

Promoting transparency and replicability in research: Workshop at Tuebingen University

Monday 19/09/2022: Introduction	Tuesday 20/09/2022: Planning reproducible research	Wednesday 21/09/2022: Conducting reproducible research	Thursday 22/09/2022: Knowledge synthesis and sharing in an open science world
	9:00 – 10:00 Pre-registration <i>Krzysztof Cipora</i>	9:00 – 10:30 Researcher degrees of freedom in data preprocessing <i>Max Primbs</i>	9:00 – 10:30 Science communication <i>Thomas Susanka</i>
	10:00 – 10:30 Coffee break	10:30 – 11:00 Coffee break	10:30 – 11:00 Coffee break
	10:30 – 11:30 Low research data availability in educational psychology journals and how to overcome it. A meta-scientific approach <i>Markus Huff</i> 11:30 – 12:00 Discussion	11:00 – 12:00 Robustness check with specification curve analysis <i>Max Primbs</i>	11:00 – 11:30 Funding <i>Discussion with Krzysztof Cipora & Christina Artemenko</i> 11:30 – 12:30 Meta-analysis <i>Wolfgang Viechtbauer</i>
14:00 – 15:00 Welcome 14:50 Welcome graduate academy	12:00 – 14:00 Lunch & Poster session 1	12:00 – 14:00 Lunch	12:30 – 14:00 Lunch
15:00 – 16:30 General introduction and first easy steps <i>Tim Errington & Felix Schönbrodt</i>	14:00 – 15:30 Sample size estimations <i>Florian Wickelmaier</i>	14:00 – 15:30 Testing evidence of absence <i>Paul Bürkner</i>	14:00 – 15:30 PsychOpen CAMA (ZPID) <i>Tanja Burgard</i>
	15:30 – 16:00 Coffee break	15:30 – 16:00 Coffee break	15:30 – 16:00 Coffee break
	16:00 – 17:30 Registered Reports <i>Chris Chambers</i>	16:00 – 17:30 SoftwareCarpentries & OpenLifeScience - two great initiatives to help young scientists to be more open" <i>Holger Dinkel</i>	16:00 – 17:30 No reproducibility without U <i>Andrew Webb</i>
18:00 Event dinner			

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Program

Monday, 19th September 2022

14:00 – 15:00	Welcome
15:00 – 16:30	<p>General introduction and first easy steps</p> <p><i>Lecture by Tim Errington and Felix Schönbrodt (online)</i></p> <p>In an introductory lecture, key terms usually referred to in open science will be explained, such as open data, open access, open source, etc. History of the movement, some initiatives in this scope, and the reproducibility crisis will be covered. Some example on how to adopt open science in research will be provided.</p>
18:00 – 00:00	Event dinner

Tuesday, 20th September 2022

9:00 – 10:00	<p>Pre-registration</p> <p><i>Lecture by Krzysztof Cipora (in person)</i></p> <p>Pre-registering a study implies several advantages. For example, it prevents hypothesizing after results are known (HARKing) or p-hacking by declaring specific statistical analyses as planned before data acquisition. Even if pre-registering makes research more transparent and replicable, it requires time and resources which are often not deemed appropriate in a world of fast science. Here, different tools which can be used for structured pre-registrations will be introduced, with advantages and pitfalls within the process of study planning.</p>
10:00 – 10:30	Coffee break
10:30 – 11:30	<p>Low research data availability in educational psychology journals and how to overcome it. A meta-scientific approach</p> <p><i>Lecture by Markus Huff (in person)</i></p> <p>Research data availability contributes to the transparency of the research process and the credibility of educational psychology research and science in general. Recently, there have been many initiatives to increase the availability and quality of research data. Many research institutions have adopted research data policies. This increased awareness might have raised research data sharing in empirical articles. To test this idea, we coded N = 1242 publications from five educational psychology journals and the psychological journal Cognition (as a baseline) published in 2018 and 2020. Research data availability was low (3.85% compared to 62.74% in Cognition) but has increased from 0.32% (2018) to 7.16% (2020). However, neither the data transparency level of the journal nor the existence of an official research data policy on the level of the corresponding author's institution was related to research data availability. We discuss the consequences of these findings for institutional research data management processes.</p>
12:00 – 14:00	<p>Lunch and <i>Poster session 1</i></p> <p>In the scope of favoring networking, participants will be invited to present and discuss their own work in two poster sessions. Different topics such as pre-registration, open data, open material or classical experimental posters will be allowed. Participants will upload their poster on an institutional online repository prior to the event. Posters will be available for discussion before and after the actual event.</p>
14:00 – 15:30	<p>Sample size estimations</p> <p><i>Hands-on with Florian Wickelmaier (in person)</i></p> <p>Sample size estimation is an important aspect of study planning, and many tools support researchers in this task. However, the dependence of this estimation on several parameters entered in the analysis might be a confusing factor for many young researchers. This session will give an overview over sample size estimations and address common mistakes.</p>
15:30 – 16:00	Coffee break
16:00 – 17:30	<p>Registered reports</p> <p><i>Hands-on with Chris Chambers (online)</i></p>

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	<p>Scientific journals increasingly implement registered reports as article format, where introduction, methods, and planned analyses receive an in-principle acceptance prior to data collection. This preliminary acceptance can be compared to an in-depth published version of a pre-registration, and ensures publication of the entire manuscript in a second stage after data has been analyzed. With the help of the design table constructed by the initiative PCI Registered Reports, participants will be practically trained to transparently and explicitly link research questions with hypotheses and statistical analyses, drawing possible conclusions for theoretical models or results not going in the expected direction.</p>
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Wednesday, 21st September 2022

9:00 – 10:30	<p>Researcher degrees of freedom in data preprocessing <i>Lecture by Max Primbs (in person)</i></p> <p>An accurate data preprocessing is a necessary step while conducting research. However, the lack of specific guidelines in many disciplines prevents the application of standard pipelines or protocols. In extreme cases, two researchers might obtain completely different results starting from the same raw datasets due to different, both valid, processing pipelines. In this lecture, effects of applying different pipelines on the statistical outcomes will be explored.</p>
10:30 – 11:00	Coffee break
11:00 – 11:30	<p>Robustness check with specification curve analysis <i>Hands-on with Max Primbs (in person)</i></p> <p>After the introduction about the degrees of freedom, this practical session will introduce the specification curve analysis, which estimates the robustness of behavioral findings. This tool is used to compare the effect sizes between results from different preprocessing pipelines in order to assess the vulnerability of findings to changes in data preprocessing.</p>
11:30 – 14:00	Lunch and <i>Poster session 2</i>
14:00 – 15:30	<p>Testing evidence of absence <i>Hands-on with Paul Bürkner (in person)</i></p> <p>In the attempt to go beyond the report of null results defined as insignificant frequentist hypothesis tests, different methods are becoming popular in the scientific community for testing the evidence of absence. These are the increasing report of effect sizes, equivalence tests, Bayesian statistics and simulations. This session will give a short overview over available measures, while focusing on a practical introduction to Bayesian statistics.</p>
15:30 – 16:00	Coffee break
16:00 – 17:30	<p>SoftwareCarpentries & OpenLifeScience - two great initiatives to help young scientists to be more open" <i>Hands-on with Holger Dinkel (in person)</i></p> <p>Open science is not only about making publications free to read without subscription. It is also about making sure that your analysis, dataset, hardware or software can be shared, easily understood and be reproduced. In this session, two initiatives will be presented which help scientists to improve their computational skills and openness:</p> <p>First, with a diverse global community of thousands of Instructors, Helpers, Trainers, Maintainers, Mentors, and more, the Carpentries (https://carpentries.org/) are (and have been for many years) teaching foundational coding and data science skills to researchers worldwide.</p> <p>Second, a mentoring and training program for Open Science ambassadors (https://openlifesci.org/) helping scientists learning how to successfully run an open source project will be presented. The 16-week long personal mentorship and cohort-based training focuses on gaining and sharing knowledge in creating, leading, and sustaining an Open Science project as well as empowering each other to become effective Open Science ambassadors in their communities.</p>

Thursday, 22nd September 2022

9:00 – 10:30	<p>Science communication <i>Lecture by Thomas Susanka (in person)</i></p> <p>Communication of findings is also an essential step towards transparency and open science. Our workshop is concluded with sharing some examples of how to effectively communicate scientific findings with the general public, making these findings easy to discuss with other scientists, and motivate students to be proactive in planning and conducting reproducible research.</p>
10:30 – 11:00	Coffee break
11:00 – 11:30	<p>Funding <i>Discussion with Krzysztof Cipora & Christina Artemenko</i></p> <p>The transition to open science is supported by agencies at many levels. For example, the Projekt DEAL aims to promote open access to publications from German institutions through the coverage of costs related to publishing in hybrid or open access journals. Also several funding agencies, such as the German DFG, the European Commission, or the NIH in the USA now require the recipients of funds to make their publications and data as open as possible. In this section, participants will be informed about funding opportunities in the scope of open science, and provided with practical tips on how to include open science declarations in a grant proposal. Examples of funded grant applications will be discussed as case studies.</p>
11:30 – 12:30	<p>Meta-analysis <i>Lecture by Wolfgang Viechtbauer (online)</i></p> <p>Meta-analyses are tools for summarizing the existing body of research concerning a specific topic. As such, meta-analyses must rely on high-quality studies or the validity of the meta-analysis results will be hard to assess (“Garbage in - garbage out”). Fortunately, there are some mechanisms to evaluate their explanatory power. This session will focus on the issues publication bias raises for conducting a meta-analysis.</p>
12:30 – 14:00	Lunch
14:00 – 15:30	<p>PsychOpen CAMA (ZPID) <i>Hands-on with Tanja Burgard (online)</i></p> <p>The open data tool Psychopen CAMA, which is hosted by the Leibniz Institut für Psychologie (Trier, Germany), will be introduced. Here, researchers can upload their meta-analysis data and are able to interact with them, e.g., checking the original analyses or investigating more effects of interest. These datasets can also be extended, adding more recent studies and making meta-analytic research an interactive and continuous process.</p>
15:30 – 16:00	Coffee break
16:00 – 17:30	<p>No reproducibility without U <i>Lecture by Andrew Webb (in person)</i></p> <p>Open science is a lofty goal, especially in the midst of a replication crisis. It is easy to see the importance of making your experimental setup, analysis, and dataset sharable, understandable and reproducible. It is much harder, however, to know where to start. In this session we will talk about some of the easy first steps, and slightly less easy follow-up steps we can take to ensure that we are part of the solution, rather than part of the problem.</p>

Speakers

- **Artemenko**, Christina (Dr.) is a postdoctoral researcher in the Diagnostics and Cognitive Neuropsychology group at Tübingen University. She studies the neuro-cognitive correlates of arithmetic and math anxiety.
- **Burgard**, Tanja (Dr.) works at the Leibniz Institute for Psychology Information, where she is responsible for PsychOpen CAMA, a platform for community-augmented meta-analyses in psychology.
- **Bürkner**, Paul (Dr.) is an Independent Junior Research Group Leader for Bayesian Statistics at University of Stuttgart's Cluster of Excellence SimTech (Germany). His work focuses on development, evaluation, implementation, and application of Bayesian methods as well as open source software development.
- **Chambers**, Chris (Prof. Dr.) is a professor of cognitive neuroscience and head of brain stimulation at Cardiff University. His research focuses on the use of brain stimulation and brain imaging techniques to understand cognitive control, attention and awareness. He is promoting registered reports and open science practices, also using a meta-scientific perspective.
- **Cipora**, Krzysztof (Dr.) is a lecturer for Mathematical Cognition at the Mathematics Education Centre of Loughborough University (UK). His work focuses on spatial-numerical associations, linguistic and cultural influences on number processing, and math anxiety, while he is also interested in research methods, open science and replicability.
- **Dinkel**, Holger (Dr.) is the head of the Core IT facility at the Max Planck Institute for Biological Cybernetics in Tübingen. He provides computational support for the scientists of the institute, and is an instructor for the Software Carpentry and a mentor in the OpenLifeScience.
- **Errington**, Tim (Dr.) is the Director of Research at the Center for Open Science (COS), a non-profit organization in Charlottesville, Virginia, USA that has a mission to increase openness, integrity, and reproducibility of scientific research.
- **Huff**, Markus (Prof. Dr.) is head of the Applied Cognitive Psychology research group at Tübingen University's Department of Psychology and the Perception and Action Lab at Leibniz-Institut für Wissensmedien (IWM). His research focuses on the social and cognitive foundations of knowledge exchange, while he is also interested in meta-research and open science.
- **Primbs**, Max (PhD student) at Radboud University (Netherlands). He is interested in situational models of implicit bias, the role of stereotypes in visual perception, meta-science, and data pre-processing and multiverse analysis of reaction time data.
- **Schönbrodt**, Felix (Prof. Dr.) is a professor at the Ludwig-Maximilian-Universität in Munich. He is currently the managing director of the LMU Open Science Center, author of several R-packages and self-committed to open science practices. On his private blog, he also writes about harking, reproducibility and open research data.
- **Susanka**, Thomas (Dr.) is publisher and editor-in-chief of the Tübingen-located magazine "Science Notes", which covers a broad range of articles covering science communication. He also teaches about science journalism at the department of rhetoric at Tübingen University.
- **Viechtbauer**, Wolfgang (Prof. Dr.) is an associate professor of methodology and statistics in the Department of Psychiatry and Neuropsychology and the School for Mental Health and Neuroscience at Maastricht University. He does research on meta-analysis and mixed-effects models and created the R package *metafor*.
- **Webb**, Andrew (Dr.) is a Scientific Software Engineer in the Department Computational Neuroscience at the Max Planck Institute for Biological Cybernetics in Tübingen. His aim is to help researchers produce robust, reproducible results.
- **Wickelmaier**, Florian (Dr.) works for the group for Research Methods and Mathematical Psychology at the University of Tübingen. While focusing on psychophysical research, he also teaches statistics, psychometrics and scientific methods.