Annual report 2015

- 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)
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Foreword

The early months of 2015 were marked by the NWO Graduate Programme Grant competition at our graduate school. Thirteen candidates submitted a proposal, written under the supervision of IOPS staff members, and an international jury was asked to give the board of IOPS a ranking of these projects, only four of which could actually be granted. This jury consisted of Carolyn Anderson (University of Illinois at Urbana-Champaign), Matthias von Davier (Educational Testing Service), Ken Kelley (University of Notre Dame), Sophia Rabe-Hesketh (University of California at Berkeley), and Chun Wang (University of Minnesota). On June 22th, the winners were announced: Beibei Yuan (Leiden Un.), Johnny van Doorn (UvA), Joost Kruis (UvA), and Lisa Wijsen (UvA).

Even though the word ‘winners’ implies that there were losers too, at this competition there were no losers at all. Thanks to the very high quality of the proposals, all remaining candidates found other means of funding their project shortly after the competition, eight of which became members of IOPS in 2015 or 2016. Altogether, the number of new PhD projects in 2015 was impressive: we were happy to welcome no less than 21 new students.

We congratulate the eleven students who defended their thesis successfully. With two projects left unfinished, the number of IOPS students in 2015 increased with eight.

The IOPS Best Paper of 2014 Award was won by Xin Gu, with his paper “Bayesian Evaluation of Inequality Constrained Hypothesis” published in Psychological Methods. The two winners of the Best Poster Award were Jed Cabrieto and Sanne Willems.

The transfer of the IOPS secretariat in 2014 has had a slightly retarding effect on the organization of the courses, so a renewed focus on the curriculum was important this year. Firstly, the website information has been expanded significantly to meet the students’ need for more clarity concerning the curriculum and the requirements for the IOPS certificate. Secondly, the board initiated the redesign of existing courses and the development of new ones to achieve a wider range of different topics. In 2015 the mandatory course What is psychometrics? was newly designed by Denny Borsboom and new courses are scheduled for 2016 and 2017.

On behalf of the IOPS board,

Rob Meijer
1 Organization

1.1 Board

The IOPS Board consists of seven members delegated by the participating universities and two representatives of the participating research institutes. The institute director is also chairman, he/she is elected from the representatives of the seven participating universities. 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.

Members IOPS Board

On 31 December 2015 the IOPS 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 J.M. (Jelte) Wicherts, Tilburg University
- Prof. H.J.A. (Herbert) Hoijtink, Utrecht University
- Prof. F. (Francis) Tuerlinckx, KU Leuven, University of Leuven
- Dr A.A. (Anton) Béguin/Prof. G.K.J. (Gunter) Maris, CITO (National Institute for Educational Measurement)
- Prof. A.G. (Ton) de Waal, CBS (Statistics Netherlands)

PhD representatives

Michèle Nuijten (Tilburg University) was appointed first representative, after being assistant representative in 2014.
Paulette Flore (Tilburg University) was appointed assistant PhD student representative.

Changes in the IOPS Board

In December 2015, the board was happy to welcome Prof. Ton de Waal, successor of Dr Barry Schouten (CBS). We thank Barry Schouten for his commitment to our graduate school.

Board meetings

In 2015 board meetings were held on 23 March, 18 June, 10 December and one Autumn session by email.

1.2 Office

The secretariat is accommodated at:
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Grote Kruisstraat 2/1, 9712 TS Groningen, The Netherlands

Secretary: Drs. Edith Ruisch-de Vries
E-Mail: secretariaat.iops@rug.nl
Web: www.iops.nl
Phone: 050 36 36 367
## 1.3 Participating institutes

| **Leiden University** | **Methodology and Statistics Unit** | P.O. Box 9555, 2300 RB Leiden  
Secretary: Jacqueline Hartman  
071 527 3761  
j.hartman@fsw.leidenuniv.nl |
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<td><strong>Faculty of Social and Behavioural Sciences</strong></td>
<td><strong>Institute of Psychology</strong></td>
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| **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  
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<td><strong>Faculty of Social and Behavioural Sciences</strong></td>
<td><strong>Department of Psychology</strong></td>
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| **Developmental Psychology** | **Department of Psychology** | Postbus 15916, 1001 NK Amsterdam  
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e.buijn@uva.nl |
| **Work and Organizational Psychology** | **Department of Psychology** | Nieuwe Achtergracht 129 B, Amsterdam  
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<td><strong>Faculty of Behavioural and Social Sciences</strong></td>
<td><strong>Department of Psychology</strong></td>
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Methodology and Statistics

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Research Group of Quantitative Psychology and Individual Differences

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| Department of Psychology, Education & Child Studies | P.O. Box 1738, 3000 DR Rotterdam  
| Secretariat D-PECS  
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2 Staff

The members of the staff belong to the participating 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.

Associated staff

In 1994, the establishment of graduate schools and the rearrangement of staff members as a result of this, caused IOPS to introduce a new category of staff for those who - for formal reasons - could not be a regular IOPS staff member. 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.

2.1 Professorships

Irene Klugkist was appointed professor at Utrecht University on October 1\textsuperscript{st}. Chair: Methods and techniques for the social and behavioural sciences. As of January 1\textsuperscript{st}, she is also professor by special appointment at the University of Twente for a period of three years. Chair: Bayesian modelling using informative priors.

As of April 1\textsuperscript{st} 2015, Andries van der Ark was appointed endowed professor: Kohnstamm chair, Vereniging ter Bevordering van de Studie der pedagogiek (VBSP). Chair mission: “Kwantitatieve onderzoeksmethodologie ter bevordering van de academisering van het onderwijs.”

2.2 Staff meetings

Plenary meetings for all IOPS members (staff and PhD students) are held twice a year during the IOPS conferences. In 2015 two plenary meetings took place, one on 18 June, and one on 10 December.

2.3 Staff changes

Junior staff members admitted to IOPS in 2015
- Dr Marjan Bakker, Tilburg University
- Dr Terrence Jorgensen, University of Amsterdam
- Dr Thomas Klausch, Utrecht University

Senior staff members admitted to IOPS in 2015
- Prof. Ton de Waal, CBS
- Dr Elise Dusseldorp, Leiden University
- Dr Don van Ravenzwaaij, University of Groningen
Junior staff members leaving IOPS in 2015

- Dr Rudy Ligtvoet, University of Amsterdam
- Dr Jorre Vannieuwenhuyze, Utrecht University
- Dr Wobbe Zijlstra, Tilburg University

Senior staff members leaving IOPS in 2015

- Dr Hennie Boeije, Utrecht University
- Dr Alwin Stegeman, University of Groningen

Emeritus status

No staff members entered the emeritus status in 2015.

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<th>1 Januari 2015</th>
<th>31 December 2015</th>
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<td>Junior staff members</td>
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<td>Senior staff members</td>
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<td>Honorary emeritus members</td>
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Psychometric Research Center (Cito), Arnhem

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2.5 Associated staff members

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3 Scientific awards and grants

3.1 Awards and grants honored to IOPS staff members

3.1.1 Scientific awards

3.1.2 NWO Grants

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

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Project Description</th>
<th>Grant Type</th>
<th>Start-End Date</th>
<th>Amount (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hamaker, E.</td>
<td>Utrecht Un.</td>
<td>Time for change: Studying individual differences in dynamics</td>
<td>Vidi</td>
<td>1 May 2011 – 1 May 2016</td>
<td>600,000</td>
</tr>
<tr>
<td>Huizenga, H.</td>
<td>UvA Amsterdam</td>
<td>Why speeding on your scooter is a good idea: decision strategies in childhood and adolescence</td>
<td>Vici</td>
<td>1 Sept 2013 – 31 Aug 2019</td>
<td>1,500,000</td>
</tr>
<tr>
<td>Mulder, J.</td>
<td>Tilburg University</td>
<td>Testing competing theories</td>
<td>Veni</td>
<td>2013 - 2018</td>
<td>250,000</td>
</tr>
<tr>
<td>Oberski, D.</td>
<td>Tilburg University</td>
<td>Developing novel latent variable techniques that open up a treasure trove of register data for social science</td>
<td>Veni</td>
<td>1 January 2015 – 31 December 2017</td>
<td>250,000</td>
</tr>
<tr>
<td>Van de Schoot, R.</td>
<td>Utrecht Un.</td>
<td>Integrating background knowledge about traumatic stress experienced after trauma into statistical models assessing individual change over time</td>
<td>Veni</td>
<td>January 2011 – January 2016</td>
<td>250,000</td>
</tr>
<tr>
<td>Vermunt, J.K.</td>
<td>Tilburg University</td>
<td>Stepwise model-fitting approaches for latent class analysis and related methods</td>
<td>Vici</td>
<td>23 June 2011 – 22 June 2016</td>
<td>1,500,000</td>
</tr>
<tr>
<td>Wicherts, J.M.</td>
<td>Tilburg University</td>
<td>Human Factors in statistics</td>
<td>Vidi</td>
<td>September 2012 – September 2017</td>
<td>800,000</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Years</th>
<th>Amount (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hamaker, E.</td>
<td>Utrecht Un.</td>
<td>2011-2016</td>
<td>100,000</td>
</tr>
</tbody>
</table>
### 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.

<table>
<thead>
<tr>
<th>Name</th>
<th>University</th>
<th>Description</th>
<th>PhD Student</th>
<th>Start Date - End Date</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wagenmakers, E.J., Forstmann, B., Nieuwenhuis, S. &amp; Van der Maas, H.</td>
<td>UvA Amsterdam</td>
<td>A dynamic and formal account of what people do before and after they make an error</td>
<td>H. Steingroever</td>
<td>1 Sept. 2011 - 1 Sept. 2015</td>
<td>€ 208.193</td>
</tr>
</tbody>
</table>

### 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.

<table>
<thead>
<tr>
<th>Name</th>
<th>University</th>
<th>Description</th>
<th>PhD Student</th>
<th>Start Date - End Date</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ark, A. van der</td>
<td>Tilburg University</td>
<td>Improving norms for psychological and educational tests</td>
<td>Hannah Oosterhuis</td>
<td>1 Sept. 2012 - 1 Sept. 2016</td>
<td>€ 168.735</td>
</tr>
<tr>
<td>Assen, M. van</td>
<td>Tilburg University</td>
<td>Meta-analysis in the presence of publication bias and researcher degrees of freedom</td>
<td>Robbie van Aert</td>
<td>1 Sept. 2013 - 1 Sept. 2017</td>
<td>€ 165.000</td>
</tr>
<tr>
<td>Borsboom, D.</td>
<td>UvA Amsterdam</td>
<td>Network psychometrics</td>
<td>Sacha Epskamp</td>
<td>1 Aug. 2012 - 1 Aug. 2016</td>
<td>€ 167.576</td>
</tr>
<tr>
<td>Hoijtink, H.</td>
<td>Utrecht Un.</td>
<td>How to hedge our bets in educational testing: combining test results with teacher expertise</td>
<td>Kimberly Lek</td>
<td>1 Sept. 2015 - 1 Sept. 2019</td>
<td>€ 219.170</td>
</tr>
<tr>
<td>Van der Maas, H.L.J.</td>
<td>UvA Amsterdam</td>
<td>Analyzing developmental change with time-series data of a large scale educational monitoring system</td>
<td>Abe Hofman</td>
<td>1 Sep. 2012 – 1 Sep. 2016</td>
<td>€ 168.576</td>
</tr>
<tr>
<td>Vermunt, J.K. (2012), Tilburg University</td>
<td>Tilburg University</td>
<td>Power analysis for simple and complex mixture models</td>
<td>Dereje Gudicha</td>
<td>1 Sept. 2012 – 1 Sept. 2015</td>
<td>€ 165.000</td>
</tr>
<tr>
<td>Vermunt, J.K. (2013), Tilburg University</td>
<td>Tilburg University</td>
<td>Multiple imputation of nested missing data using extended latent class models</td>
<td>Davide Vidotto</td>
<td>1 Sept. 2013 – 1 Sept. 2016</td>
<td>€ 165.000</td>
</tr>
<tr>
<td>Wicherts, J.M. (2013)</td>
<td>Tilburg University</td>
<td>The psychometrics of stereotype threat</td>
<td>Paulette Flore</td>
<td>1 Sept. 2013 – 1 Sept. 2017</td>
<td>€ 165.000</td>
</tr>
</tbody>
</table>
### Other NWO grants

<table>
<thead>
<tr>
<th>Name</th>
<th>Project Description</th>
<th>Scheme</th>
<th>Year Range</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hoijtink, H.</td>
<td>Individual development: why some children thrive and others don’t.</td>
<td>NWO-Gravity Scheme</td>
<td>2012-2016</td>
<td>€540,000 Of total €27,600,000</td>
</tr>
<tr>
<td>Schmand, B., Huizenga, H. &amp; Murre, J. (2013), UvA Amsterdam</td>
<td>Advanced Neuropsychological Diagnostics Infrastructure (ANDI)</td>
<td>Investment Subsidy NWO Medium</td>
<td>1 Sept 2013-31 Aug 2017</td>
<td>€ 450,000</td>
</tr>
<tr>
<td>Van Putten, K. (Leiden University) &amp; Béguin A. (Cito)</td>
<td>Mathematics education in the classroom and students' strategy use and achievement in primary education</td>
<td>NWO-PROO</td>
<td>1 Sept. 2011 – 1 Sept. 2015</td>
<td>€ 299,850</td>
</tr>
</tbody>
</table>

### 3.1.3 International grants

<table>
<thead>
<tr>
<th>Name</th>
<th>Project Description</th>
<th>Funding</th>
<th>Year Range</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borsboom, D. (2015) UvA</td>
<td>ERC Consolidator grant for the project “Psychosystems: Consolidating Network Approached to Psychopathology”</td>
<td>European Research Council (ERC)</td>
<td>2016-2020</td>
<td>€2,000,000</td>
</tr>
<tr>
<td>Lugtig, P. (2012), Utrecht Un.</td>
<td>Subsidy for three year research project 'Trade-offs between nonresponse and measurement error in a panel survey'</td>
<td>ERSC Future Leaders Grant (United Kingdom)</td>
<td>2012 – 2015</td>
<td>€ 163,000</td>
</tr>
<tr>
<td>Wagenmakers, E.J. (2011), UvA Amsterdam</td>
<td>Bayes or Bust: Sensible hypothesis tests for social scientists</td>
<td>Consolidator grant by the European Research Council</td>
<td>May 2012- May 2017</td>
<td>€1,500,000</td>
</tr>
</tbody>
</table>
Grants awarded to KU Leuven, University of Leuven

<table>
<thead>
<tr>
<th>Name(s)</th>
<th>Position/Grant Type</th>
<th>Funding Source</th>
<th>Start Date</th>
<th>End Date</th>
<th>Duration</th>
<th>Salary/Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulteel, K., Ceulemans, E., &amp; Tuerlinckx, F. (2012)</td>
<td>PhD position</td>
<td>Fund Scientific Research (FWO), Flanders, Belgium</td>
<td>1 Oct 2012-30 Sept 2017</td>
<td>4 years PhD salary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceulemans, E., Kuppers, P., &amp; Tuerlinckx, F. (2013)</td>
<td>PhD position, Switching component models for capturing emotional response patterning and synchronization processes</td>
<td>Fund Scientific Research (FWO), Flanders, Belgium</td>
<td>1 Jan 2014-31 Dec 2017</td>
<td>€ 310,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>De Roover, K., Ceulemans, E. (2013)</td>
<td>postdoc grant</td>
<td>Fund Scientific Research (FWO), Flanders, Belgium</td>
<td>1 Oct 2013-30 Sept 2016</td>
<td>3 years of postdoc salary</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Other Grants

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution/Project Description</th>
<th>Grant Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boeije, H. &amp; Leferink, S.</strong> (2012), Utrecht University</td>
<td>Kwaliteitsverbetering in de hulpverlening aan slachtoffers door innovatie in effectmeting</td>
<td>€ 120,000 by Fonds Slachtofferhulp and €120,000 by Dept. M&amp;S, Utrecht Un.</td>
</tr>
<tr>
<td>Boersma, P., Raijmakers, M. &amp; Bögels, S. (2009), UvA Amsterdam</td>
<td>Models and tests of early category formation: interactions between cognitive, emotional, and neural mechanisms</td>
<td>€ 470,000</td>
</tr>
<tr>
<td>Candel, M. (2011), Maastricht Un.</td>
<td>Sample size calculation for nested cost-effectiveness RCTs (PhD student project)</td>
<td>€ 115,000</td>
</tr>
<tr>
<td>Hox, J., Snijkers, G. (CBS)</td>
<td>Motivation of Respondents in Business Surveys</td>
<td>€ 238,000</td>
</tr>
<tr>
<td>Jansen, B.R.J., Salemink, E., &amp; Wiers, R. (2014), UvA Amsterdam</td>
<td>The missing factor in math anxiety: The role and modification of cognitive biases and executive functioning</td>
<td>€ 200,000</td>
</tr>
<tr>
<td>Keljers, L., Ter Hillegers, M. Bogt, T., Van de Schoot, R., Vollebergh, W., Cahn, W.</td>
<td>Grant for Post-doc on disentangling normative irritability from early signs of depression among adolescents with cell-phone micro-measures of daily mood swings</td>
<td>€ 96,000</td>
</tr>
<tr>
<td>Klugkist, I., Nielen, M. (DGK, Utrecht University)</td>
<td>Bayesian statistics applied to clinical trials from veterinary medicine</td>
<td>€ 97,500 by Fac. Veterinary Medicine, UU and € 97,500</td>
</tr>
<tr>
<td>Researcher(s)</td>
<td>Project Title</td>
<td>Grants Summary</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Van der Heijden, P. &amp; Cruyff, M. (Utrecht Un.)</td>
<td>Event history analysis for population size estimation of elusive populations</td>
<td>Grant for International PhD project, funded by the faculty of Social and Behavioural Sciences</td>
</tr>
</tbody>
</table>
3.2 Awards and grants honored to IOPS PhD students

3.2.1 Scientific awards

In 2015, the following IOPS PhD students were honored with a scientific award:

- Zsuzsa Bakk: Classification Societies Distinguished Dissertation Award
- Jed Cabrieto: IOPS Best Poster Award (Summer 2015). Comparing the performance of non-parametric change point detection methods for capturing response concordance
- Sacha Epskamp: Travel Award for the International Meeting of the Psychometric Society (IMPS) in Beijing, July 2015
- Xin Gu: IOPS Best Paper of 2014 Award
- Lianne Ippel: Travel Award for the International Meeting of the Psychometric Society (IMPS) in Beijing, July 2015
- Claudia Van Borkulo: Travel Award for the International Meeting of the Psychometric Society (IMPS) in Beijing, July 2015
- Sanne Willems: IOPS Best Poster Award (Winter 2015): Optimal scaling in survival analysis

3.2.2 Grants

- Robbie Van Aert, Jelte Wicherts & Marcel Van Assen: Social Science Meta-Analysis and Research Transparency Grant (SSMART) of 30,000 dollars by the Berkeley Initiative for Transparency in the Social Sciences (BITSS).
4 Students and projects

4.1 Introduction

Applicants for the IOPS dissertation training must have a Master’s degree in one of the following disciplines. Behavioral 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 the participating universities or by NWO (Netherlands Foundation of Scientific Research).

| PhD student projects in progress on 1 January 2015 | 60 |
| New projects                                      | 21 |
| Dissertations                                     | 11 |
| Projects left unfinished                          | 2  |
| PhD student projects in progress on 31 December 2015 | 62 |
| Projects that exceeded the project time limit     | 11 |

Dissertations

1. Zsussa Bakk (Tilburg University) - Contributions to bias adjusted stepwise latent class modelling
2. Mariska Barendse (University of Groningen) - Dimensionality Assessment with Factor Analysis Methods
3. Rivka de Vries (University of Groningen) - Bayes Factor Tests for Intervention Effects
4. Marjolein Fokkema (VU University Amsterdam) - Psychometric Contributions to Improving the Efficiency and Fidelity of Clinical Assessment and Research
5. Dereje Gudicha (Tilburg University) - Power Analysis Methods for Tests in Latent Class and Latent Markov Models
6. Khurrem Jehangir (University of Twente) - Methodological Issues in Large-Scale Educational Surveys
7. Renske Kuijpers (Leiden University) - Applications of Categorical Marginal Models in Test Construction
8. Tam Thi Thanh Lam (University of Groningen) - Some new methods for three-mode factor analysis and multi-set factor analysis
9. Maryam Safarkhani (Utrecht University) - Optimal Designs for Discrete-time Survival Analysis with Heterogeneity
10. Gerko Vink (Utrecht University) - Restrictive imputation of incomplete survey data
11. Ingrid Vriens (Tilburg University) - Two of a Kind? Comparing Ratings and Rankings for Measuring Human Values using Latent Class Modeling
New projects

1. Yasin Altinisik (Utrecht University) - Research replication through the evaluation of prior knowledge in the form of informative hypotheses and sparse big data models
2. Frank Bais (Utrecht University) - Respondent profiles and questionnaire profiles in mixed-mode surveys
3. Nitin Bhushan (University of Groningen) - PhD Network dynamics of households’ energy consumption after interventions
4. Laura Boeschoten (Tilburg University) - Consistent Estimates for Categorical Data based on a Mix of Administrative Data Sources and Surveys
5. Giulio Flore (Leiden University) - Predictive Unfolding Models for Single-Peaked Items with Binary and Graded Response Data
6. Chris Hartgerink (Tilburg University) - Detecting potential data fabrication in the social sciences
7. Robert Hillen (Tilburg University) - Latent categories versus latent dimensions
8. Thomas Husken (Tilburg University) - Event history analysis for population size estimation of elusive populations
9. Fayette Klaassen (Utrecht University) - Hypotheses formulation, evaluation, updating and replication for experimental univariate within person data
10. Joost Kruis (University of Amsterdam) - Developing Process Measurement Models with Broad Applicability
11. Kimberley Lek (Utrecht University) - How to hedge our bets in educational testing: combining test results with teacher expertise
12. Xinru Li (Leiden University) - Meta-CART: An integration of classification and regression trees into meta-analysis
13. Annemiek Punter (University of Twente) - Psychometric modeling of cultural bias in International Large-Scale Assessments
14. Oisin Ryan (Utrecht University) - Not straightforward: Mediation and networks in continuous time
15. Alexander Savi (University of Amsterdam) - Experimentation in online education: Increasing return on investment through A/B testing
16. Riet Van Bork (University of Amsterdam) - Empirical methods to distinguish network from latent variable constructs
17. Johnny van Doorn (University of Amsterdam) - Bayesian inference for ordinal data in psychology
18. Sara van Erp (Tilburg University) - Advancing structural equation modeling with unbiased Bayesian methods
19. Lisa Wijssen (University of Amsterdam) - The History of Psychometrics: Tools, Trends and Turning points
20. Sanne Willems (Leiden University) - New Approaches in Survival Analysis
21. Eva Zijlman (Tilburg University) - Solutions for some psychometric problems of the reliability of psychological measurements
Projects in progress beyond project time limits

On 13 December 2015, 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 summary of projects.

1. Maria Bolsinova (Utrecht University) - *New applications of Rasch models in educational measurement*
2. Laura Bringmann (KU Leuven) - *Networks! New insights into time series data*
3. Sebastiaan De Klerk (University of Twente/ECABO) - *Multimedia-Based Performance Assessment (MBPA) in Vocational Education and Training (VET) in The Netherlands*
4. Marije Fagginger Auer (Leiden University) - *Mathematics instruction in the classroom and students’ strategy use and achievement in primary education*
5. Xin Gu (Utrecht University) - *Bayesian evaluation of informative hypotheses in general statistical models*
6. Joke Heylen (KU Leuven) - *Modeling multilevel time-resolved emotion data*
7. Marianne Hubregtse (University of Twente) - *Competence based assessment in vocational education in The Netherlands*
8. Joran Jongerling (Utrecht University) - *Modelling individual differences in intraindividual change and variability*
9. Pieter Oosterwijk (Tilburg University) - *Improving global and local reliability estimation in nonparametric item response theory*
10. Noémi Schuurman (Utrecht University) - *Time for a change: Studying individual differences in dynamics with multilevel multivariate autoregressive models*
11. Hail Michael Worku (Leiden University) - *Multivariate logistic regression using the ideal point classification model*

Projects left unfinished

1. Annelies Bartlema (KU University Leuven) - *Modeling individual differences: A Bayesian hierarchical mixture approach*
2. Susan Boerma (University of Groningen) - *Investigating opinion dynamics using the FreqNet model - An agent based approach using dynamic networks*
4.2 Dissertations

Zsussa Bakk  
*Contributions to bias adjusted stepwise latent class modelling*

16 October 2015  
MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University

Supervisors:  
Prof. J.K. Vermunt & Dr F.B. Tekle

Project financed by NWO, part of Vici grant Prof. Vermunt  
15 September 2011 - 15 March 2015

**Summary of thesis**

Latent class analysis (LCA) is used by social and behavioral scientists as a statistical method for building typologies, taxonomies, and classifications based on a set of observed characteristics. Examples include attitudinal typologies of citizens based on survey questions measuring their attitudes toward freedom of speech, subtypes of schizophrenia patients derived from recorded mood symptoms, or taxonomies of temporal project networks based on characteristics of these projects and the related organizations.

The project focuses on developing and testing correction methods for the stepwise LCA. This is an approach to extend the latent class model to include external variables. First the underlying latent construct is estimated based on a set of observed indicator variables, then in the second step individuals are assigned to the latent classes, and in the third step the class assignments from step two are used in further analyses. In the thesis we propose 3 approaches to build a stepwise LCA model, test them, and give practical recommendations which of the approaches to use under different circumstances.

Mariska Barendse  
*Dimensionality Assessment with Factor Analysis Methods*

16 February 2015  
Heijmans Institute, Faculty of Behavioural and Social Sciences, University of Groningen

Supervisors:  
Prof. R.R. Meijer, Prof. M.E. Timmerman

Project financed by NWO, Open Competition Grant  
Period: 1 September 2010 – 1 September 2014

**Project description**

Dimensionality assessment of polytomous items

Personality scales are popular instruments to measure individual’s traits. As important decisions on individuals are based on such measurements, scales of good quality are essential. Scale evaluation critically depends on appropriately assessing the number of traits measured, that is, the dimensionality of the items. For personality scales, which commonly consist of polytomous items, it is unclear which dimensionality assessment method
should be used. A comparative study, including various methods associated with factor analysis and nonparametric item response theory, will be performed. The ultimate goal is to provide proper, well-founded guidelines for the dimensionality assessment of polytomous items in personality scales.

Rivka de Vries
Bayes Factor Tests for Intervention Effects

5 February 2015
Heijmans Institute, Faculty of Behavioural and Social Sciences, University of Groningen

Supervisor:
Prof. R.R. Meijer, Dr R.D. Morey & Dr M. Huisman

Project financed by University of Groningen
Period: 1 September 2010 - 1 September 2014

Project description
A Bayesian approach to the analysis of individual change

It is clear that NHST has serious shortcomings in hypothesis testing, and that the Bayesian approach can ameliorate many if not all of the problems inherent to NHST. Because applied researchers in the field of individual change seem to be unaware of the existence or benefits of the Bayesian approach, we consider it to be useful to introduce them to the benefits of Bayesian statistics. Therefore, in the first part of the dissertation we will discuss NHST and the Bayesian approach as outlined above. We will provide examples with empirical and simulated data to show how results from NHST can be misleading and compare them with Bayesian results, in the context of single subject research.

In the second part, we will adapt existing statistics and tests for single-subject data to simple Bayes factor formulae and compare them using empirical and simulated data. Empirical data are available from several projects in which our research group is involved. Examples of statistics and tests already used in single subject studies are the percentage of non-overlapping data (the percentage of observations in a post-intervention phase exceeding the highest point in a pre-intervention phase), Cohen’s d, permutation tests, and time series analysis. Rouder et al. (2009) already presented a Bayes factor for Cohen’s d for group studies and provided a Web-based program that performs the calculations. A similar interface for single subject Bayes factors would make computing Bayes factors convenient even for researchers without deep knowledge of Bayesian statistics.

In the third part of the dissertation, we will adapt existing statistics and tests for individual change within group data to Bayes factor formulae. Again, the classical and Bayes factor statistics will be compared using empirical and simulated data. An example is the RCI of Jacobson & Truax (1991) which was already discussed for this type of data, and several variations of this measure have been developed (e.g., Bruggemans, Van de Vijver, & Huysmans, 1997; Chelune, Naugle, Lüders, Seliak, & Awad, 1993; Hageman & Arrindell, 1999; McSweeney, Naugle, Chelune, & Lüders, 1993; for a comparison of measures, see Maassen, Bossema, & Brand, 2009). If possible, online toolkits will be provided where researchers can easily calculate the Bayesian variants of their statistics.

In sum, we hope to show researchers in the field of individual change the merits of the Bayesian approach and will provide them with tools to use it. The Bayesian approach will give researchers the odds of their hypotheses, rather than the probabilities of observed and unobserved data.
Summary of thesis

In clinical practice, assessments are often performed for making decisions: for example, assessment may be aimed at deciding which treatment should be provided to a patient. By taking the decision for which assessment is performed into account, the accuracy and efficiency of assessment can often be improved (Cronbach & Gleser, 1965).

In Chapter 1, I discussed and applied curtailment, an algorithm that allows for early stopping of item administration when questionnaires are used for binary classification decisions. Application of curtailment to three mental health questionnaires was found to result in substantial test length reductions, without reducing diagnostic accuracy.

In Chapter 2, I presented a new algorithm for assessment length reduction of tests batteries: CART-SC. CART-SC combines a classification tree (CART) with application of stochastic curtailment (SC) in every node of the tree, allowing for reduction of both the number of tests administered within a battery, as well as the number of items administered within tests. By simulating application of CART-SC on an existing dataset of responses to a psychological test battery, substantial assessment length reductions could be obtained, without reducing diagnostic accuracy.

The CART algorithm is a powerful method for selecting relevant attributes for decision-making in clinical practice, because CART trees provide sequential testing plans. In addition, CART can deal with a large number of potential predictor variables, can be used for subgroup detection, and allows for automatic detection of interactions between predictor variables. These characteristics are shared by all recursive partitioning methods (RPMs). Therefore, RPMs seem preeminently suited for improving the efficacy of clinical assessment, and more appropriate than many of the data-analytic methods traditionally used in clinical research. In Chapters 3 and 4, I further discussed the potential of RPMs for improving the efficacy of clinical assessment. Clinical decisions are often based on predictions of future behavior. Therefore, in Chapter 3, I show that by deriving rules from decision trees, we can create a prediction rule ensemble. By reanalyzing a dataset from an earlier study, I show that a prediction rule ensemble allows for more efficient decision making in clinical practice, while providing predictive accuracy similar to that of logistic regression analysis, which was originally applied to the dataset.

In Chapter 4, I introduce an algorithm that can automatically detect patient characteristics that are predictive of treatment outcome in datasets in which the results of several clinical trials have been pooled. The results of the algorithm can be represented as a tree, and in a simulation I show that the algorithm performs very accurately in recovering patients characteristics that are predictive of treatment outcome.

Finally, the accuracy of predictions of treatment effects depends not only on the data-analytic method used, but also on the accuracy with which treatment outcomes are measured. Biased measurement of treatment outcomes will likely introduce bias in the estimation of a predictive model. Therefore, in Chapter 5, I discussed response-shift bias: changes in the measurement models underlying total scores on self-report inventories. As an illustration, I examined the measurement models underlying a self-report inventory from an influential trial comparing the effects of four treatments for depression. Results show that, compared to before treatment, after treatment, item scores overestimate depressive symptomatology, measurement errors are smaller and
there is a stronger association between the underlying constructs. These effects were more apparent in psychotherapy groups, than in pharmacotherapy groups. These changes indicate that response shifts have occurred, and that observed-score comparisons over time yield confounded measures of treatment efficacy.

Dereje Gudicha

*Power Analysis Methods for Tests in Latent Class and Latent Markov Models*

10 July 2015
MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University

Supervisors: Prof. J.K. Vermunt & Dr F.B. Tekle

Financed by NWO
Period: 1 September 2012 - 1 September 2015

Summary of thesis

Reviewers of journal publications and research grant proposals often request to justify the number of observations and measurement occasions used in the study. These are in fact questions about the statistical power of the performed tests; that is, about the probability of rejecting a particular null hypothesis when it is false. Whereas power analysis methods have been developed for many statistical techniques, these are currently lacking for mixture models.

This dissertation aimed to fill in this important gap in the literature by developing power analysis methods for the most important tests applied when using mixture models for categorical response variables.

Methods are described for a) determining the data requirements to achieve a certain (acceptable) power level (for example, for determining the necessary sample size or number of measurement occasions to achieve a power of .8 or larger) and b) performing power calculations to evaluate whether a specific study design yields an appropriate power level for the statistical tests of interest.

An additional objective is to learn more about the design factors affecting the power of statistical tests in latent class and latent Markov analysis, which will make it easier to design studies with sufficient power, and thus to use available resources more efficiently.

Khurrem Jehangir

*Methodological Issues in Large-Scale Educational Surveys*

29 October 2015
OMD, University of Twente

Supervisors: Prof. C.A.W. Glas & Dr A.A. Béguin

Financed by University of Twente
Period: 1 May 2006 - 1 September 2011

Project description

**The use of item response theory for scaling in educational surveys**

This project focuses on the application of item response theory (IRT) in the context of large-scale international educational surveys, such as PISA, TIMSS, CIVICS and PEARLS. Although IRT methodology has been widely used in educational applications such as test construction, norming of examinations, detection of item bias, and computerized adaptive testing, large scale education surveys present a number of specific problems. A
number of these problems are addressed in the present proposal. The first problem relates to the detection of cultural bias over countries. Statistical tests to detect item bias are available, but the sheer numbers of students (over 10,000) and countries (between 30 and 70) present feasibility problems related to the power of the tests and the presentation of the tests results, which has to be concise and meaningful. Therefore, test statistics will probably need to be redefined and functions for these statistic need to be defined that give information with respect to the seriousness of model violations in relation to the inferences that need to be made. The second problem relates to modeling of item bias. One of the possibilities in this respect that will be investigated is modeling item bias by adding country-specific item parameters or item parameters which are random over the countries. A related problem is the definition of test statistics which support the appropriateness the bias model. The third problem relates to the combination of the results of IRT measurement models with multilevel structural models that relate cognitive outcomes with background variables. Several procedures are available (concurrent and two-step procedures, maximum likelihood, Bayesian procedures and plausible value imputation). A study will be made of the relative merits and disadvantages of these methods. The fourth problem relates to linking surveys, predominantly over cycles within a survey, but possibly also between surveys. The possibility of linking arises because a survey as PISA retained a number of cognitive items and background questions over the cycles (2000, 2003, 2006 and 2009). The possibility of linking over surveys may be supported by such occasions as common items and questions or a common framework. In the latter case, a dedicated linking design may be called for. The psychometric problems related to these forms of linking, both pertaining to the measurement model and the structural model will be investigated. The supervisors of this research project are involved in a consortium led by Cito to implement Core B (background questionnaires) of the fourth cycle of the PISA by OECD. The proposed methods will be evaluated using examples of the various PISA cycles. However, the method will also be evaluated using data from the TIMSS project, and using data from national assessments as PPON and NAEP.

Renske Kuijpers

Applications of Categorical Marginal Models in Test Construction

16 January 2015
MTO, Tilburg School of Social and Behavioral Sciences, Universiteit van Tilburg

Supervisors:
Prof. K. Sijtsma, Dr M.A. Croon & Dr L.A. Van der Ark

Financed by NWO, Open Competition grant
Period: 1 September 2010 - 1 September 2014

Project description

Test construction using marginal models

Mokken scale analysis is an important statistical tool for the construction of psychological tests. For parts of the tool no statistical significance tests were available until recently, but Van der Ark, Croon, and Sijtsma (2007) showed that marginal models provided these tests. Marginal models substantially increase the possibilities of Mokken scale analysis but are available only for short tests consisting of dichotomous items. The proposal aims at extending the approach to longer tests and polytomous items, and developing it into user-friendly software tool for test construction.
Tam Thi Thanh Lam  
**Some new methods for three-mode factor analysis and multi-set factor analysis**

19 February 2015  
Psychometrics & Statistics, Heijmans Institute, Fac. BSS, University of Groningen

Supervisors: Prof. R.R. Meijer & Dr A. Stegeman

Financed by NWO, part of the Vidi grant of Dr. Alwin Stegeman  
Period: 1 February 2011 – 1 February 2015

**Project description**  
**Multi-way decompositions: Existence and uniqueness**

Over the last 10 years the interest in multi-way data representations has increased exponentially. There is growing awareness that if data are not 2-way (e.g., subjects multi-way (e.g., subjects is often desirable. Such representations are given by multi-way generalizations of Principal Component Analysis (PCA) or, equivalently, of the Singular Value Decomposition (SVD), and are called multi-way decompositions or tensor decompositions. This research project concerns the existence (main project) and uniqueness (PhD project) of an important class of multi-way decompositions and is expected to greatly benefit the application of multi-way models.

Maryam Safarkhani  
**Optimal Designs for Discrete-time Survival Analysis with Heterogeneity**

27 March 2015  
Methods & Statistics, Faculty of Social Sciences, Utrecht University

Supervisors: Prof. P.G.M. Van der Heijden & Dr M. Moerbeek

Financed by NWO  
Period: 1 January 2011 - 1 January 2015

**Project description**  
**Heterogeneity in studies with discrete-time survival endpoints: Implications for optimal designs and statistical power analysis**

The main research question in studies on event occurrence is whether and when subjects experience a particular event, such as the onset of daily smoking or the shift to adulthood. The experience of such an event and its timing can be related to explanatory variables such as gender, socio-economic status, educational level, and, in the case of an experiment, treatment condition. Such a variable’s effect should be identifiable with sufficient probability, so the power of a study on event occurrence should be controlled in the design phase.

In studies on event occurrence subjects may be monitored continuously, or be measured at intervals. Interval measurement is often used in the behavioural sciences. The sample sizes that should be used to achieve a desired power level are often large and not always feasible in social science research. It is therefore worthwhile to study to what extent covariates can improve statistical power and reduce sample size. The costs of taking such covariates is also taken into account. We will also study optimal designs where treatment and covariates are used as predictor variables in the statistical model.

Furthermore we study trials where part of the heterogeneity is unobserved. To what extent does ignoring
unobserved heterogeneity result in incorrect conclusions with respect to the treatment effect and its significance? How large should sample size be if unobserved heterogeneity is taken into account?

Gerko Vink

Restrictive imputation of incomplete survey data

13 March 2015
Methodology and Statistics, Faculty of Social Sciences, Utrecht University

Supervisors: Prof. S. Van Buuren, Dr J. Pannekoek, Dr L.E. Frank

Financed by Utrecht University and Statistics Netherlands (CBS)
Period: 1 September 2009 - 1 September 2013

Project description
Restrictive imputation of incomplete survey data

Imputation is a method to correct for missing data by using various models to estimate missing values whilst adding the estimated data to the original dataset. The completed dataset can then be analyzed by methods for complete data. To estimate the reliability of estimates on imputed data, however, special techniques are needed, because standard methods for complete data do not discriminate between real and imputed data. Imputations are predictions for the values that could have been encountered, if the missing data would have been observed. Because imputations are, to some extent, used as real observations, these predictions have to be as accurate as possible. In order to obtain accurate estimates, models have to be constructed that optimally represent the properties of the various variables and their internal coherence. In addition to the quality of predictions, plausible imputations also have to meet certain a priori knowledge, such as variable restrictions (e.g. an income must be greater than or equal to zero) or restrictions conform to known population distributions (e.g. the known amount of cars in a country).

Three research topics will be distinguished in this research proposal: imputing variables that have to meet restrictions (§A), imputing semi-continuous variables (§B) and measuring the quality of imputation models and the accuracy and reliability of estimations on imputed data (§C). These research questions can be answered within a PhD position, resulting in a dissertation, as well as new software. Expected results include answering the following general research questions:
– How can imputations under row and column restrictions be executed?
– How can imputations on semi-continuous data best be done?
– How can imputations most effectively and plausibly be evaluated?

Furthermore, based on the research in this PhD-project, recommendations for routinely use of imputation methods at Statistics Netherlands will be made.
Ingrid Vriens

Two of a Kind? Comparing Ratings and Rankings for Measuring Human Values using Latent Class Modeling

20 November 2015
MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University

Supervisors: Prof. J.K. Vermunt, Dr J.P.T.M. Gelissen & Dr G.B.D. Moors

Financed by NWO
Period: 1 March 2011 - 1 March 2015

Summary of thesis
The study of values is an important topic within the social sciences. After years of conducting research still uncertainty exists whether these values can be measured best by using a ranking approach or a rating approach.

In the ranking approach respondents are being asked to rank-order a number of alternatives based on importance of each of the alternatives relative to the other alternatives presented (for example: choose top 3 most important alternatives), while in the ranking approach respondents are being asked to rate each of the alternatives on a predefined scale (like for example a 5-point Likert scale ranging from 1 “not important” to 5 “very important”).

Ideally results obtained by both methods should be similar, however there are method-specific features that may be biasing the results which have nothing to do with the content of the question (like the tendency in a rating scale to assign the same value to (almost) all alternatives).

The main finding in this dissertation is that, when controlling for method-specific features of each response format and by using a latent class modeling approach, the results obtained by the ranking and rating approach are more similar than previously assumed.
4.3 New projects

**Yasin Altinisik - Research replication through the evaluation of prior knowledge in the form of informative hypotheses and sparse big data models**

Methodology and Statistics, Faculty of Social Sciences, Utrecht University  
Supervisors Prof. H. Hoijtink, Prof. T. Oldenhinkel, Dr R. Kuiper & Dr R. Klein Entink  
Financed by NWO  
20 February 2014 – 20 March 2018

**Summary**

Research replication is increasingly becoming an important topic. It has two main goals: to reduce the probability of false positives and false negatives; and, to test the generalizability of research conclusions to other (sub)populations and related (but not necessarily exactly the same as in the original study) contexts. Currently the methodologies that are available for research replication are rather limited. In this project a new methodology will be developed, evaluated, and applied. Knowledge derived from existing animal studies, completed waves of cohorts, and expert elicitation will be formalized into informative hypotheses. Subsequently the support in new data for these hypotheses will be quantified using a new model selection criterion: a generalization of the GORIC. The performance of this new approach will be evaluated by means of a simulation study and through its use (in cooperation with other CID researchers) in three case studies: translating the results of animal studies into hypotheses with respect to the development of children; replication of results from a study with respect to attention style as conditional adaptation with different subpopulations and contexts; and, replication of expert expectations with respect to the relation between exposure to stories and the development of social competence and self-regulation.

**Frank Bais - Respondent profiles and questionnaire 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

**Summary**

More and more surveys use multiple modes (web, mail, phone, face-to-face); they supplement or replace traditional interviewer modes by web. In multi-mode questionnaire design, usually some consideration is given to mode-specific measurement error. Despite this consideration, however, these measurement effects are frequently unexpectedly large and hamper publication. For this reason, there is a strong incentive to better predict measurement effects. Measurement effects are determined by the interplay between characteristics of the questionnaire and characteristics of the respondents, which we will refer to as questionnaire profiles and respondent profiles, respectively. In this project, we will construct a typology of characteristics of questionnaires and respondents to identify such profiles. When these profiles appear to explain variation in answering behaviour, these profiles may function as a bridge between anticipating measurement effects and purposeful consideration of survey mode.
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

Summary
The global consensus on climate change today agrees that climate warming trends are very likely due to human activities. Households account for 26% of the total primary energy consumption in Europe (Eurostat) and there is a rising interest in behaviour based interventions aimed at targeting household energy efficiency. Traditionally, the outcome of these interventions have been given more importance than the underlying process that is assumed to lead to the outcome. We argue that to gain better insight into the process of behaviour change and to help inform future behavioural interventions, it is imperative to examine the patterns and transitions reflected in household energy savings over time. Or more specifically, we intend to model the dynamics (process) of household energy consumption after intervention.

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

Summary
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 is by utilizing already available register data and supplement them with survey data. A major challenge with the use of combined datasets is to obtain consistent population estimates. Therefore, the main goal of this project is to develop an approach for combining different data sources as effectively and efficiently as possible that can easily be implemented and applied in practice.

In the first project, the focus is on constructing a general class of imputation models that can be used to model the truth, the variable that gives the true value of the conceptual phenomenon that one aims to measure, by making use of multiple indicators within a combined dataset. In the second project, more attention is paid on the relation of the conceptual phenomenon with other variables. The third project focuses on using the models to impute other missing values within the combined dataset as well. Other projects focus on...
comparing the imputation models with other methods for obtaining consistent estimates within combined datasets and on extensions for longitudinal data.

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

Summary
The project will develop and extensively test new models for the prediction of individual attitudinal responses, preferences, emotional and behavioral tendencies as measured in questionnaires. A common basic assumption of unfolding models is that the probability of endorsement of an attitude item or the occurrence of a behavioral tendency is a single-peaked function of the underlying scale being measured. When background variables for persons and/or design characteristics for items are available, we can incorporate them in the model and then predict and potentially explain the response of new persons with known background profiles and/or interpolate their response tendency to items not previously measured. The explanatory version of this approach represents an alternative to Structural Equation Modelling (SEM) in problems characterized by a unidimensional Latent Variable (LV) data structure. This approach will improve the assessment of items in attitudinal and diagnostic assessment for item bank building and optimization, as items can be screened to meet ad-hoc specifications (such as a regular coverage of the LV dimension). In marketing and opinion survey research this approach can be used to rank items in terms of appeal to different types of audiences. Person response assessment is also improved by a more accurate and flexible specification of item features. A common simulation framework for experimental testing is used for all models and estimation strategies, and the software developed for model estimation and hypothesis testing will be integrated in a user-friendly R-package.

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

Summary
Data fabrication and other forms of research misconduct present major threats to the validity of empirical findings and to the trust in science. The goal of the proposed research is to develop methods for the examination of signs of potential data fabrication using statistical tools. In four projects we (i) review statistical tools, (ii) do empirical research on data fabrication, (iii) develop and apply software on a large scale to detect signs of data fabrication in published results, and (iv) validate the tools and software. The projects’ results will advance future detection of misconduct and increase trust in science.
Robert Hillen - *Latent categories versus latent dimensions*

MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University  
Supervisors Dr W.H.M. Emons, Dr J. M. Wicherts, Prof. K. Sijtsma  
Financed by Tilburg University  
2012 - 2016

**Summary**  
The question whether constructs are dimensions or categories is a long-standing and on-going debate in psychology. As psychological constructs cannot be directly observed, they are commonly measured by means of psychometric models that formalize and analyze the responses to problems, questions, statements, and so on. Many psychometric models and other statistical procedures have been developed over the past century that either assume a dimensional latent variable, a categorical latent variable, or both.

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

**Summary**  
The size of an elusive population is often of interest to social scientists and policy makers. Elusive populations such as drug addicts and delinquents are often stigmatized, leading to a lack of knowledge about the size and composition of such a population. With the use of registration files, for example police arrests or hospital admissions, a list of events counts of observed individuals from an elusive population can be generated. Population members who are not apprehended by the police or admitted to the hospital, are not in the registration file. The data are therefore truncated at zero; only population members that where seen at least once are registered. The statistical challenge is to estimate the number of unobserved individuals, which is then added to the number of observed individuals to obtain an estimate of the total population size.

The basic model for the analysis of event count data is the zero-truncated Poisson regression model. This model uses the summary information of event counts of each individual in the estimation procedure. In this PhD project, the frequently used Poisson model is extended to the more flexible and less restrictive recurrent events model for the purpose of population size estimation. Rather than using the summary information of events counts, the recurrent events model also incorporates when each apprehension takes place. This approach is also termed event history analysis and allows for the inclusion of time-varying covariates and periodic effects (eg. seasonal variation in capture probabilities), which is the focus of the first paper in this PhD project.

Other projects in this PhD will focus on more extensions to the models for population size estimation from a single dataset. These extensions consist of the inclusion of detention times, unobserved heterogeneity and latent subpopulations in the analysis. By including these factors in the population size estimation framework, we are able to get a more realistic reflection of reality and hence improved estimates.
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

Summary
Different projects that concern aspects of the formulation of informative hypotheses. The Bayes factor can be used to evaluate informative hypotheses. However, little is known about the frequentist properties of a Bayes factor. Furthermore, it is important to consider what conclusion is made based on the Bayes factor. Different decision strategies result in differences in the minimally required sample size, relevant (error) probabilities and conclusions that can be drawn. Additionally, if multiple people are evaluated consecutively, how can the evidence be aggregated and what information does this provide us?

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

Summary
Some important process measurement models assume that a response is triggered after an information accumulation process. In the current project we validate these process measurement models and extend them for broad applicability. The project consists of four subprojects: Subproject one focuses on extending the existing models for multiple-choice items, thereby accounting for alternative attractiveness of the response categories. In subproject two we develop models for response processes that require multiple stages. Subproject three investigates how group differences in these models can be traced. In the final subproject an R package is developed that allows fitting and evaluation of our models.

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

Summary
In the Netherlands, educational testing is heatedly debated. In specific, there is disagreement whether to use objective test results or expert knowledge (i.e., teacher expertise) for many school-track related decisions. To prevent placing one’s “bet” on either test results or teacher expertise, we propose hedging our bets using a
Bayesian methodology that based judgements on the ability of children on both teacher expertise and test results. To make this possible, the following issues are investigated in my PhD:

1. Experts (i.e., teachers, educational practitioners, test takers, et cetera) need to be able to express their knowledge in such a way that it can be used in statistical modelling (i.e., expert elicitation);
2. The quality of test results and expert knowledge has to be evaluated to avoid inaccuracy and/or bias;
3. Test results and expert knowledge need to be combined taking the relative quality of both sources into account;
4. Possible conflicts between expert knowledge and test results need to be checked and the cause for these conflicts need to be evaluated.

The CITO-LVS and WISC-III IQ-test are used as case studies to provide a strong test and potential demonstration of the advantages and pitfalls of the Bayesian method in educational testing.

Xinru Li - Meta-CART: An integration of classification 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

Summary
Meta-CART: integrate classification and regression tree into meta-analysis
Meta-analysis is an important tool to synthesize results from multiple studies in a systematic way. Interaction effects play a central role in assessing conditions under which the relationship between study features and effect size (the outcome variable) changes in strength and/or direction. However, within the framework of meta-analysis, interaction effects between moderators are barely investigated due to the lack of theories for confirmatory studies and methods with enough power for exploratory studies. To detect interaction effects in exploratory studies, a new approach named "meta-CART" introduced Classification and Regression Trees (CART) in the field of meta-analytic data to identify interactions. The current version of meta-CART has several shortcomings: 1) when applying CART, the sample sizes of studies are not taken into account; 2) the effect size is dichotomized around the median value; 3) the method is a stepwise approach. In this PhD project, we will propose new extensions for meta-CART to overcome its shortcomings and to improve its performance. Furthermore, Monte Carlo simulation studies will be carried out to valuate the performance of (extended) meta-CART. As a result, software will be developed for researchers to apply meta-CART for interaction detection in real-world data.

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

Summary
International Large-scale Assessment Surveys, such as TIMSS, PIRLS, and ICILS, play a major role in the evaluation of the state of educational systems, in guiding educational policy and in more theory oriented educational effectiveness research. Statistical issues of such surveys are complicated by the sheer size of the
data, the multilevel structure of the data, complex test administration designs, and possible cultural bias. Though the statistical methodology for tackling these issues has become more and more sophisticated over the years, criticism of the used statistical methodology is eminent. An example that has attracted wide attention is the article by Kreiner and Christensen (2014) which criticizes the use of the Rasch model and the handling of cultural bias across countries. This project aims at providing new orientations for the analyses and comparing them with existing solutions. Components are developing and comparing of different ways of handling cultural differential item function and developing methods to combine these models with between-scales multidimensional population models and with multilevel latent regression models.

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

**Summary**

The advent of smartphone technology has led to a huge increase in the availability of intensive longitudinal (also known as time series, ambulatory assessment, experience sampling methodology or ESM) data. In psychology in particular this type of data is increasingly being used to model psychological processes or disorders as dynamic systems. There a wide range of models used to do this, but the most popular models are based on the analysis of lagged relationships between variables measured at different occasions. Such approaches form the core of both longitudinal mediation analysis and dynamical network modeling.

However, it is well-known that these relationships depend on the amount of time that elapses between measurements, such that, among other problems, results cannot be generalized to other lags. An innovative and elegant solution to this problem is to adopt a continuous time (CT) modelling approach, based on the use of differential equation models. This shift to a CT modelling approach however also entails a shift in the perspective with which the dynamic systems we are interested in are viewed. This leads to many major implications regarding the calculation and interpretation of for instance path-specific effects, and other causal or quasi-causal notions. The current project is concerned with developing a CT approach to dynamical network analysis, and tackling the most urgent problems that arise when applying the CT perspective to mediation and network analysis.

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

**Summary**

This PhD project is part of a larger project that involves two professors (my promoters), three post-docs, and a programmer. It is a joint effort of the University of Amsterdam (UvA), CITO, and OefenWeb (a spin-off from the UvA Psychological Methods department that delivers gamified math and language practice to primarily primary school children). The aim of the joint research project is to increase the return of investment (ROI) of
online learning. In order to accomplish this goal, we develop methods to track children’s math abilities through time and study learning interventions that potentially increase the ROI. Ultimately, a framework that enables us to relatively easily deploy and experiment with learning interventions, and an ability tracker that enables the evaluation of the interventions’ effectiveness, must result in insights in which learning interventions are most effective. My PhD project targets experimentation (i.e., A/B testing) with learning interventions in large-scale online learning systems.

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

Summary
Psychological research aims to understand constructs that exist in the minds of individuals and that affect individuals and their societies, such as anxiety, racism, intelligence, and happiness. Researchers use statistical models to study these constructs, and the models they choose affect the conclusions that are made and future research questions. The current standard in psychology is to construe and model psychological constructs as latent causal variables that give rise to measurable variables. This standard is being challenged by a new movement to construe psychological phenomena as networks of interrelated variables in a causal system. The two approaches are radically different in what they imply about the nature and structure of psychological constructs and their causes and effects. Until now, the network and latent variable methods for representing and modeling psychological constructs have been developed and studied independently. The proposed research aims to integrate these fields of methodological research.

The main research objectives are, first, to develop and test ways of comparing the statistical models implied by each framework in terms of parsimony; second, to develop and test ways of comparing the models in terms of fit; and third, to develop and test statistical methods for comparing the validity of the two frameworks in terms of their ability to situate the construct within the larger theoretical space. The overarching project goal is to provide guidance to applied researchers in the social sciences as to how to choose a statistical model for their data based on both theoretical and empirical considerations.

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

Summary
Many statistical methods do not respect the ordinal scale that is typical of measurement in psychology; even when they do, classical hypothesis tests have several drawbacks. Bayesian inference offers a promising alternative framework but has not often been applied to ordinal measurements. The current project aims to harmonize these traditionally disparate fields of statistical inquiry. We propose to model test statistics and use parametric yoking in order to obtain a complete Bayesian inference framework for five nonparametric tests. This framework allows researchers to quantify evidence in favor of the null hypothesis or in favor of the alternative hypothesis, and monitor such evidence continually, as the data accumulate. This flexible method of
evidence monitoring is both ethical and efficient. The proposed tests will be incorporated in R and in JASP, an open source GUI for Bayesian analyses. In sum, we propose to bring together the advantages of Bayesian inference and ordinal data analysis, and disseminate these techniques among a wide audience.

**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

**Summary**

*Bayesian* structural equation modeling (SEM) is becoming increasingly popular in applied research as an alternative to *classical* SEM. In the Bayesian approach, a prior needs to be specified. When appropriately chosen, the prior yields higher statistical power, prevents technical problems occurring in classical SEM, such as nonconvergence and inadmissible solutions, and allows the researcher to incorporate state-of-the-art substantive knowledge. When inappropriately chosen, however, priors cause bias. The goal of this project is to develop novel priors for Bayesian SEM that overcome the technical limitations of classical SEM while avoiding bias. The new methodology will be implemented in user-friendly statistical software.

**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

**Summary**

The field of psychometrics has had an eventful history, yet surprisingly little has been written about its origins and its development over the years. In this project, we aim to write an integrated history of psychometrics. To achieve this goal, we will i) interview prominent psychometricians on important inventions in psychometrics, ii) create a timeline and genealogical tree that describes the origins and development of psychometrics and iii) explore important turning points, such as the development of the factor model. This project will ultimately result in a book proposal for the first book on the *History of Psychometrics*.

**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

**Summary**

Optimal scaling with regularization and survival analysis are two research elds in statistics. In the history of the
methodology for the social and behavioral sciences, there has been a strong demand for approaches that deal with categorical data. Classical statistical methods had to be adapted to suit particular characteristics of research in, for example, psychology, education, political science, and market research. These adaptations were aimed at the optimal assignment of quantitative values to qualitative scales, and have been actively developed in the area of psychometrics.

In the medical sciences, there is ample opportunity of application of optimal scaling as well. In survival analysis, the predictor is usually a composite variable derived from a large number of categorical variables, for example measuring depression. The basic data are non-numerical, with measurements recorded on scales having an uncertain unit of measurement. Such qualitative or categorical variables describe the objects (patients) in a limited number of categories. Ignoring the particular characteristics of the data, the typical approach in survival analysis it to simply compute a sum score as a composite variable. The incorporation of optimal scaling in survival analysis seems to have been given very little attention. This situation motivates the PhD research described in this proposal. Quite recently optimal scaling has been combined with regularization to improve the prediction accuracy of regression models. Our ultimate aim is to combine the two fields to improve the prediction accuracy of the proportional hazards model.

In the sequel, I will first briefly describe the basics of classic survival analysis and introduce notation. Then, I will describe the data set that will be used, being an example of a typical data set used in survival analysis. This data example will show the relevance of the envisaged research, since it will become clear that optimal scaling is extremely appropriate for the type of data under consideration. Finally, a time line will be given which gives an impression of my activities during my PhD.

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**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

**Summary**

Measurement instruments, such as tests and questionnaires, for psychological attributes, such as intelligence and personality traits, must be reliable and valid. In classical test theory, reliability refers to the degree to which a measurement value is repeatable under precisely the same test administration conditions (Lord & Novick, 1968). Validity refers to the attribute the test measures and also to practical use of tests, such as prediction of educational and job success and suitability for therapy (Lissitz, 2009). In this project, we concentrate on psychometric issues and problems of reliability, and we provide solutions.

1. The first project provides an overview of the different approaches to reliability and the varying methods for estimating the reliability coefficients that are associated with these approaches.
2. The second project assesses estimating the reliability of single items. The reliability of a single item may provide a more direct and interpretable contribution to the test-score reliability.
3. In the third project, standard errors are obtained for a variety of reliability methods, such as the lambda coefficients, the MS–statistic, and stratified alpha (Cronbach, Schönemann, & McKie, 1965; Rae, 2007). Additionally, the bias of these estimation methods is investigated.
4. The fourth project deals with reliability of nominal data, by focusing on the degree to which nominal scores are replicable over repeated observations.
5. The final project extends the framework developed in the previous project such that it can be applied to item scores having an ordinal level of measurement.
4.4 Running projects

**Joost Agelink van Rentergem Zandvliet**

*Advanced Neuropsychological Diagnostics Infrastructure (ANDI)*

Brain & Cognition / Psychology, Fac. Social and Beh. Sc., University of Amsterdam

Supervisors: Prof. Ben Schmand, Prof. Hilde Huizenga, Prof. Jaap Murre

Financed by NWO/MaGW

Period: 1 September 2013 – 1 September 2017

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**Florian Böing-Messing**

*Testing order-constrained hypotheses on variance components*

MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University

Financed by Tilburg University

Period: 1 September 2012 - 1 September 2016

Supervisors: Prof. J.K. Vermunt & Dr J. Mulder

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**Kirsten Bulteel**

*Dynamic network models for dyadic data*

Faculty of Psychology and Educational Sciences, Methodology of Educational Sciences Research Group, KU Leuven

Financed by FWO

Period: 1 October 2013 - 1 October 2017

Supervisors: Dr E. Ceulemans, Prof. F. Tuerlinckx

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**Jed Cabrieto**

*Capturing time-varying response patterning and synchronicity through Switching PCA model*

Methodology of Educational Research, Fac. of Psychology and Educational Sc., KU Leuven

Supervisors Dr Eva Ceulemans, Prof. Francis Tuerlinckx, Dr Peter Kuppens

Financed by

Period: 1 October 2014 – 1 October 2018
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  
Period: September 2014 – 1 September 2018

Janneke De Kort  
**Do our genes pave our way? Modeling GE-covariance, GxE interaction and moderated GE-covariance in longitudinal twin-models**  
Department of Biological Psychology, Faculty of Psychology and Education, VU University Amsterdam  
Financed by NOW Social Sciences, Research Talent Grant  
Period: 1 October 2013 – 1 October 2017  
Supervisors: Prof. C.V. Dolan & Prof. D.I. Boomsma

Dries Debeer  
**Psychometric models for differential item performance**  
Quantitative Psychology and Individual Differences, Faculty of Psychology and Educational Sciences, KU Leuven,  
Financed by KU Leuven  
Period: 1 October 2010 - 1 October 2016  
Supervisor: Prof. R. Janssen

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

Laura Dekkers  
**Why speeding on your scooter is a good idea: Decision strategies in childhood and adolescence**  
Psychology, Faculty of Social and Behavioural Sciences, University of Amsterdam  
Supervisors Prof. H.M. Huizenga, Dr B.R.J. Jansen  
Financed by  
Period: 1 September 2013 – 1 September 2017

Dino Dittrich  
**Social network modeling using Bayesian statistics**  
MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University  
Supervisors: Prof. J.K. Vermunt, Prof. R.T.A.J. Leenders, Dr J. Mulder  
Financed by Tilburg University  
Period: 1 June 2014 – 1 June 2017

Lisa Doove  
**Methodology for detecting treatment-subgroup interactions**  
Faculty of Psychology and Educational Sciences, Quantitative Psychology and Individual Differences, KU Leuven  
Financed by KU Leuven  
Period: 1 October 2012 - 1 October 2016
Supervisors: Prof. I. Van Mechelen, Dr E. Dusseldorp & Dr K. Van Deun

Sacha Epskamp
*Network psychometrics*
Department of Methodology, University of Amsterdam
Financed by NWO, Research Talent Grant
Period: 15 August 2012 - 15 August 2016
Supervisors: Prof. D. Borsboom & Prof. P.A.L. de Boeck

Paulette C. Flore
*The psychometrics of stereotype threat*
MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University
Supervisors Dr J.M. Wicherts & Prof. J.K. Vermunt
Financed by NWO Talent Grant
Period: 1 September 2013 – 1 September 2017

Susanna Gerritse
*The estimation of population size and population characteristics using incomplete registries*
Methods & Statistics, Faculty of Social Sciences, Utrecht University
Financed by Utrecht University / Statistics Netherlands (CBS)
Supervisors: Prof. P.G.M. Van der Heijden & Prof. B.F.M. Bakker

Abe Hofman
*Analyzing developmental change with time-series data of a large scale monitoring system*
Psychological Methodology, Department of Psychology, FMG, University of Amsterdam
Financed by NWO, Research Talent grant
Period: 1 September 2012 - 1 September 2016
Supervisors: Prof. H.L.J. Van der Maas, Dr I. Visser & Dr B. R. J. Jansen

Lianne Ippel
*Streaming estimation of response heterogeneity*
MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University
Supervisors Dr M.C. Kaptein and Prof. J.K. Vermunt
Financed by Tilburg University
Period: 1 October 2013 - 31 August 2017

Ruslan Jabrayilov
*Improving assessment of individual change in clinical, medical and health psychology*
MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University
Financed by NWO, Open Competition grant
Period: 1 December 2011 - 1 December 2016
Supervisors: Dr W.H.M. Emons, Prof. K. Sijtsma & Dr F.B. Tekle

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)
Financed by IBM / SPSS Leiden
Period: 1 December 2012 - 1 December 2017  
Supervisor: Prof. J.J. Meulman

Tanja Krone  
*Understanding human behavioural processes with Bayesian dynamic models*  
Psychometrie & Statistiek, Fac. BSS, University of Groningen  
Financed by NWO, Research Talent grant  
Period: 1 July 2012 - 1 March 2016  
Supervisors: Prof. R.R. Meijer & Dr M.E. Timmerman

Jurian Meijering  
*The Delphi method: methodological issues and its application to the development of rankings*  
Research Methodology Group, Wageningen University  
Supervisors: Prof. Adri Van den Brink, Prof. Kristine Kern, & Dr Hilde Tobi  
Financed by  
Period: 1 September 2011 – 1 September 2016

Merijn Mestdagh  
*Modeling and control of dynamical within-person networks*  
Faculty of Psychology and Educational Sciences, Quantitative Psychology and Individual Differences, KU Leuven  
Financed by FWO  
Period: 1 October 2013 – 1 October 2017  
Supervisors: Prof. F. Tuerlinckx, Prof. D. Borsboom & Dr P. Kuppens

Camelia Minica  
*On modeling genetic association with addiction phenotypes*  
VU University Amsterdam, Department of Biological Psychology, Faculty of Psychology and Education, Room 2b-03  
Supervisors: Prof. D.I. Boomsma, Prof. C.V. Dolan & Dr J. Vink  
Financed by VU University Amsterdam  
Period: 1 January 2012 - 1 January 2016

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  
Period: 1 September 2014 – 1 September 2018

Erwin Nagelkerke  
*Diagnostics for latent class models with dependent univariate and multivariate observations*  
MTO, Tilburg School of Social and Behavioral Sciences, Universiteit van Tilburg  
Supervisors: Prof. J.K. Vermunt & Dr D. Oberski  
Financed by NWO, Research Talent Grant  
Period: 1 February 2013 – 1 February 2017

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Michèle Nuyten  
**Human factors in statistics**  
MTO, Tilburg School of Social and Behavioral Sciences, Universiteit van Tilburg  
Supervisors: Dr J.M. Wicherts, Dr M.A.L.M. Van Assen & Prof. J.K. Vermunt  
Financed by NWO, Vidi grant nr 452-11-004  
Period: 1 December 2012 - 1 December 2016

Hannah Oosterhuis  
**Improving norms for psychological and educational tests**  
MTO, Tilburg School of Social and Behavioral Sciences, Universiteit van Tilburg  
Supervisors: Dr L.A. Van der Ark & Prof. K. Sijtsma  
Financed by NWO, Research Talent Grant  
Period: 1 September 2012 - 1 September 2016

Silvia Rietdijk  
**Time for a change: Studying individual differences in dynamics**  
Methods & Statistics, Utrecht University  
Financed by NWO, part of Vidi grant of Dr. Ellen Hamaker  
Period: 1 September 2012 - 1 September 2016  
Supervisors: Prof. H. Hoijtink & Dr E. Hamaker

Inga Schwabe  
**Nurturing natural talents: A twin study**  
Department of Research Methodology, Measurement and Data Analysis, Faculty of Behavioural Sciences, University of Twente  
Supervisors: Prof. C.A.W Glas, Dr S.M. Van den Berg, Dr A.A. Beguin & Prof. D.I. Boomsma  
Financed by NWO, PROO grant  
Period: 1 January 2013 - 1 January 2016

Florian Sense  
**Bayesian inferential methods for state-trace plots**  
Heijmans Institute, Faculty of Behavioural and Social Sciences, University of Groningen  
Supervisors: Prof. R.R. Meijer & Dr R.D. Morey  
Financed by NWO  
Period: 1 September 2012 – 1 September 2016

Aniek Sies  
**Developing a statistical methodology for optimal treatment assignment**  
Quantitative Psychology and Individual Differences, Faculty of Psychology and Educational Sciences, KU Leuven, Belgium  
Supervisor: Prof. Iven van Mechelen  
Financed by  
Period: No exact data available

Robbie Van Aert  
**Meta-analysis in the presence of publication bias and researcher degrees of freedom**  
MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University  
Supervisors: Prof. K. Sijtsma, Dr M.A.L.M. van Assen & Dr J.M. Wicherts  
Financed by NWO (Research Talent Grant)  
Period: 1 September 2013 – 1 September 2017
Claudia Van Borkulo

**A network approach to mood disorders**

Psychological Methods, Psychology/Psychiatry, University of Amsterdam & Medical University Center Groningen

Supervisors: Prof. Robert A. Schoevers (UMCG) & Prof. Denny Borsboom (UvA)

Financed by

Period: 1 November 2012 – 1 November 2016

Mattis van den Bergh

**Divisive latent class modeling**

MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University

Supervisors: Prof. J.K. Vermunt, Dr V.D. Schmittmann

Financed by NWO – Vici

Period: 1 May 2014 – 1 September 2017

Leonie Van Grootel

**Not as we know it: Developing and evaluating synthesis methods that incorporate quantitative and qualitative research**

Methods & Statistics, Faculty of Social Sciences, Utrecht University

Financed by Utrecht University

Period: 1 August 2011 - 1 August 2017

Supervisors: Dr H.R. Boeije, Dr F. van Wesel & Prof. J. Hox

Geert Van Kollenburg

**Diagnostics for latent class models**

MTO, Tilburg School of Social and Behavioral Sciences, Tilburg University

Financed by NOW, part of Vici grant Prof. dr J.K. Vermunt

Period: 1 July 2012 - 1 July 2017

Supervisors: Prof. J.K. Vermunt & Dr J. Mulder

Eva Van Vlimmeren

**The mapping of national cultures: Examining the robustness of measurements of cross-national cultural dimensions**

MTO, Tilburg School of Social and Behavioral Sciences, Universiteit van Tilburg

Financed by NWO

Period: 1 January 2012 – 1 January 2017

Supervisors: Prof. J.K. Vermunt & Dr G.D.B. Moors

Cooijse Veldkamp

**Human factors in statistics**

MTO, Tilburg School of Social and Behavioral Sciences, Universiteit van Tilburg

Supervisors: Dr J.M. Wicherts, Dr M.A.L.M. Van Assen & Prof. J.K. Vermunt

Financed by NWO, Vidi grant nr 452-11-004

Period: 1 December 2012 - 1 December 2016

Mathilde Verdam

**Using Structural Equation Modeling to detect measurement bias in patient-reported quality-of-life outcomes to improve their interpretation**

Department of Child Development and Education, University of Amsterdam

Supervisors: Prof. F.J. Oort & Prof. M.A.G. Sprangers

Financed by Dutch Cancer Society (KWF)

Period: 1 June 2012 - 1 June 2016
Marlies Vervloet  
*Model construction in (multilevel) regression analysis*  
Methodologie van het Pedagogisch Onderzoek, Faculty of Psychology and Educational Sciences, KU Leuven  
Financed by KU Leuven  
Period: 1 October 2010 - 1 October 2016  
Supervisors: Dr W. Vanpaemel

Davide Vidotto  
*Multiple imputation of nested missing data using extended latent class models*  
MTO, Tilburg School of Social and Behavioral Sciences, Universiteit van Tilburg  
Supervisor: Prof. J.K. Vermunt  
Project financed by NWO, Research Talent Grant  
Period: 1 September 2013 - 1 September 2017

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  
Period: 1 July 2014 – 1 July 2018
5 Graduate training program

5.1 Courses in the IOPS curriculum

In 2015 five courses of the IOPS curriculum were organized:

1. **Generalized latent variable modeling** (elective)
   - Tilburg University
   - Instructor: Prof. J.K. Vermunt
   - Dates: 14 – 15 January 2015

2. **What is Psychometrics?** (mandatory)
   - University of Amsterdam
   - Coordinator: Prof. D. Borsboom
   - Dates: 17 – 19 February 2015

3. **Advising on Research Methods** (mandatory)
   - University of Amsterdam
   - Instructors Dr Herman Adèr & Prof. Don Mellenbergh
   - Dates: 3, 10, 17, 24 and 31 March 2015

4. **Applied Bayesian Statistics** (elective)
   - Utrecht University
   - Instructors: Herbert Hoijtink, Irene Klugkist and Rens Van de Schoot
   - Dates: 20 – 24 April 2015

   - KU University of Leuven
   - Instructors: Francis Tuerlinckx, Geert Molenberghs, Katrijn van Deun and Tom Wilderjans
   - Dates: 18 - 19 November 2015

5.2 Conferences

5.2.1 30th IOPS Summer Conference

The 30th IOPS Summer Conference was held at Utrecht University on 18-19 June 2015.

Invited speakers

- Eric-Jan Wagenmakers (University of Amsterdam) - *JASP: A Fresh Way to do Bayesian Hypothesis Testing*
- Daniel Oberski (Utrecht University) - *Model fit evaluation by sensitivity analysis*

PhD student presentations

- Noémi Schuurman - *Multilevel autoregressive modeling with measurement error*
- Xin Gu - *Controlling for error probabilities when using default Bayes factors*
- Dereje Gudicha - *Power Analysis for the Likelihood Ratio Test in Latent Markov Models: Short-cutting the bootstrap p-value based method*
- Joke Heylen - *Two-mode K-Spectral Centroid analysis for studying multivariate dynamical processes*
Maria Bolsinova - Testing conditional independence and modeling conditional dependence between response time and accuracy

Ruslan Jabrayilov - Comparison of classical and modern testing methods in change assessment

Pieter Oosterwijk - Reliability estimation and coefficient alpha revisited

Marije Fagginger Auer - Exploring relations between instruction, strategies and achievement in mathematics: latent variable modeling of large-scale assessment data and experiments

Xinru Li - Meta-Cart: Integrating Classification and Regression Trees into Meta-analysis

PhD student poster presentations

Jedelyn Cabrieto - Comparing the performance of non-parametric change point detection methods for capturing response concordance

Jolien Cremers - Bayesian Longitudinal Modelling of Circular Data: Application and Interpretation

Laura Dekkers - Decision Making in a Sequential Context: A Drift Diffusion Model Study

Dino Dittrich - Bayesian Analysis of the Network Autocorrelation Model

Paulette Flore - Publication bias in practice: The case of Stereotype Threat

Frank Bais - Intercoder Reliability: Coding Surveys on their Item Characteristics for Constructing Questionnaire Profiles

Robert Hillen - A Critical Assessment of Taxometrics

Jurian MeiJering - The Delphi method: methodological issues and its application to the development of rankings

Camelia Minica - Family-based genetic association analysis: methods and applications to addiction phenotypes

Kees Mulder - Extending Bayesian analysis of circular data to comparison of multiple groups

Aniek Sies - Comparing four methods for estimating tree-based treatment regimes

Mariëlle Zondervan-Zwijnenburg - Development and evaluation of a belief elicitation procedure

5.2.2 25th IOPS Winter Conference

The 25th IOPS Winter Conference was held on 10 and 11 December 2015 at Leiden University.

Invited speakers

Carolin Strobl - Detecting differential item and differential step functioning by means of model-based recursive partitioning

Xin Gu (winner of the IOPS Best Paper of 2014 Award) - Bayesian evaluation of inequality constrained hypotheses

Tom Wilderjans - Combining cluster analysis techniques and three-way component models to account for heterogeneity in the components underlying three-way data
PhD student presentations

- Marlies Vervloet - *Model selection for principal covariates regression*
- Mathilde Verdam - *Investigating change in health-related quality of life: What are we measuring?*
- Susanna Gerritse - *How implied coverage affects capture-recapture estimation for administrative data*
- Tanja Krone - *A Bayesian Dynamic Model to analyse Emotion Dynamic Features in Intensive Longitudinal Data*
- Camelia Minica - *The Weighting is the Hardest Part: On The Behavior of the Likelihood Ratio Test and Score Test Under a Data-Driven Weighting Scheme in Rare Variant Association Studies*
- Erwin Nagelkerke - *Goodness-of-fit of Multilevel Latent Class Models*
- Michèle Nuijten - *Meta-Science in Psychology: An Overview of 3 Years of Research*
- Claudia van Borkulo - *A method for constructing networks from binary data*
- Sacha Epskamp - *Generalized Network Psychometrics: Combining Network and Latent Variable Models*
- Florian Böing-Messing - *Automatic Bayes Factors for Testing Equality and Inequality Constrained Hypotheses on Variances*

PhD student poster presentations

- Yasin Altinisik - *The GORICA method and its application to a multilevel regression model*
- Mattis van den Bergh - *Building Latent Class Trees, applied to Social Capital*
- Riet van Bork - *Two Tests for Comparing Network Models and Unidimensional Factor Models*
- Chris Hartgerink - *Too good to be false: Nonsignificant results revisited*
- Jolanda Kossakowski – (1) *Is this the Real Quality of Life? A Comparison of Health-Related Quality of Life Networks in Healthy Adults and Cancer Patients*
- Jolanda Kossakowski – (2) *A Bifurcation Awakens: Investigating the Detection Quality of the Mean Field Approximation in a Random Graph and Small-World Graph*
- Sanne Willems - *Optimal scaling in survival analysis*
- Eva Zijlmans - *Estimating Reliability for Single Items*
6 Research output

6.1 Scientific publication

6.1.1 Dissertations by IOPS PhD students


Fokkema, M. (2015, June 17). Psychometric Contributions to Improving the Efficiency and Fidelity of Clinical Assessment and Research. VU University Amsterdam. Prom/coprom. Prof. H. Kelderman, Prof. P. Cuijpers & Dr N. Smits


Jehangir, K. (2015, October 29). Methodological Issues in Large-Scale Educational Surveys. University of Twente. Prom./coprom. Prof. C.A.W. Glas, Dr A.A. Béguin


6.1.2 Other dissertations under supervision of IOPS staff members


Zwitser, R.J. (2015, April 22). Contributions to latent variable modeling in educational measurement. Universiteit van Amsterdam (114 pag.). Prom./coprom.: Prof. G.K.J. Maris
6.1.3 Refereed article in a journal


Böhning, D. & Van der Heijden, P.G.M. (2015). Some general points on estimating the size of hidden
populations from register data. *BMC Medical Research Methodology* [E]


Hofman, A.D., Visser, I., Jansen, B.R.J., & Van der Maas, H.L.J. (2015). The balance-scale task revisited: a...


assessments. Pedagogische studiën, 92 (6), 380-393


Oberski, D. (2015) Beyond the number of classes: Separating substantive from non-substantive dependence in latent class analysis. *Advances in Data Analysis and Classification*. 10(2), 171-182


Nursing research, 64(2), 128-136. DOI: 10.1097/NNR.0000000000000077


Toepoel, V., & Lughtig, P.J. (2015). Online surveys are mixed-device surveys. Issues associated with the use of different (mobile) devices in web surveys. *Methods, data, analyses*, 9(2), 155-162. DOI: 10.12758/mda.2015.009


**Warrens, M.J. (2015).** Some relationships between Cronbach’s alpha and the Spearman-Brown formula. *Journal of Classification, 32*(1), 127-137. DOI: 10.1007/s00357-015-9168-0

**Warrens, M.J. (2015).** Additive kappa can be increased by combining adjacent categories. *International Mathematical Forum 10*:323-328


Wynants, L., Bouwmeester, W., Moerbeek, M., Timmerman, D., Van Huffel, S., Van Calster, B., & Vergouwe, Y. (2015). A simulation study of sample size demonstrated the importance of the number of events per variable to develop prediction models in clustered data. *Journal of Clinical Epidemiology, 68*(12), 1406


6.1.4 Non refereed articles in a journal

Bais, F., Schouten, B., & Toepoel, V. (2015). Interbeoordelaar-Betrouwbaarheid: Het coderen van kenmerken van survey items voor de constructie van vragenlijstprofielen. STAtOR, 2, 18-21


6.1.5 Book


6.1.6 Book section


6.1.7 Conference contribution (proceeding)


Cham: Springer. DOI: 10.1007/978-3-319-07503-7


6.2 Professional publication

6.2.1 Article in journal

De Leeuw, E.D. (2015). Help...de mobiele respondent. CLOU : het magazine voor marketing research & digital analytics, 71, 42

6.2.2 Report

study (Research Report No. 15-05). Law School Admission Council

6.3 Popular publications

6.4 Other results
6.4.1 Editorial activities
Kiers, H.A.L. (editor). Psychometrika. Date: 1994 → ...
6.4.2 Software and test manuals


6.4.3 (Paper) presentation


Van Borkulo, C.D. (2015, oktober 02). Do symptom expression patterns matter? Amsterdam, 6th Lab meeting Network and time series models


6.4.4 In press


6.4.5 Miscellaneous


7 Finances

7.1 Financial statement 2015

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 2015. The participation fee for 2015 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 2015 of € 26.682,42

7.2 Summary of receipts and expenditures in 2015

<table>
<thead>
<tr>
<th>Receipts</th>
<th>Expenditures</th>
</tr>
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<tbody>
<tr>
<td>Contribution participating institutions</td>
<td>Salaries IOPS office</td>
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<tr>
<td>35.800,00</td>
<td>Secretary, 18 hours per week</td>
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<td>Graduate Program 2013</td>
<td>Salary director</td>
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<td>Course</td>
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<td>University of Amsterdam</td>
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<td>-47.500,00</td>
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<td>Office supplies</td>
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<td>Travel</td>
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<td>550,13</td>
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<td>Catering</td>
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<td>Representation costs</td>
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<td>Subtotal Receipts</td>
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</tbody>
</table>

Negative financial outcome 2015 26.682,42
Total receipts (include result 2014) 62.482,42
Total expenditures 62.482,42

7.3 Balance sheet 2015

<table>
<thead>
<tr>
<th>IOPS Own Funds 2014</th>
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<tbody>
<tr>
<td>Debet</td>
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<tr>
<td>Own Funds 31-12-2015</td>
</tr>
<tr>
<td>70.062,87</td>
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<tr>
<td></td>
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<tr>
<td>Total Debet</td>
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<tr>
<td>70.062,87</td>
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</tbody>
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