-~b890d2e4/.

Albers, C. | Bagger uit de goudmijn23/06/2018De Volkskrant (National), Netherlands, Printhttps://www.volkskrant.nl/nieuws-achtergrond/medisch-massaonderzoek-bevat-potentieel-goud-maar-in-de-praktijk-gaat-het-mis~be813582/.

Albers, C. | De belangrijkste les van de videoscheidsrechter: wacht even met juichen28/06/2018De Volkskrant (National), Netherlands, Printhttps://www.volkskrant.nl/sport/de-belangrijkste-les-van-de-videoscheidsrechter-wacht-even-met-juichen~bd5ca105/.

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Albers, C. | Word je ongelukkig als je meer dan 4.500 euro netto per maand verdient?16/11/2018De Volkskrant (National), Netherlands, Printhttps://www.volkskrant.nl/wetenschap/word-je-ongelukkig-als-je-meer-dan-4-500-euro-netto-per-maand-verdient-br-~b56e57c2/.

Albers, C. & Beldhuis, H. | Hoe Hoog Moet De Lat Liggen?01/11/2018HO Management (National), Netherlands, Printhttp://www.schoolmanagementtotaal.nl/archief-ho-management/doc/tijdschriftartikelen/2018/nr-05-november/hoe-hoog-moet-de-lat-liggen.html.

Halman, L. C. J. M., & Gelissen, J. P. T. M. (2018). Wat is er aan de hand in religieland? *Religie & Samenleving*, 13(1), 28-49.

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Niessen, S. & Meijer, R. | Loten is onbetrouwbaar testen, geef het toeval een kans maar psychologen moeten niet zo bescheiden zijn 14/05/2018 https://www.scienceguide.nl/2018/05/loten-is-onbetrouwbaar-testen/.

7.4 Other results

Eltanamly, H., Leijten, P. H. O., Jak, S., & Overbeek, G. J. (2018). *Coming of age in a context of adversity: Parenting in times of war: Meta-analytical Structural Equation Modeling and Qualitative-Synthesis of how war-exposure affects parenting and youth adjustment*. Paper presented at 16th conference of the European Association for Research on Adolescence (EARA) 2018, Ghent, Belgium.

Huber-Mollema, Y., Lindhout, D., Oort, F. J., & Rodenburg, H. R. (2018). Behavioral effects after in utero exposure to Antiepileptic Drugs and associations with family factors: Preliminary results of the Dutch observational study EURAP & Development (NL). *Epilepsia*, *59*(S3), S30-S31. https://doi.org/10.1111/epi.14612.

Koopman, V. E. C., Zijlstra, B. J. H., & van der Ark, L. A. (2018). *Checking assumptions in two-level Mokken scale analysis*. Paper presented at VIII European Congress of Methodology, Jena, Germany.

Kwok, O-M., Cheung, M. W-L., Ryu, E., Jak, S., & Wu, J-Y. (Eds.) (2018). Recent advancements in Structural Equation Modeling (SEM): From both methodological and application perspectives. *Frontiers in Quantitative Psychology and Measurement*.

Schouten, J. G. (2018). *Multi-mode en multi-device surveys: Oratie bij leerstoel Methoden en Statistiek, in het bijzonder Mixed-Mode Survey Designs* . Utrecht: Universiteit Utrecht.

Toepoel, V. (2018). *Practical Aspects of Web and Nonprobability Panels*. Paper presented at american association for the advancement of science, austin, United States.

Van Dijk, J., Cruyff, M. J. L. F., & van der Heijden, P. G. M. *Monitoring Target 16.2 of the United Nations Sustainable Development Goals: multiple systems estimation of the numbers of presumed victims in persons: Serbia.*

Van Dijk, J., Cruyff, M. J. L. F., & van der Heijden, P. G. M. *Monitoring Target 16.2 of the United Nations Sustainable Development Goals: multiple systems estimation of the numbers of presumed victims of trafficking in persons: Ireland.*

Van Dijk, J., Cruyff, M. J. L. F., & van der Heijden, P. G. M. *Monitoring Target 16.2 of the United Nations Sustainable Development Goals: multiple systems estimation of the numbers of presumed victims of trafficking in persons: Romania.*

Van Dijk, J., Cruyff, M. J. L. F., van der Heijden, P. G. M., & Kragten-Heerdink, S. L. J. *Monitoring Target 16.2 of the United Nations Sustainable Development Goals: A multiple systems estimation of the numbers of presumed human trafficking victims in the Netherlands in 2010-2015 by year, age, gender, form of exploitation and nationality.*

Verhoeven, M., Volman, M. L. L., & Zijlstra, B. J. H. (2018). *Adolescents' learner identity enactment and development amidst contextual (dis)continuity*. Paper presented at ECER 2018, Bolzano, Italy.

Verhoeven, M., Volman, M. L. L., & Zijlstra, B. J. H. (2018). *Leeridentiteitsontwikkeling en contextuele continuïteit en discontinuïteit bij jongeren*. Paper presented at Onderwijs Research Dagen (ORD) 2018, Nijmegen, Netherlands.

7.4.1 Editorial activities

Albers C. : Computers & Education (Journal) Casper Albers (Editor) 1-Nov-2015 → 31-Oct-2019.

Borsboom, Denny (Member of editorial board) (2018). Clinical Psychological Science (Journal).
Borsboom, Denny (Member of editorial board) (2018). Educational Measurement : Issues and Practice (Journal).
Borsboom, Denny (Member of editorial board) (2018). European Journal of Personality (Journal).
Borsboom, Denny (Member of editorial board) (2018). Frontiers of Quantitative Psychology (Journal).
Borsboom, Denny (Member of editorial board) (2018). Journal of Abnormal Psychology (Journal).
Borsboom, Denny (Member of editorial board) (2018). Measurement Science Review (Journal).
Borsboom, Denny (Member of editorial board) (2018). Psychological Medicine (Journal).
Epskamp, Sacha (Consulting editor) (2018). European Journal of Personality (Journal).
Epskamp, Sacha (Member of editorial board) (2018). European Journal of Psychological Assessment (Journal).
Kiers, H.: Psychometrika (Journal) Henk Kiers (Editor) 1994 → …
Meijer, R.: Journal of Personality Assessment (Journal) Rob Meijer (Editor)2017 → 2018.
Timmerman M.: Psychometrika (Journal) Marieke Timmerman (Editor) 2007 → 2020.
Van Everdingen, Y. (Ed.), & Toepoel, V. (2018). *MOA Topic of the Year: Digital Advertising*. Amsterdam: MOA.
Van Ravenzwaaij, D: Behavior Research Methods (Journal)Don Ravenzwaaij, van (Editor)Mar-2018 → …
Visser, Ingmar (Associate editor) (2018). British Journal of Mathematical and Statistical (Journal).
Wagenmakers, Eric-Jan (Member of editorial board) (2018). Advances in Methods and Practices in Psychological Science (Journal).
Wagenmakers, Eric-Jan (Member of editorial board) (2018). Computational Brain & Behavior (Journal).

7.4.2 Software and test manuals

Egberink, I.J.L. (2018, Jun). COTAN Addendum mbt Computer Adaptief Toetsen: versie 14-06-2018.
Egberink, I.J.L. (2018, Jun). COTAN Addendum mbt Normering Referentieniveaus: versie 14-06-2018.
Emden, R. V., & Kaptein, M. (2018). *contextual: Evaluating contextual multi-armed bandit problems in R*. (arXiv). arXiv.org.
Hoijtink, H. J. A. (Author), Gu, X. (Author), & Mulder, J. (Author). (2018). Bain0.1.2. Software.
Kaptein, M., & Ketelaar, P. (2018). *Maximum likelihood estimation of a finite mixture of logistic regression models in a continuous data stream*. (arXiv). arXiv.org.
Verstappen, V. (Author), Mussman, O. (Author), Schouten, J. G. (Author), & Mc Cool, D. M. (Author). (2018). CBS Travel App. Software.
Veen, D. (Author). (2018). Correlational Statistics.Software.
Veen, D. (Author). (2018). Effects-Coding simulation tool. Software.
Veen, D. (Author). (2018). Sampling Correlations. Software.
Zondervan - Zwijnenburg, M. A. J. (Author). (2018). ANOVAreplication: Test ANOVA Replications by Means of the Prior Predictive p-Value. Software, DOI: 10.17605/OSF.IO/6H8X3.

7.4.3 (Paper) presentation

Albers, C., Ernst, A., Jeronimus, B.F., & Timmerman, M. (2018). Disentangling Individual Dynamics: An Adaptive Dynamic Clustering Model for Longitudinal Data. Paper presented at European Conference on Data Analysis, Paderborn, Germany.

Bhushan, N. (2018). Using graphical models to explore relationships between variables underlying community energy initiatives. Abstract from International Congress of Applied Psychology, Montreal, Canada.

De Waal, T., van Delden, A., & Scholtus, S. (2018). *Quality measures and indicators for multisource statistics*. Paper presented at Q2018.

Ernst, A.F., Albers, C.J., & Timmerman, M.E. (2018). Disentangling individual dynamics - Probabilistic clustering of longitudinal data. International Meeting of the Psychometric Society, New York, United States.

Ernst, A.F., Albers, C.J., & Timmerman, M.E. (2018). Disentangling Individual Dynamics: An Adaptive Dynamic Clustering Model for Longitudinal Data. Poster session presented at 33rd IOPS Summer Conference.

Niessen, A., Meijer, R.R., & Tendeiro, J. (2018). Differential prediction by gender in performance-sampling tests for college admissions. Abstract from Annual Meeting of the National Council on Measurement in Education, New York, United States.

Sense, F., van der Velde, M., & van Rijn, H. (2018). Deploying a Model-based Adaptive Fact-Learning System in University Courses. Poster session presented at 16th International Conference on Cognitive Modeling.

Vugteveen, J., de Bildt, A., Hartman, C.A., & Timmerman, M. (2018). Does the multi-informant Strengths and Difficulties Questionnaire (SDQ) predict adolescent psychiatric diagnoses?. Poster session presented at Heymans Symposium 2018.

Vugteveen, J., de Bildt, A., Hartman, C.A., & Timmerman, M. (2018). Kan de Strengths and Difficulties Questionnaire (SDQ) psychiatrische diagnoses van aangemelde adolescenten voorspellen? Poster session presented at Jeugd in Onderzoek 2018, Amsterdam, Netherlands.

7.4.4 In press

Tendeiro, J.N. & Kiers, H.A.L. (in press) A Review of Issues About Null Hypothesis Bayesian Testing, *Psychological Methods, xx*, xxx-xxx.

Vichi, M., Vicari, D., & Kiers, H.A.L. (in press) Clustering and Dimensional Reduction for mixed variables. Behaviormetrika.

7.4.5 Miscellaneous

Albers, C.: IAP-StUDyS (External organisation) Casper Albers (Member) 1-Jan-2013 → …

Albers, C.: International Association for Statistical Computing (External organisation) Casper Albers (Member) 1-Sep-2015 → 31-Aug-2019.

Albers, C.: Netherlands Statistical Society (External organisation) Casper Albers (Member) 1-Jan-2014 → …

Albers, C.: Wetenschappelijk Onderzoek- en Documentatiecentrum (WODC) (External organisation) Casper Albers (Member) 1-Jul-2017 → 1-Mar-2018.

Balachandran Nair, L. (Author). (2018). “Interdisciplinary, like everyone else.” But are you being interdisciplinary for the wrong reasons?. Web publication/site, Retrieved from http://blogs.lse.ac.uk/impactofsocialsciences/2018/11/08/interdisciplinary-like-everyone-else-but-are-you-

being-interdisciplinary-for-the-wrong-reasons/?fbclid=IwAR0f2mCJOMThL1nVw9IM2ggdmb9N7pBFACJuqJe_eb5ZegkXOqij5svlZL0.

Brenda Jansen (Organiser) (15 May 2018 - 16 May 2018). VNOP Conference 2018, Wageningen , Netherlands.

Brenda Jansen (Organiser) (2018). Schoolpsychologencongres 2018, Amsterdam, Netherlands.

Brenda Jansen (Organiser) (31 May 2018 - 2 Jun 2018). 48th Annual meeting of the Jean Piaget Society, Amsterdam, Netherlands.

Egberink, I.: European Federation of Psychologists' Associations (External organisation) Iris Egberink (Member) Feb-2018 → …

Kiers, H.: International Statistical Institute (External organisation) Henk Kiers (Member) 2009 → …

Timmerman, M.: Board of Trustees of the Psychometric Society (External organisation) Marieke Timmerman (Member) 2016 → 2019

Timmerman, M.: COTAN (External organisation) Marieke Timmerman (Member) 2016 → …

Timmerman, M.: De Kinderacademie (External organisation) Marieke Timmerman (Member) 2015 → …

Timmerman, M.: ERCIM Working Group (External organisation) Marieke Timmerman (Chair) 2013 → …

Timmerman, M.: Faculty of Behavioural and Social Sciences (Organisational unit) Marieke Timmerman (Member) 2018

Timmerman, M.: Faculty of Medical Sciences (Organisational unit) Marieke Timmerman (Member) 2018

Timmerman, M.: International Statistical Institute (External organisation) Marieke Timmerman (Member) 2016 → …

Timmerman, M.: NWO VENI (External organisation) Marieke Timmerman (Member) 2018

Timmerman, M.: NWO VENI (External organisation) Marieke Timmerman (Member) 2018 → …

Timmerman, M.: Research Foundation Flanders (FWO) (External organisation) Marieke Timmerman (Member) 2018 → …

Timmerman, M.: Sociology (Organisational unit) Marieke Timmerman (Member) 2018

Timmerman, M.: Statistical advisor Marieke Timmerman (Consultant) 2017 → …

Timmerman, M.: University of Amsterdam (External organisation) Marieke Timmerman (Member) 2018.

Timmerman, M.: University of Utrecht, Utrecht (External organisation) Marieke Timmerman (Member) 2018.

Tollenaar, N., van der Laan, A. M., & van der Heijden, P. G. M. (2018). Correction to: effectiveness of a prolonged incarceration and rehabilitation measure for high-frequency offenders. *Journal of Experimental Criminology*, 14(1), 121-125. DOI: 10.1007/s11292-017-9315-1.

ts' Associations. (External organisation) Iris Egberink (Chair)Apr-2014 → Feb-2018.

Van Ravenzwaaij, D.: Psychonomics Society (External organisation) Don Ravenzwaaij, van (Member) 2015 → …

Van Ravenzwaaij, D.: Society for Mathematical Psychology (External organisation) Don Ravenzwaaij, van (Member) 2008 → …

8 Finances

8.1 Financial statement 2018

Receipts
The participating institutes of Leiden University, University of Amsterdam, VU University of Amsterdam, University of Groningen, University of Twente, Tilburg University, Utrecht University, KU Leuven-University of Leuven, Statistics Netherlands (CBS), and Cito Arnhem contributed financially according to the number of their PhD students that participated in IOPS on 1 July 2017. The participation fee for 2017 was € 700 per PhD student. Associated institutes with PhD students in the IOPS Graduate School, participated on the same terms.
Apart from the above mentioned annual contributions, no other funds are available for the IOPS Interuniversitary Graduate School.

This resulted in a credit balance for the year 2018 of € 4.898,05

8.2 Summary of receipts and expenditures in 2018

Receipts		**Expenditures**		
		Salaries IOPS office		
		Secretary, 0,4 fte	23.012,91	
Contribution participating institutions	42.200,00	Salary director 0,1fte	17.540,37	
		Other personel costs	1.647,44	
		Subtotal		42.200,72
		Printed matter	0,81	
		Website	68,06	
		Travel	295,47	
		Representation costs	2.532,99	
		IOPS 2017 Tilburg	2.000,00	
Subtotal Receipts	42.200,00	Subtotal		4.897,33
Negative financial outcome 2018	4.898,05			
Total receipts	47.098,05	**Total expenditures**		47.098,05

8.3 Balance sheet 2018

IOPS Own Funds 2018			
Debet	**Euro**	**Credit**	**Euro**

Own Funds 31-12-2017	58.483.92	Own Funds 01-01-2018 Results 2016	63.381,97 -4.898.05
Total Debet	58.483,92	Total Credit	58.483,92

Appendix 1: Contact details of IOPS institutes

Participating Institutes

Leiden University Faculty of Social and Behavioural Sciences	
Methodology and Statistics Unit Institute of Psychology	P.O. Box 9555, 2300 RB Leiden Secretary: Jacqueline Hartman 071 527 3761 secr.psy.ms@fsw.leidenuniv.nl
Education and Child Studies Institute of Education	P.O. Box 9555, 2300 RB Leiden Secretary: Esther Peelen 071 527 3434 peelene@fsw.leidenuniv.nl
Statistical Science for the Life and Behavioral Sciences Mathematical Institute	P.O. Box 9512, 2300 RA Leiden Secretary: Martine Goderie-Vliegenthart m.l.goderie@math.leidenuniv.nl +31 71 527 7047
University of Amsterdam Faculty of Social and Behavioural Sciences	
Psychological Methods Department of Psychology	Nieuwe Achtergracht 129-B, Postbus 15906, 1001 NK Amsterdam Secretary: Louise Stutterheim 020 525 6870 mlsecretariaat-fmg@uva.nl
Developmental Psychology Department of Psychology	Postbus 15916, 1001 NK Amsterdam Secretary: Ellen Buijn 020 525 6830 e.buijn@uva.nl
Work and Organizational Psychology Department of Psychology	Nieuwe Achtergracht 129 B, Amsterdam Postbus 15919, 1001 NK Amsterdam Secretary: Joke Vermeulen 020 525 6860 j.h.vermeulen@uva.nl
Methods and Statistics Department of Development and Education	Nieuwe Achtergracht 127, Amsterdam Postbus 15906, 1001 NK Amsterdam Secretary: Mariëlle de Reuver 020 525 6050 j.m.dereuver@uva.nl
University of Groningen Faculty of Behavioural and Social Sciences	

Psychometrics and Statistics Department of Psychology	Grote Kruisstraat 2/1, 9712 TS Groningen Secretary: Hanny Baan 050 363 63 66 j.m.baan@rug.nl
Theoretical Sociology Department of Sociology	Grote Kruisstraat 2/1, 9712 TS Groningen Secretary: Saskia Simon 050 363 6469 s.simon@rug.nl
University of Twente Faculty Behavioural, Management and Social Science (BMS)	
Department of Research Methodology, Measurement and Data Analysis (OMD)	P.O. Box 217, 7500 AE Enschede Secretary: Birgit Olthof-Regeling, T. 053 489 3555 Birgit.Olthof@utwente.nl
Tilburg University Tilburg School of Social and Behavioral Sciences	
Methodology and Statistics	P.O. Box 90153, 5000 LE Tilburg Secretary: Anne-Marie Heijden 013 466 2544 a.m.j.heijden@uvt.nl
Utrecht University Faculty of Social and Behavioural Sciences	
Methodology and Statistics	P.O. Box 80.140, 3508 TC Utrecht Secretary: Chantal Molnar-van Velde 030 253 4438 c.molnar@uu.nl
KU Leuven-University of Leuven, Belgium Faculty of Psychology and Educational Sciences	
Research Group of Quantitative Psychology and Individual Differences	Tiensestraat 102 box 3713, B-3000 Leuven, Belgium Secretary:
Statistics Netherlands (CBS), Den Haag	
	P.O. Box 24500, 2490 AH Den Haag Secretary: 070 337 3800
Psychometric Research Center (Cito), Arnhem	
	P.O. Box 1034, 6801 MG Arnhem Secretary: Ghita Bakker Ghita.Bakker@cito.nl

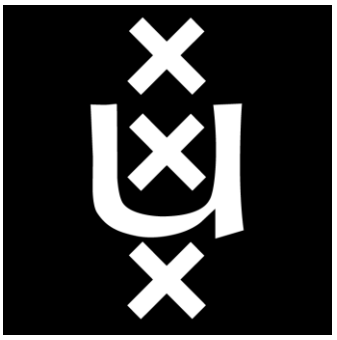
Cooperating institutes

University of Groningen Faculty of Behavioural and Social Sciences	
Department of Education	Grote Rozenstraat 38, 9712 TJ Groningen Secretary: M.J. Kroeze-Veen 050 363 6540 M.J. Kroeze-Veen@rug.nl
VU University Amsterdam Faculty of Psychology and Education	
Department of Clinical Psychology	Van der Boechorststraat 1, 1081 BT Amsteram Secretary: Sherida Slijmgaard 020 598 8951, s.r.slijmgaard@vu.nl
Department of Biological Psychology	Van der Boechorststraat 1, 1081 BT Amsteram Secretary: Stephanie van de Wouw 020-598 8792 s.b.vande.wouw@vu.nl
Maastricht University Faculty of Health, Medicine and Life Sciences & Faculty of Psychology & Neuroscience	
Department of Methodology and Statistics	P.O. Box 616, 6200 MD Maastricht Secretary: Edith van Eijsen 043 388 2395 e.vaneijsden@maastrichtuniversity.nl
Erasmus University Rotterdam	
Department of Econometrics	P.O. Box 1738, 3000 DR Rotterdam Secretary: Research Office 010 408 1370 / 1377 researchoffice@ese.eur.nl
Department of Psychology, Education & Child Studies	P.O. Box 1738, 3000 DR Rotterdam Secretariat D-PECS 010 408 8789 / 8799 sec-dpecs@fsw.eur.nl
Wageningen University	
Biometrics	P.O. Box 8130, 6700 EW, Wageningen Secretary: Dinie Verbeek and Hanneke Ommeren 0317 48 5702 biometris@wur.nl

Appendix 2: IOPS Conference Summer 2018

[ΨΣ] interuniversity graduate school of
iops Psychometrics and Sociometrics

33rd IOPS Summer Conference
14-15 June 2018
University of Amsterdam



33rd IOPS summer conference, 14-15 June 2018

Conference host: University of Amsterdam
Conference location: Roeterseilandcomplex
Conference dinner: De Brug, Roeterseilandcomplex
Conference hotel: Suggestions at the end of this document (p.22)

All talks will be at the Roeterseilandcomplex, Building REC M, room 1.03 (Plantage Muidergracht 12)

Programme

Thursday 14 June 2017

10.30 - 12.00	IOPS Board meeting (REC G - Senaatszaal 1.22)	
11.30 - 12.00	Pre meeting IOPS PhD students (REC M 1.03)	
12.00 - 13.00	Registration / Welcome lunch (hallway REC M 1.03)	
13.00 - 13.05	Official opening by Rob Meijer, IOPS director (REC M 1.03)	
13.05 - 13.10	Welcome by Denny Borsboom, University of Amsterdam	
13.10 - 13.35	**Lisa Wijsen,** University of Amsterdam *What's on the mind of the psychometrician?*	**4**
13.35 - 14.00	**Iris Yocarini,** Erasmus University Rotterdam *Testing in higher education*	**5**
14.00 - 14.25	**Mariëlle Zwijnenburg,** University of Utrecht *Testing replication with the prior predictive p-value*	**6**
14.25 – 14.55	Break (hallway REC M 1.03)	
14.55 - 15.20	**Chris Hartgerink,** Tilburg University *"As-you-go" instead of "after-the-fact": Better practices by design*	**7**
15.20 - 16.40	Keynote Speaker: **Maarten Marsman,** University of Amsterdam *The Idiographic Ising Network Model*	**8**
16.40 - 16.50	IOPS Best Paper Award 2017	
16:50 - 17:00	IOPS Plenary Meeting (REC M room 1.03)	
17:00 – 18:30	Poster presentations & drinks (hallway REC M 1.03)	
	Olmo van den Akker, Tilburg University *What heuristics do researchers use when assessing the outcomes of multiple studies?*	**14**
	Anja Ernst, University of Groningen *Disentangling individual dynamics — probabilistic clustering of longitudinal data*	**15**
	Laura Kolbe, University of Amsterdam	**16**

	An illustration of generalizations of the polychoric correlation coefficient with empirical data	
	Letty Koopman, University of Amsterdam *Checking assumptions in two-level Mokken scale analysis*	**17**
	Duco Veen, University of Utrecht *Sample Size Determination for Bayesian Estimation Using Informative Priors*	**18**
	Wai Wong, University of Leuven *Reliability of within-person associations in ESM data*	**19**
19.00 - late	Conference dinner at De Brug & drinks afterwards	

Friday 15 June 2018

09.00 - 09.30	Welcome/ Coffee (Hallway REC M room 1.03)	
09.30 – 9.55	**Johnny van Doorn,** University of Amsterdam *Bayesian rank-based inference through data augmentation*	**9**
09.55 - 10.20	**Laura Boeschoten,** Tilburg University *Combining latent class analysis and multiple imputation to correct for misclassification in combined datasets*	**10**
10:20- 10:45	**Oisin Ryan,** University of Utrecht *Centrality and Interventions in Continuous-Time Dynamical Networks*	**11**
10.45 - 11.15	Break	
11.15 - 11.40	**Xinru Li,** Leiden University *Meta-CART: a flexible tool for multiple moderator meta-analysis*	**12**
11.40 - 12.05	**Jonas Dalege,** University of Amsterdam	**13**
12:05 - 12:15	IOPS Best Presentation and Poster Award/Closing	
12:15	Lunch (take-away)	

End of conference program

Lisa Wijsen, University of Amsterdam

What's on the mind of the psychometrician?
Interviews with Psychometric Society Presidents

When we think of psychometrics, we might think of important research traditions, such as IRT or factor analysis, or of its effects on society, such as the rise of mental testing. But who are the people behind these developments? And how do they reflect on their own research area? To collect the ideas of psychometricians about their own research area, I interviewed 20 presidents of the Psychometric Society, and asked them questions on their career, the relations between psychometrics and other disciplines, and the history and future of psychometrics. One of the interesting findings is that the interviewees differ greatly on what they consider is the role of psychometrics in relation to psychology. Some consider psychometrics as a science of consultation; others are convinced psychometrics itself should be strongly influenced by psychology and vice versa. Whereas the interviewees stress the importance of psychometrics' achievements, they also emphasize their frustration with the lack of proper psychometrics in psychological science and testing agencies. Furthermore, the interviewees vary highly on their ideas of the future of psychometrics: some argue psychometrics should open up to new developments such as neuroscience or data mining, others find it important to protect the skills and knowledge that are unique to the psychometrician. Besides preserving the testimonies of frontrunners of psychometrics, the interviews provide an interesting peek into the mind of the psychometrician.

Student discussant: Mariëlle Zwijnenburg
Staff discussant: Herbert Hoijtink

Iris Yocarini, Erasmus University Rotterdam

Testing in higher education

In higher education, tests are used to assess students' competence. These tests are often small-scaled, designed in-house by an individual academic for each course. For the multiple choice (MC) tests in higher education, where students' optimal and common strategy is to guess instead of omit an answer, a correction for guessing is often applied in estimating students' competence. In addition, different methods exist to transform responses on test items into grades. In the educational measurement literature most research on these measurement topics focus on the context of large-scale standardized high-stakes tests (such as the SAT). Most methods used to estimate students true scores (e.g. IRT models) or discussions on the correction for guessing in this context of high stake testing consequently do not generalize to the small-scaled, non-standardized tests in higher education. Two simulation studies were performed to assess the performance of different methods to correct for guessing in MC tests and to compare the accuracy of different cut-score methods that are feasible in higher education.

Student discussant: Laura Boeschoten
Staff discussant: Robert Zwitser

Marielle Zwijnenburg, University of Utrecht

Testing replication with the prior predictive *p-value*

In this presentation, I will explain how replication can be tested with the prior predictive *p*-value. One of the unique elements of the method that we propose is that original studies generate informative hypotheses for new studies. For example, for the ANOVA model these hypotheses can concern specific values for the group means, the ordering of the group means, or effect sizes for between group differences. I will explain the calculation of the prior predictive *p*-value step by step, and illustrate the method with examples.

Student discussant: Oisín Ryan
Staff discussant: Michele Nuijten

Chris Hartgerink, Tilburg University

“As-you-go” instead of “after-the-fact”: Better practices by design

The current scholarly communication system fulfills its functions in a narrow sense, but hardly facilitates research integrity. In light of the Web, the scholarly paper seems anachronistic and unnecessarily “after-the-fact”. Several of the issues in research integrity, such as hypothesizing after results are known and publication bias, could be mitigated by more modular and chronological reporting. For example, selective publication can only occur when results are known, and if the design and data have already been communicated the effect of not communicating a results section are less influential. As such, one of the limiting factors to make progress on research integrity is the scholarly paper; I will discuss how modular and chronological reporting could look, why it is worthwhile for individuals and scholarly research, and how it can be implemented in the very near future without harming people’s career opportunities.

Student discussant: Xinru Li
Staff discussant: Don van Ravenzwaaij

Maarten Marsman, University of Amsterdam

The Idiographic Ising Network Model

In recent years, it has been proposed to conceptualize psychometric constructs such as depression as networks of mutually reinforcing variables. In this new field of network psychometrics, graphical models such as the Ising model play an important role. A growing concern with these models is that they are commonly applied to model associations at the group level and assume that individuals are independent replications of the exact same topology. But the topology at the group level may be completely different from the topology at the individual level. In this presentation, I will introduce an idiographic Ising network model in which the topology of the network is allowed to vary over persons and we obtain the Ising model as an average of the individual topologies. With this idiographic network model we can study both the individual network structures and the group level phenomena. Several consequences of this formulation will be explored.

Student discussant: Joost Kruis
Staff discussant: Laura Bringmann

Johnny van Doorn, University of Amsterdam

Bayesian rank-based inference through data augmentation

Parametric assumptions are often violated under non-normality, outliers, or an ordinal measurement level. Rank-based methods, such as the Wilcoxon tests and rank correlations, offer a robust and powerful statistical alternative to their parametric counterparts. However, due to the nonparametric nature of rank data, there is a lack of an explicit likelihood function. This problem can be overcome by introducing a latent normal level to the observed data, which respects the ordinal information in the data. In doing so, Bayesian inference through posterior distribution and Bayes factors is enabled. To illustrate the latent normal methodology, it is applied to the Wilcoxon rank sum test.

Student discussant: Zhengguo Gu
Staff discussant: Joris Mulder

Laura Boeschoten, Tilburg University

Combining latent class analysis and multiple imputation to correct for misclassification in combined datasets

National Statistical Institutes (NSIs) often use large datasets to estimate population tables on many different aspects of society. A way to create these rich datasets as efficiently and cost effectively as possible is by utilizing already available administrative data. When more information is required than already available, administrative data can be supplemented with survey data. A major problem is however that both surveys and administrative data can contain misclassification.
To overcome the issue of misclassification in both sources, a method is developed which combines Multiple Imputation (MI) and Latent Class (LC) analysis (MILC). This method estimates the misclassification and simultaneously imputes a new variable that is corrected for that misclassification. Furthermore, uncertainty due to misclassification is incorporated by using multiple imputations. Edit rules can be incorporated in the MILC method, which prevent impossible combinations of scores from occurring in the multiply imputed dataset.
During my PhD, I worked on investigating the performance of MILC using simulation studies, on applying the method to combined datasets and to expand the method to handle practical issues. More specifically, we investigated how the method can be expanded to simultaneously impute missing values in covariates, how the method can be applied to longitudinal data and how the method can be expanded to include covariates at a later time-point.

Student discussant: Iris Yocarini
Staff discussant: Samantha Bouwmeester

Oisin Ryan, University of Utrecht

Centrality and Interventions in Continuous-Time Dynamical Networks

Centrality measures in dynamical networks offer an appealing method to identify targets (e.g., specific symptoms of psychopathology) for intervention. We develop new centrality measures for use with dynamical networks based on Continuous-Time VAR(1) models. We examine and compare the use of these new centrality measures with those based on traditional Discrete-Time VAR(1) models, from an interventionist perspective.

Student discussant: Diulio Flore
Staff discussant: Sacha Epskamp

Xinru Li, Leiden University

Meta-CART: a flexible tool for multiple moderator meta-analysis

In meta-analysis, heterogeneity often exists between studies. Knowledge about study features (i.e., moderators) that can explain the heterogeneity in effect sizes can be useful for researchers to assess the effectiveness of existing interventions and design new potentially effective interventions. When there are multiple moderators, they may amplify or attenuate each other's effect on treatment effectiveness. In this situation, we say that there are interaction effects between the moderators. Usually, interaction effects are neglected in meta-analytic studies. One reason for this is the lack of appropriate methods that are able to identify interactions between multiple moderators in situations without a priori hypotheses. To overcome this problem, a new approach called meta-CART was proposed with the advantage of dealing with many moderators and identifying interaction effects between them (Li et al., 2017). The method follows the paradigm of classification and regression trees (CART) to partition studies into more homogeneous subgroups by influential moderators, and simultaneously tests the subgroup meta-analysis results. In our presentation, we will introduce an improved version of meta-CART with fixed- or random-effects model assumptions and various options to control the partitioning process. We will also illustrate an R-package to apply the method on real-world meta-analytic data sets.

Student discussant: Tessa Blanken
Staff discussant: Mattis van den Bergh

Jonas Dalege, University of Amsterdam

The Attitudinal Entropy (AE) Framework as a General Theory of Individual Attitudes

This talk introduces the Attitudinal Entropy (AE) framework, which builds on the Causal Attitude Network (CAN) model that conceptualizes attitudes as Ising networks. The AE framework rests on three propositions. First, attitude inconsistency and instability are two related indications of attitudinal entropy, a measure of randomness derived from thermodynamics. Second, energy of attitude configurations serves as a local processing strategy to reduce the global entropy of attitude networks. Third, directing attention to and thinking about attitude objects reduces attitudinal entropy. I discuss several determinants of attitudinal entropy reduction and show that several findings in the attitude literature, such as the mere thought effect on attitude polarization and the effects of heuristic versus systematic processing of arguments, follow from the AE framework.

Olmo van den Akker, Tilburg University

What heuristics do researchers use when assessing the outcomes of multiple studies?

In social and experimental psychology single studies are generally considered to be insufficient to test a theory and multiple study papers are the norm. In this project, we consider how researchers assess the validity of a theory when they are presented with the results of multiple studies that all test that theory. More specifically, we consider what researchers' beliefs in the theory are as a function of the number of significant vs. nonsignificant studies, and whether this relationship depends on the type of studies (direct or conceptual replications) and the role of the respondent (researcher or reviewer). We find that researchers' belief in the theory increases with the number of significant outcomes and that replication type and the respondent's role do not affect response patterns. In a preregistered follow-up analysis we look at individual researcher data to find out which heuristics researchers use when assessing the outcomes of multiple studies. We lump each researcher into one of six categories: those who use Bayesian inference (i.e. the normative approach), those who use deterministic vote counting, those who use proportional vote counting, those who average prior beliefs with the proportion of significant results, those with irrational response patterns, and those whose response patterns are inconsistent with any of the previous categories. This follow-up study highlights mistakes researchers make when assessing the outcomes of scientific papers and sheds light on the ways we can educate current and future researchers to avoid making these mistakes.

Anja Ernst, Marieke Timmerman & Casper Albers, University of Groningen

Disentangling individual dynamics — probabilistic clustering of longitudinal data

Studying idiographic dynamics through time series models is becoming increasingly popular in the social sciences. Often, researchers are interested in generalizing to a population of individuals, rather than being interested in the single individuals per se. As dynamics can be rather heterogeneous across individuals, one needs sophisticated tools to express the essential similarities and differences across individuals. A way to proceed is to identify subgroups of people who are characterized by qualitative differences in their dynamics. Recently, dynamic clustering methods have been proposed to discern groups of individuals who exhibit homogeneous dynamics. So far, these methods assume equal generating processes for individuals of a cluster. To avoid this, in empirical practice overly restrictive assumption, I will outline a probabilistic clustering approach based on the Gaussian finite mixture model that clusters on individuals' VAR coefficients, thereby allowing for individual deviations within clusters. I will contrast the proposed method to another time series clustering procedure drawing form the results of a simulation study and illustrating their performance on an empirical data set. The models are applied to *N*= 366 ecological momentary assessment data with external measures of depression and anxiety.

Laura Kolbe, Suzanne Jak, Frans J. Oort, University of Amsterdam

An illustration of generalizations of the polychoric correlation coefficient with empirical data

In structural equation modeling, the association between two ordinal variables can be measured by means of a polychoric correlation coefficient. This coefficient is based on the assumption that responses to ordinal variables are generated by two underlying continuous variables that follow a bivariate normal distribution. If the assumption of underlying bivariate normality holds, the polychoric correlation coefficient is the correlation between the two underlying continuous variables. However, previous studies have shown that the underlying bivariate normality assumption rarely holds in empirical data. A violation of the assumption can result in bias in the polychoric correlation estimate. Generalizations of the polychoric correlation coefficient have therefore been proposed based on other distributional assumptions. In this poster presentation, various generalizations will be illustrated with empirical data.

Letty Koopman, University of Amsterdam

Checking assumptions in two-level Mokken scale analysis

Currently, Mokken scale analysis for two-level data is being developed. This scaling procedure allows test constructors to investigate the scalability, reliability, and validity of multi-rater measurement instruments. The nonparametric IRT models that underlie Mokken scale analysis consist of four main assumptions: unidimensionality, local independence, monotonicity, and invariant item ordering. These assumptions imply certain observable properties of the data. For example, local independence and monotonicity imply conditional association; for dichotomous items scores, monotonicity implies manifest monotonicity; and invariant item ordering implies manifest invariant item ordering. Mokken scale analysis provides methods to investigate the assumptions of the nonparametric IRT models by investigating the observable properties. When dealing with multi-rater data, some adjustments of the assumptions are necessary. For example, the monotonicity assumption concerns the latent trait of the subject combined with the rater effect. In addition, multi-rater data require a different way to estimate the item probabilities. As a result, the methods to investigate observable properties must be adapted for multi-rater data. This poster presentation focusses on explaining the various concepts and discussing the necessary adaptation to make the methods from Mokken scale analysis useful in a multi-rater context.

Duco Veen, University of Utrecht

Sample Size Determination for Bayesian Estimation Using Informative Priors

When limited data is available, Bayesian statistics are often mentioned as a possible solution. Yet, for Bayesian statistics to provide real benefits over classical analyses in small data situations, specification of prior information is key. If prior and data agree with each other, using informative priors will results in quick convergence to a stable estimate for the model. If the priors and the data however do not agree with each other this will lead unstable results and the idea that prior and data will form a compromise in the posterior is only true for a very small region of sample size. We show that with informative priors and prior-data conflict, mean parameters tend to either the data or the prior and variance parameters will overestimate the variance due to the prior-data conflict (even with accurate priors on the variance). We demonstrate how prior-data conflict can be detected for each parameter using the Data Agreement Criterion and show how we can identify if we are making decisions based on the prior or the data. By identifying the region of prior-data compromise for the posterior distribution, we also identify the regions in which the data or the prior dominates. Based on that information, one can determine how small a sample can be used with informative priors, even if they are wrong, whilst still being able to make data driven conclusions.

Wai Wong, University of Leuven

Reliability of within-person associations in experience sampling method data

Researchers collecting experience sampling method (ESM) data are often interested in the within-person association between some response and one or more predictor variables. For example, participants were asked to rate the pleasantness of the most important recent event and their affect level multiple times throughout the day for a number of days in various ESM studies. As expected, there is considerable variability in how strongly these variables are related to each other across subjects (reflecting differential sensitivity of mood to pleasant/stressful events) and also across groups (e.g., patients versus healthy controls). However, at the moment, we do not have a clear understanding of how reliable our estimates of such within-person relationships actually are. In this presentation, methods for estimating the reliability of such within-person relationships (using Cronbach's alpha or some similar measure based on the correlation of day-specific random slope effects) will be demonstrated. In addition, since there is a positive association between the length (i.e., the number of days) of an ESM study and the reliability with which we can estimate such person-specific associations, we can consider for how many days an ESM study should be conducted in order to achieve acceptable levels of reliability. This presentation will also show how researchers can predict the reliability for various durations of an ESM study (using the Spearman-Brown equation). This approach can therefore also help researchers decide for how many days data should be collected in their ESM study.

PARTICIPANTS

Surname	First name	University/Institute
Akker, van den	Olmo	Tilburg
Arends	Lidia	Rotterdam
Ark, van der	Andries	Amsterdam
Assen, van	Marcel	Tilburg
Bakker	Marjan	Tilburg
Bergh, van den	Mattis	Tilburg
Blanken	Tessa	Amsterdam (VU)
Boeschoten	Laura	Tilburg
Bork, van	Riet	Amsterdam
Borsboom	Denny	Amsterdam
Bouwmeester	Samantha	Rotterdam
Breukelen, van	Gerard	Maastricht
Bringmann	Laura	Groningen
Conijn	Judith	Amsterdam
Dittrich	Dino	Tilburg
Doorn, van	Johnny	Amsterdam
Epskamp	Sacha	Amsterdam
Ernst	Anja	Groningen
Erp, van	Sara	Tilburg
Flore	Giulio	Leiden
Fu	Qianrao	Utrecht
Gu	Zhengguo	Tilburg
Hartgerink	Chris	Tilburg
Haslbeck	Jonas	Amsterdam
Haucke	Matthias	Groningen
Heiser	Willem	Leiden
Hoijtink	Herbert	Utrecht
Isvoranu	Adela	Amsterdam
Jansen	Brenda	Amsterdam
Jorgensen	Terence	Amsterdam
Kayenmbe	Mutamba	Maastricht
Kesteren, van	Erik-Jan	Utrecht
Klaassen	Fayette	Utrecht
Kolbe	Laura	Amsterdam
Koopman	Letty	Amsterdam
Kossakowski	Jolanda	Amsterdam
Kuijpers	Renske	Amsterdam
Li	Xinru	Leiden
Loon, van	Wouter	Leiden
Lunansky	Gaby	Amsterdam
Maas, van der	Han	Amsterdam

Marsman	Maarten	Amsterdam
Meijer	Rob	Groningen
Mulder	Joris	Tilburg
Mulder	Kees	Utrecht
Nuijten	Michele	Tilburg
Polak	Marike	Rotterdam
Pratawi	Bunga	Leiden
Ravenzwaaij, van	Don	Groningen
Ryan	Oisín	Utrecht
Savi	Alexander	Amsterdam
Sigurdardottir	Hannah	Tilburg
Tuerlinckx	Francis	Leuven
Veen	Duco	Utrecht
Vaheoja	Monika	10voordeleraar
Verdam	Mathilde	Leiden
Verschoor	Mark	Groningen
Vogelsmeier	Leonie	Tilburg
Voncken	Lieke	Groningen
Waal, de	Ton	Tilburg
Waldorp	Lourens	Amsterdam
Wicherts	Jelte	Tilburg
Wijsen	Lisa	Amsterdam
Wong	Wai	Leuven
Yuan	Beibei	Leiden
Yocarini	Iris	Rotterdam
Zwijnenburg	Marielle	Utrecht
Zwitser	Robert	Amsterdam

Hotel recommendations

Hotel Le Coin
Nieuwe Doelenstraat 5
1012 CP AMSTERDAM
31 (0)20 524 6800
hotel@lecoin.nl
Ask for UvA rates

Eden Hotel Amsterdam
Amstel 144
1017 AE Amsterdam
0031 20 530 78 78
info.eden@edenhotelgroup.com

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Hotel Arena
's-Gravesandestraat 51
1092 AA Amsterdam
0031 20 850 24 10
reservations@hotelarena.nl

Appendix 3: IOPS Conference Winter 2018

28th IOPS Winter Conference
13-14 December 2018

Nederlands Watermuseum

Zijpendaalseweg 26-28, 6814 CL Arnhem

[ΨΣ] interuniversity graduate school of
iops Psychometrics and Sociometrics

CITO 50 jaar

Prior to the conference – Thursday December 13th

10.30 – 12.00 **IOPS Board meeting** (Archicolourzaal)

11.30 – 12.00 **IOPS PhD student meeting** (Watercinema)

12.00 – 13.00 Lunch and registration (Grand Café Aan de Beek)

Program Thursday December 13th (Watercinema)

13.00 – 13.05 **Official opening by Cor Sluijter**
Head of Psychometric Research department, Cito

13.05 – 13:30 **Presentation** *Alexandra de Raadt, University of Groningen*
A comparison of agreement coefficients for categorical and interval scales
Discussant: Dylan Molenaar

13.30 – 13.55 **Presentation** *Nitin Bhushan, University of Groningen*
Comparing Constraint-based Causal Discovery algorithms in scenarios typical to psychology
Discussant: Robbie van Aert

13.55 – 14.20 **Presentation** *Sara van Erp, Tilburg University*
Shrinkage priors for Bayesian measurement invariance:
Practical and robust approaches for modeling and detecting non-invariance
Discussant: Leonie Vogelsmeier

14.20 – 14.45 **Presentation** *Konrad Klotzke, University of Twente*
Bayesian Covariance Structure Modelling of Responses and Process Data
Discussant: Herbert Hoijtink

14.45 – 15.15 Break (Watercinema)

15.15 – 15.40 **Presentation** *Joost Kruis, University of Amsterdam (and ACT-Next)*
A general framework for choice dynamics
Discussant: Michèle Nuijten

15.40 – 16.30 **Invited speaker:** *Timo Bechger, senior researcher at Cito*
Sense and non-sense of item response theory

16.30 – 16.50 **Plenary meeting IOPS staff and students**

16.50 – 18.00 **Poster Session and Drinks** (Grand Café Aan de Beek)

Erik-Jan van Kesteren, Utrecht University
Qianrao Fu, Utrecht University
Esther Maassen, Tilburg University
Bunga Citra Pratiwi, Leiden University
Giulio Flore, Leiden University
Aline Claesen, Katholieke Universiteit Leuven
Shuai Yuan, Tilburg University
Richard Artner, Katholieke Universiteit Leuven

18.30 Conference dinner (Grand Café Aan de Beek)

Program Friday December 14th (Watercinema)

09.00 – 09.30 Registration / Coffee

09.30 – 10.15 **Presentation IOPS Best Paper Award Winner 2018**
Jed Cabrieto – University of Leuven

10.15 – 10.40 **Presentation** *Monika Vaheoja, University of Twente (and 10voordeleraar)*
Resetting performance standard in small samples with IRT and Circle-arc.
Discussant: Tom Wilderjans

10.40 – 11.05 Break (Watercinema)

11.05 – 11.30 **Presentation** *Fayette Klaassen, Utrecht University*
The Bayesian world of Probabilities, Odds and Updating.
Discussant: Sanneke Schouwstra

11.30 – 11.55 **Presentation** *Kimberley Lek, Utrecht University*
The optimal role of the EPST-result and teacher advice in the transition from primary to secondary education
Discussant: Rob Meijer

11:55 – 12.20 **IOPS Best Poster/Presentation Award Ceremony 2018**

12.20 – 12.30 **Closing by Cor Sluijter**

12.30 Take away Lunch (Grand Café Aan de Beek)

Thursday December 13th

13.05 – 13:30 A comparison of agreement coefficients for categorical and interval scales
Alexandra de Raadt – University of Groningen

Agreement assessment is of concern for both categorical as well as interval ratings. Kappa coefficients are commonly used for assessing agreement on a categorical scale, whereas correlation coefficients are commonly applied to assess agreement on an interval scale. In this study we compared the values of different agreement coefficients for both categorical and interval ratings using several real-world data sets. We studied empirical similarities between the various ways of measuring agreement. In addition, we studied how often we may reach similar decisions with different coefficients with regard to agreement assessment. Many authors have criticized the use of weighted kappa, a popular coefficient for ordinal ratings. We discussed the pros and cons of the use of quadratic kappa and the Pearson correlation. We can imagine that the much-criticized weighted kappa coefficient could generally be replaced by the Pearson correlation.

13.30 – 13.55 Comparing Constraint-based Causal Discovery algorithms in scenarios typical to psychology
Nitin Bhushan – University of Groningen

Researchers in psychology are often interested in understanding substantive causal relationships between variables underlying their phenomenon of interest. Such causal theories are of interest because they help predict the effects of interventions and are beneficial to both science and policy. One way of gaining insight into underlying mechanisms and effects of interventions is through true experiments (or randomized controlled trials; RCTs). However, in the context of certain branches of psychology, various real-world constraints do not permit use of RCTs and as a consequence, researchers often resort to observational studies.
When RCTs are not feasible and substantive theories yet to be developed, causal discovery algorithms can discover probabilistic causal relationships between variables of interest from observational data. In this talk, we assess three such procedures which use conditional independence as a constraint to infer underlying causal structures; the PC algorithm (Spirtes et al., 2000), LinGaM (Shimizu et al., 2006), and the FCI algorithm (Spirtes et al., 1995; Zhang, 2008). The PC algorithm assumes a linear model with Gaussian errors and no unmeasured common-causes or confounders. The LinGaM algorithm relaxes the Gaussian error assumption and retains assumptions of linearity and absence of hidden confounders. The FCI algorithm allows for hidden confounders while retaining linear Gaussian assumptions. To validate these procedures, we perform a simulation study varying the sample size, number of variables, degree of confounding, degree of non-normality of the error distribution, and graph sparsity. We score these procedures using two graph theoretic metrics (i) the structural Hamming distance and (ii) structural intervention distance. We discuss the results of our study and further discuss implications of such procedures for theory development in psychology.

13.55 – 14.20 Shrinkage priors for Bayesian measurement invariance: Practical and robust approaches for modeling and detecting non-invariance.

Sara van Erp – Tilburg University

When comparing multiple groups it is important to establish measurement invariance (MI), meaning that the latent construct under investigation is measured in the same way across groups. Traditionally, MI is tested using multiple group confirmatory factor analysis (MGCFA) with certain restrictions on the model. The goal is often to attain scalar invariance, which sets the loadings and intercepts equal across groups, so that factor means can be meaningfully compared. In practice, however, scalar invariance is often an unattainable ideal. Therefore, several alternative methods have been proposed to test for MI, such as partial MI, Bayesian approximate MI, and the alignment method. Although these techniques relax the restrictions imposed by the scalar invariance model, the assumptions they impose about the underlying structure of MI remain specific and stringent.
In this presentation, a novel method for modeling MI will be presented. The proposed method relies on the observation that MI essentially poses an identification problem, similar to the problem in sparse regression where the number of predictor variables is (much) greater than the number of observations. In sparse regression problems, regularization methods (e.g., the lasso) are popular approaches that identify the model by shrinking the small coefficients towards zero. We apply a similar strategy to the MI problem to model the invariance in a more flexible and robust manner than the current state-of-the-art methods.

14.20 – 14.45 Bayesian Covariance Structure Modelling of Responses and Process Data

Konrad Klotzke – University of Twente

A novel Bayesian modelling framework for response accuracy (RA), response times (RTs) and other process data is proposed. Nested (e.g., within a testlet) and crossed (e.g., between RAs and RTs for an item) local dependences are explicitly modelled in an additive covariance matrix. The inclusion of random effects (on person or group level) is not necessary, which allows constructing parsimonious models for responses and multiple types of process data. Bayesian Covariance Structure Models (BCSMs) are presented for various well-known dependence structures. In a simulation study, BCSMs are compared to state-of-the-art mixed-effect models. With an empirical example based on data from the Programme for the International Assessment of Adult Competencies (PIAAC) study, the flexibility and relevance of the BCSM for complex dependence structures in a real-world setting are discussed.

15.15 – 15.40 A general framework for choice dynamics

Joost Kruis – University of Amsterdam (and ACT-Next)

It has been demonstrated frequently that people often violate the rationality assumptions in decision making as implied by Luce's choice axiom. In this talk we present a simple framework for choices, which allows us to explain the occurrence of these violations. Inspired by the Ising model from statistical physics, we graphically represent a choice situation as a network, where the nodes correspond to cues and alternatives, and the edges between nodes describe the relationship between these. By introducing a Markov choice process that has rational choice behaviour as it's invariant distribution, and enforcing the rule that the decision process stops the first time the choice conditions are met, we obtain choice behaviour that is consistent with the research showing deviations of rationality.

15.40 – 16.30 Sense and non-sense of item response theory

Timo Bechger – senior researcher at Cito

Item response theory (IRT) came in the 1960s and caused a revolution in educational measurement. It alleviated psychometricians from the need to collect complete data and led to cool applications such as computer adaptive testing, student monitoring systems and international educational surveys. IRT has since become the dominant paradigm for educational measurement. As standardized testing became more popular in schools and computers became faster, the applications got bigger. Theoretical developments, on the other hand, were scant. One could say that psychometricians have only one, rather old, tool that they use for ever more complex applications. In this talk, I will illustrate two consequences of this. First, that IRT may be unsuited as a tool for some applications. Much like a hammer is not an ideal tool to build a skyscraper. Second, that some rather urgent issues are not addressed or ignored; simply because IRT cannot handle them. Most notably learning and change.

Friday December 14th

10:15 – 10:40 Resetting performance standard in small samples with IRT and Circle-arc

Monika Vaheoja – University of Twente/10voordeleraar

Resetting performance standard in exams with few respondents is statistically challenging because the estimates often include bias. Therefore do experts such as in Angoff method (1971) often reset the standards, and empirical information is often neglected. However, the standard-setting methods with experts are biased too and often expensive (Cizek & Bunch, 2007). In this presentation, we will compare Circle-arc equating (specially developed for small samples; Livingston & Kim, 2011) and IRT concurrent calibration with OPLM in resetting the cut-score from reference test to a new test form in different contexts. Responses are simulated in three different situations: sample size, test length, test difficulty and ability. The results demonstrate that even in small samples (50 subjects taking both tests) IRT-method outperforms Classical test theory when tests' difficulty and population ability interact.

11:05 – 11:30 The Bayesian world of Probabilities, Odds and Updating

Fayette Klaassen – Utrecht University

A Bayes factor can be used to quantify the relative evidence for any two hypotheses, it can be updated sequentially, and can be used to compare more than two hypotheses. In my PhD I have researched both practical and philosophical considerations in using a Bayes factor. In this talk I give an overview of some of these questions and answers. For example, what do power and error probabilities mean in Bayesian hypothesis testing? How can knowledge about a set of hypotheses be updated? What is the role of prior probabilities and how can they be specified? Three central concepts that are discussed in this talk are: (un)conditional error probabilities; prior/posterior odds; Bayesian updating.

11.30 - 11.55 The optimal role of the EPST-result and teacher advice in the transition from primary to secondary education

Kimberley Lek – Utrecht University

To determine the level of secondary education a pupil should transition to at the end of primary school, in the Netherlands two sources of information are consulted: 1) the result of an end-of-primary-school-test (EPST) and 2) the advice of the pupil's teacher. Depending on national policy decisions, one of these two sources is leading. Since 2015, the EPST-result is subordinated to the advice of the teacher, to great discontent of many psychometricians who warned for the subjectivity of teacher advice and teachers' sensitivity to pressure from parents and irrelevant child characteristics such as ethnicity. In my PhD, I investigate whether these psychometricians are right: has the change in policy in 2015 indeed led to worse transition advice? Or is there some merit in looking at the teacher advice? Additionally, I investigate whether instead of choosing between teacher and test it is possible to optimally weight and combine the EPST-result and teacher advice.

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