Participant Manual
Research Transparency and Reproducibility Training (RT2)

April 4-6, 2018

Amsterdam, Netherlands

Contents

About RT2

Welcome to the BITSS community! We are pleased to host you for our three-day Research Transparency and Reproducibility Training (RT2) in Amsterdam, Netherlands April 4–6, 2018. With this training, BITSS aims to *directly impact researchers' practices in favor of transparency and reproducibility*. We focus on topics such as:

- *Pre-registration*

  The registration of study designs in public repositories prior to data collection allows for better tracking of the universe of studies in a given domain, including studies with null results that are rarely published. This begins to tackle the "file-drawer problem" whereby only statistically significant findings are reported;

- *Pre-analysis plans*

  The design and use of a pre-analysis plan (PAP) — a step-by-step plan, written before data are accessed, describing hypotheses and strategies for analyzing data — can help protect against specification searching and reduce researcher "degrees of freedom" in confirmatory research.

- *Meta-analysis*

  Innovations in the design of meta-analyses — dealing with issues of bias, study sample size, and model selection — can improve the quality of inferences made from the analyses of pooled studies.

- *Data de-identification*

  To facilitate open science, researchers must work toward public posting of the data and code needed to replicate findings of published studies. However, this requires understanding of and training on how to balance maximizing data's usability with the protection of human subjects and data confidentiality by using methods for data de-identification.

- *Tools for transparent workflows*

  There are a plethora of software and online tools to facilitate transparent and reproducible workflows, such as the Open Science Framework (OSF), Git, R, and dynamic documents.

BITSS aims for RT2 events to have long-term, sustainable impacts on scientific norms and practices as learners and faculty like you continue to incorporate innovative tools and methods into curricula and coursework at your own institutions.

To ensure you get the most out of this three-day event, BITSS has prepared this **Participant Manual** with instructions for preparing for the hands-on sessions (including necessary software installation), a reading list, glossary, and lists of RT2 faculty and participants.

If you are also interested in joining our community, please visit our website to learn more about the **BITSS Catalyst Program**.

Pre-Training Actions

Please take the following actions before April 4, 2018. Doing so will allow you and your fellow participants to get more out of the hands-on sessions.

Please reference the Software section of our Resources page on the BITSS website for more information on this software.

1. Establish an OSF Account

The Open Science Framework (OSF) allows you to store your research files and link together all your research across several platforms such as Dropbox, Harvard's Dataverse, and GitHub. It version controls any files you upload and you can register a project to create a frozen time-stamped version with a persistent URL. So by writing a pre-analysis plan, you can prove to the world that your significant results aren't just a successful fishing expedition. Sign up for a free account here.

2. Review study pre-registration

In the Improved Specification hands-on session, participants will be able to walk through developing a pre-analysis plan and registering a study on the OSF. Think of one of your recent studies or a study that you would like to conduct. See **Appendix A** below and this Protocol about how to prepare your pre-registration.

3. Install Git and Create Github.com Account

The date-and-initial version of keeping track of changes to your files doesn't really cut it when you're doing something complicated or you've got a lot of co-authors. *If you want your work to be reproducible, use version control.* It has a learning curve even for **xkcd**-type people, but it's worth it! Read **Gentzkow and Shapiro chapter 3** for more on why. **Software Carpentry** and **GitHub** have great tutorials.

To get started, download the **GitHub Desktop** GUI app. Note that this is only available for Windows and Mac users. Linux users can use the command line or pick one of the other GUIs listed **here**. If you are comfortable using the command line, we also recommend that Windows users install **Git Bash**.

Next, create an account on **GitHub.com**. GitHub is a popular online storage platform for your repositories (folders/projects) that are version-controlled with Git.

4. Install software for Dynamic Documents

You can write your code and your paper in one place. This means you won't mess anything up copying and pasting, and you'll never have to wonder which code produced which figures, where on earth you saved it, or whether the paper has the updated version.

In R, this can be done with R Markdown, which is built into R Studio – please download and install **R** and **R Studio**. When you open a new R Markdown file in R Studio, it starts with a really simple example, or you can learn more **here**.

In Stata, this can be done with the user-written command MarkDoc with the following commands:

ssc install markdoc

ssc install weaver

ssc install statax

The package may have been updated recently, so you might want to run "adoupdate" if you installed it a while ago. The syntax is explained in the built-in help file. For MarkDoc to work you also need to install **Pandoc**, a pretty cool Swiss-army knife that converts almost any markup file to almost any other, as well as **wkhtmltopdf**. If you install as above, these may be installed automatically, but you may have to click on a link that will show up inside Stata.

5. Install LaTeX

Microsoft Word is nice and easy for writing short papers, but not for when you start writing longer papers, or you want to include any equations, or formatting it quickly becomes cumbersome. LaTeX is better for reproducibility since when you include your figures, you just refer to files, so there's no question of whether you remembered to update or not. LaTeX (download **here**) is also used by R Markdown when you make PDFs, so it must be installed in the background. *This is a large file, and you have to install the full version, so don't leave this until the last minute.* If you don't install this, you won't be able to make PDFs with the above dynamic documents software.

6. Install a Decent Text Editor

You need a good way to edit plain text. On a Mac, the simplest thing to do is use the built-in TextEdit, but you will need to **change the default so plain text**, not rich text (rtf), is the output format. On Windows, you can use Notepad if you like, but we suggest something a little more powerful like **Atom**, **Notepad++**, or **Sublime Text**. These have syntax highlighting and add-on packages that can render markdown and things like that.

Suggested Reading List

This is a list of foundational and more recent literature related to social science research transparency and reproducibility challenges, as well as potential solutions and best practices. We suggest reading the **starred papers before RT2.

Foundational literature

**Ioannidis JPA. 2005. “Why Most Published Research Findings Are False.” *PLoS Med* 2(8): e124. doi:10.1371/journal.pmed.0020124. PMCID PMC1182327. Link.

Leamer, Edward. 1983. “Let’s Take the Con Out of Econometrics.” *American Economic Review*, 73(1): 31–43. Link.

**Merton, Robert K. 1973 [1942]. "The Normative Structure of Science." in Merton, Robert K., *The Sociology of Science: Theoretical and Empirical Investigations.* Chicago: University of Chicago Press. ISBN 978-0-226-52091-9, OCLC 755754. Link.

**Miguel, E., C. Camerer, K. Casey, J. Cohen, K. M. Esterling, A. Gerber, R. Glennerster, et al. 2014. “Promoting Transparency in Social Science Research.” *Science* 343 (6166): 30–31. doi:10.1126/science.1245317. Link.

Nosek, B. A., et al. 2015. "Promoting an open research culture: Author guidelines for journals could help to promote transparency, openness, and reproducibility." *Science* (New York, NY) 348.6242: 1422. PMCID PMC4550299. Link.

Open Science Collaboration. 2015. "Estimating the reproducibility of psychological science." *Science* 349, no. 6251: aac4716. PMID: 26315443. Link.

Rosenthal, Robert. 1979. "The file drawer problem and tolerance for null results." *Psychological Bulletin* 86.3: 638. Link.

Christensen, Garret, and Edward Miguel. 2017. “Transparency, Reproducibility, and the Credibility of Economics Research.” BITSS Preprints. Link.

**Goodman, S. N., Fanelli, D., & Ioannidis, J. P. 2016. “What does research reproducibility mean?” *Science Translational Medicine*, Vol. 8. Ch. 341. Link.

Stodden et al. “Enhancing reproducibility for computational methods.” *Science*. Link.

National Academies report “Fostering Integrity in Research.” Link.

P-curve

**Simonsohn, Uri, Leif D. Nelson, and Joseph P. Simmons. 2014: "P-curve: a key to the file-drawer." *Journal of Experimental Psychology: General* 143, no. 2: 534. Link.

Simmons, Joseph P., Leif D. Nelson, and Uri Simonsohn. 2011. "False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant." *Psychological Science* 22, no. 11: 1359-1366. Link.

Gerber, Alan S., and Neil Malhotra. “Publication Bias in Empirical Sociological Research: Do Arbitrary Significance Levels Distort Published Results?” *Sociological Methods & Research* 37, no. 1 (August 1, 2008): 3–30. Link.

Researcher Degrees of Freedom

**Wicherts, Jelte M., Coosje L. S. Veldkamp, Hilde E. M. Augusteijn, Marjan Bakker, Robbie C. M. Van Aert, and Marcel A. L. M. Van Assen. 2016. "Degrees of freedom in planning, running, analyzing, and reporting psychological studies: A checklist to avoid p-hacking." *Frontiers in Psychology* 7. Link. If you cannot access the previous link, access a preprint here.

Lenz, Gabriel, and Alexander Sahn. 2018. "Achieving Statistical Significance with Covariates". BITSS. January 9. Link.

Gelman, Andrew, and Eric Loken. "The Garden of Forking Paths: Why Multiple Comparisons Can Be a Problem, Even When There Is No 'Fishing Expedition' or 'p-Hacking' and the Research Hypothesis Was Posited Ahead of Time∗." Unpublished, 2013. Link.

Power and Priors

**Benjamin, Daniel J, James Berger, Magnus Johannesson, Brian A Nosek, Eric-Jan Wagenmakers, Richard Berk, Kenneth Bollen, et al. 2017. "Redefine Statistical Significance". PsyArXiv. July 22. osf.io/preprints/psyarxiv/mky9j. Link.

Burlig, Fiona, Louis Preonas, and Matt Woerman. 2017. "Panel data and experimental design." *Energy Institute at Haas Working Paper #277*. Link. For a lighter read, please reference the blog post that tries to be less technical.

Button, Katherine S., J.P.A. Ioannidis, C. Mokrysz, B. Nosek, J. Flint, E.S.J. Robinson, M. Munafo. "Power failure: why small sample size undermines the reliability of neuroscience." *Nature Reviews Neuroscience* 14.5 (2013): 365-376. Doi 10.1038/nrn3475 PMID: 23571845. Link.

Coville, Aidan,and Eva Vivalt. 2017. "How Often Should We Believe Positive Results? Assessing the Credibility of Research Findings in Development Economics". BITSS. November 2. Link.

Reproducibility

King, Gary. "Replication, Replication." *PS: Political Science and Politics* 28 (1995): 444–52. Link

Gandrud, Christopher. *Reproducible Research with R and R Studio, Second Edition*. Chapman and Hall, 2015. Link.

Bowers, Jake. "Six Steps to a Better Relationship with Your Future Self." *The Political Methodologist* 18, no. 2 (2011). Link.

Pre-Registration and Pre-Analysis Plans

Casey, Katherine, Rachel Glennerster, and Edward Miguel. 2012. "Reshaping Institutions: Evidence on Aid Impacts Using a Preanalysis Plan." *The Quarterly Journal of Economics* 127 (4): 1755–1812. Link.

Lin, Winston, and Donald P. Green. 2016. "Standard operating procedures: A safety net for pre-analysis plans." PS: Political Science & Politics 49 (3): 495-500. Link.

Wicherts et al., 2016. "Degrees of Freedom in Planning, Running, Analyzing, and Reporting Psychological Studies." *Front. Psychol* 7. Link.

Symposium on Pre-registration. 2013. *Political Analysis*. Link.

Replication

Dafoe, Allan. 2014. “Science Deserves Better: The Imperative to Share Complete Replication Files.” *PS: Political Science & Politics* 47 (1): 60–66. doi:10.1017/S104909651300173X. Link.

Hamermesh, Daniel S. 2007. “Viewpoint: Replication in Economics.” *Canadian Journal of Economics/Revue Canadienne D’économique* 40 (3): 715–33. doi:10.1111/j.1365-2966.2007.00428.x. Link.

**Klein, Richard A., Kate A. Ratliff, Michelangelo Vianello, Reginald B. Adams Jr, Štěpán Bahník, Michael J. Bernstein, Konrad Bocian et al. 2014. "Investigating variation in replicability: A ‘Many Labs’ Project." *Social Psychology*. Link.

Data De-Identification

Goodman, Alyssa, et al. 2014. “Ten Simple Rules for the Care and Feeding of Scientific Data”, *PLoS Computational Biology*, 10(4), e1003542. Link.

Kaiser, Karen. "Protecting respondent confidentiality in qualitative research." 2009. *Qualitative Health Research* 19, no. 11: 1632-1641. Link.

Playford, Christopher J., Vernon Gayle, Roxanne Connelly, and Alasdair JG Gray. 2016. "Administrative social science data: The challenge of reproducible research." *Big Data & Society* 3, no. 2: 2053951716684143. Link

Responsible Data Forum. “The Handbook of the Modern Development Specialist.” https://responsibledata.io/resources/handbook/ CC-BY-SA 4.0.

Sturdy, Jennifer, Stephanie Burch, Heather Hanson, and Jack Molyneaux. 2017. “Opening up Evaluation Microdata: Balancing Risks and Benefits of Research Transparency”. BITSS Preprints. Link.

Zandbergen, Paul A. "Ensuring confidentiality of geocoded health data: assessing geographic masking strategies for individual-level data." 2014. *Advances in Medicine*. Link.

Meta-analysis

**Borenstein, M., Hedges, L. V., Higgins, J. P. T. and Rothstein, H. R. 2007. "Fixed vs Random effects", in *Introduction to Meta-Analysis*, John Wiley & Sons, Ltd, Chichester, UK. Link.

Ioannidis, J.P.A., Fanelli, D., Dunne, D.D., Goodman, S.N. 2015. “Meta-research: Evaluation and Improvement of Research Methods and Practices.” *PLoS Biol* 13(10): e1002264. doi:10.1371/journal.pbio.1002264. PMCID PMC4592065. Link.

**Russo, Mark. 2007. "How to Review a Meta-Analysis." *Gastroenterol Hepatol* 3(8): 637–642. Link.

Cooper, Harris, Larry V. Hedges, and Jeffrey Valentine. *The Handbook of Research Synthesis and Meta-Analysis, Second Edition*. 2nd ed. Russel Sage, 2009. Link.

Transparent Reporting and Disclosure

Simera, et al. 2010. “Commentary: Transparent and accurate reporting increases reliability, utility, and impact of your research: reporting guidelines and the EQUATOR Network.” *BMC Medicine* 2010, Vol 8, Ch. 24. Link.

Other Useful BITSS Resources

Manual of Best Practices

Christensen, Garret, and Courtney Soderberg. 2016. "Manual of best practices in transparent social science research." Berkeley, CA: University of California. Link.

Social Science Meta-Analysis and Research Transparency (SSMART) Projects

Findings from the Social Science Meta-Analysis and Research Transparency (SSMART) program are summarized here with direct links to their working papers.

BITSS Preprints

Please also visit **BITSS Preprints** for working papers on research transparency and reproducibility topics. We welcome submissions of working papers, pre-prints, post-prints, and other scholarly works. Either post directly from an OSF project page or send to khoeberling@berkeley.edu.

BITSS Online Resource Library

We've compiled a wealth of tools and software, guidelines and templates, repositories, slide decks, and videos you may find useful in making your research more transparent and reproducible. We also list a growing number of blogs, commentary, and podcasts discussing challenges and innovations in the evolving open science movement. Find the BITSS Resource Library here.

"Transparent and Open Social Science Research" MOOC

Based on Professor Ted Miguel's UC Berkeley course on methods for transparent research, this 5-week, self-paced Massive Open Online Course (MOOC), explores the causes of the credibility crisis, as well as tools for making your own work more open and reproducible. The course runs 2-3 times a year, but you can access the video content anytime here.

Glossary

At RT2, you'll learn about a range of innovative Open Science practices and tools. Below is a list of standard definitions for the covered topics.

Analysis Plan	See *Pre-Analysis Plan*
Data citation	The practice of citing a dataset in place of or in addition to the paper in which a dataset was used. This helps other researchers to find data, and rewards researchers who share data. Read more here.
Data mining	See *specification searching*
Data sharing	Making the data used in an analysis widely available to others, ideally through a trusted public archive.
Disclosure	In addition to the widely accepted norm of publicly declaring all potential conflicts of interest, researchers can detail all the ways in which they test a hypothesis, e.g., by including the outcomes of all regression specifications tested, in appendices.
False-positive	Incorrect rejection of a null hypothesis based on the outcome of a statistical test; a finding that provides support for a conclusion that is not true.
Fishing	See *specification searching*
HARK-ing	Hypothesizing After the Results are Known
Literate programming	Writing code designed to be read and easily understood by a human. This best practice can make a researcher's code more easily reproducible.
Multiple hypothesis correction	Statistically taking into account that multiple hypotheses have been tested. This tends to decrease the reported statistical significance of any individual test conducted. The oldest method – and quite conservative – the Bonferroni correction, simply divides the significance threshold by the number of tests.
Open Access (OA)	Journals, articles, or other scholarly works that are freely available to the public, rather than only to those who pay for journal subscriptions. See HowOpenIsIt? for a detailed definition of the spectrum of openness.
Open Data	See *data sharing*
p-hacking	See *specification searching*
Statistical significance	A result has statistical significance if it is unlikely to have occurred if the null hypothesis is true. More precisely, a significance level (α) is the probability of rejecting the null hypothesis if it were true. In the social sciences, α is often defined as 0.05, though the validity of this threshold is up for debate.
p-value	The p-value is the probability of obtaining a result at least as extreme, if the null hypothesis were true. A result is considered statistically significant when p is less than α.
Pre-Analysis Plan (PAP)	A document that details, ahead of time, the statistical analyses that will be conducted for a given research project. Expected outcomes, control variables, and regression specifications are all written in as much detail as possible. This serves to make research more confirmatory in nature.
Pre-registration	See *registration*

Pre-specification	Detailing the method of analysis before actually beginning data analysis; the same as writing a Pre-Analysis Plan.
Protocol	A general term meaning a document that provides a detailed description of a research project, ideally written before the project takes place and in enough detail that other researchers may reproduce the project on their own. Often used in the context of human subjects Institutional Review Board (IRB) protocols, but increasingly used in connection with pre-analysis plans.
Publication Bias	The unfortunate tendency for research to only be published when it communicates the rejection of a null hypothesis test, i.e., a statistically significant relationship. Reviewers or journal editors may consider a null finding to be of less interest, or a researcher may fail to write up a null result, even though the null result may be a true outcome.
Registration	Publicly declaring that a hypothesis is being, has been, or will be tested, regardless of publication status. Registrations are time-stamped.
Registry	A database of registered studies or trials. For instance, the AEA RCT Registry or clinicaltrials.gov. Some of the largest registries only accept randomized trials, hence frequent discussion of 'trial registries.'
Registered Reports	An alternative publication method wherein a design is evaluated before data is collected. This is often the preferred term in psychology, cognitive science, and behavioral science. See also *Results-blind Review*.
Replication	Conducting an existing research project again. A subtle taxonomy exists and there is disagreement, as explained in Hamermesh, 2007 and Clemens, 2015. *Pure Replication* – Re-running existing code, with error-checking, on an original dataset to check if the published results are obtained. *Scientific Replication* – Attempting to reproduce the published results with a new sample, either with the same code or with slight variations on the original analysis.
Reproducible	Whether or not a study can be duplicated by another researcher to produce the same results as the original.
Researcher degrees of freedom	Flexibility a researcher has in data analysis, whether consciously abused or not. This can take a number of forms, including specification searching, covariate adjustment, or selective reporting.
Results-blind review	To reduce publication bias, peer review may take place before the results of a study are known. Reviewers base decisions on a study's design and methods, the importance or relevance of study questions, and sometimes its feasibility. Well-designed studies are given "in-principle acceptance," and will be published even a null result is obtained. See the OSF Registered Reports Project Wiki for journals practicing this form of peer review.

Specification searching	Searching blindly or repeatedly through data to find statistically significant relationships. While not necessarily inherently wrong, if done without a plan or without adjusting for multiple hypothesis testing, test statistics and results no longer hold their traditional meaning, and can limit replicability.
Trusted digital repository	An online platform where data can be stored such that it is not easily manipulated, and will be available into the foreseeable future. Storing data here is superior to simply posting on a personal website since it is more easily accessed and less easily altered.
Version control	The act of tracking every change made to a computer file. This is quite useful for empirical researchers who may edit their programming code often.

Meet the RT2 Faculty!

Marjan Bakker (Improved Specification)

Marjan Bakker is an assistant professor at Tilburg University in the Methodology and Statistics department. She teaches courses on regression analysis and multilevel analysis to psychology and research Masters students. Dr. Bakker is part of the Meta-Research Center at Tilburg University. Her research interests include scientific integrity, errors in statistics, power, publication bias, psychometrics, preregistration, and game theory. Dr. Bakker has published extensively on meta-research, including the well-known "The (mis)reporting of statistical results in psychology journals".

Nicole Janz (Replication)

Nicole Janz is an Assistant Professor at the School of Politics and International Relations at the University of Nottingham. Her research interests include human rights, foreign direct investment (FDI), corruption, and slavery. In her current projects, she examines the effects of FDI on repression and labor rights; how expropriation hinders human rights; judicial delays, impunity and corruption; how human rights shaming influences FDI; and the IMF. Nicole is an ambassador at the Center for Open Science (COS) and a BITSS Catalyst. Before working at Nottingham, she taught statistics for social scientists at the Social Sciences Research Methods Centre at the University of Cambridge. Nicole completed her PhD in Politics and International Studies at the Department of Politics and International Studies at Cambridge.

Thomas Leeper (Version Control)

Thomas Leeper is an Associate Professor in Political Behaviour in the Department of Government at the London School of Economics. His research on American and European public opinion uses survey and experimental methods to understand how citizens' political viewpoints reflect an interaction between the broader information environment (including the mass media and political elites) and individual-level attributes, namely citizens' expressed behaviors, psychological traits, social identities, and motivations. His work has been published in the American Political Science Review, American Journal of Political Science, Public Opinion Quarterly, Political Psychology, and elsewhere. He has also published more than 25 packages for the R statistical programming language and regularly writes about open science and reproducible research issues. Dr. Leeper is also a BITSS Catalyst.

Michèle B. Nuijten (Scientific Misconduct and Researcher Degrees of Freedom; Lightning Talk: statcheck)

Michèle Nuijten is an Assistant Professor at Tilburg University. Her research focuses on meta-science, including replication, publication bias, statistical errors, and questionable research practices. She is part of the Meta-Research Center at Tilburg University. Michèle received the Leamer-Rosenthal Prize for Open Social Science in 2016 for her work developing *statcheck*, an R package which extracts statistics from articles and checks them for consistency. Read more about statcheck here.

Danae Roumis (Data Management and De-Identification)

Danae Roumis is the Program Director of Impact Evaluation at Social Impact, Inc. She serves as an evaluation specialist and technical advisor while also contributing to the management and growth of the Impact Evaluation division. She has over ten years of experiencing designing and implementing research and evaluations, drawing on a broad range of quantitative and qualitative evaluation methodologies. She is currently working on three urban water infrastructure impact evaluations for the Millennium Challenge Corporation (MCC) in Tanzania, Jordan, and Lesotho. She has also evaluated HIV/AIDS, TB, and WASH programming for USAID in Zimbabwe, Zambia, and Bangladesh. Prior to joining SI, Danae evaluated HIV/AIDS, maternal health, and malaria programs in Botswana, Kenya, Uganda, and Tanzania.

Arnaud Vaganay (Creating a Reproducible Paper)

Arnaud Vaganay is the founder and director of Meta-Lab, a consultancy that develops, implements, and evaluates new tools to make research and teaching more cost-effective. He is also a visiting lecturer at the London School of Economics and Sciences Po. Arnaud is interested in defining what makes 'good' research decisions. He also studies the economic, political, psychological, and philosophical factors driving these decisions. As a BITSS Catalyst, Arnaud has led transparency and reproducibility workshops at LSE, 3ie in New Delhi, Delft University of Technology, and École polytechnique fédérale de Lausanne.

Robbie van Aert (Meta-Analysis)

Robbie van Aert is a PhD candidate in the Methodology and Statistics department at Tilburg University. Funded by the Netherlands Organization for Scientific Research (NWO), his research is about correcting for publication bias in meta-analysis. His other research interests include developing statistical methods for conducting meta-analyses (usually for the sake of convenience fully ignoring publication bias), detecting and correcting for questionable research practices such as p-hacking, and studying the reproducibility and replicability of science. Robbie is a BITSS Catalyst and has also received a SSMART grant to study the extent of publication bias within psychology and medicine.

Coosje Veldkamp (Improved Specification: Pre-registration and Pre-Analysis Plans, OSF)

Coosje Veldkamp is a Postdoctoral Researcher at the VU Medical Center in Amsterdam. Her research focuses on meta-research with respect to research methods for social and behavioral sciences, particularly human bias and error in research and study preregistration.

Eric-Jan Wagenmakers (The Case for Radical Transparency in Statistical Reporting)

Professor Eric-Jan Wagenmakers is a mathematical psychologist and a dedicated Bayesian. He works for the Psychological Methods unit at the University of Amsterdam (UvA) and he is a PI on the European Research Council grant "Bayes or Bust: Sensible Hypothesis Tests for Social Scientists," a grant that recently spawned the JASP open-source program for statistical analyses. In 2016, he received a Leamer-Rosenthal Prize for Open Social Science for his design and leadership of the graduate-level course "Good Research Practices" at UvA. Dr. Wagenmakers also co-authored an influential paper on reproducibility and several replication studies, edited a special issue of Perspectives on Psychological Science on reproducibility in psychology, and received a SSMART grant from BITSS to develop a suite of meta-analytic techniques for Bayesian evidence synthesis.

Chris Hartgerink (Lightning Talk: Scholarly Communication)

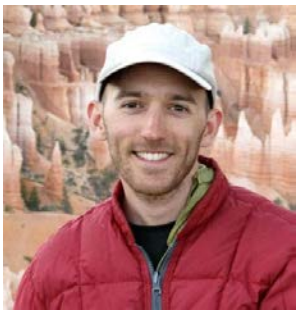
Chris Hartgerink is a PhD student in the Department of Methodology and Statistics at Tilburg University. His doctoral dissertation focuses on applied statistical methods to detect data fabrication. As a Mozilla Science Fellow, Chris is researching ways to redesign the scholarly communication system to embed more transparent practices and address a variety of issues in science, including access, exclusivity, incentives, and reproducibility.

Meet BITSS!

Edward Miguel (Faculty Director)

Edward "Ted" Miguel is an Oxfam Professor of Environmental and Resource Economics, as well as Co-Founder and Faculty Director of the Center for Effective Global Action (CEGA) and BITSS at UC Berkeley, where he has taught since 2000. He is also Co-Director of the Berkeley Opportunity Lab (O-Lab) and has served as Co-organizer of the Working Group in African Political Economy (WGAPE) since 2002. At BITSS, Ted leads research, supports partnership development, and is finalizing a forthcoming textbook on research transparency. His research focuses on African economic development and includes work on the economic causes and consequences of violence; the impacts of ethnic divisions on local collective action; interactions between health, education, environment, and productivity for the poor; and methods for transparency in social science research.

Garret Christensen (Project Scientist, RT2 Faculty – Transparency and the Research Cycle, Dynamic Documents, and Version Control)



Garret Christensen is a Project Scientist at BITSS and a Data Science Fellow with the Berkeley Institute for Data Science (BIDS) at UC Berkeley. Garret leads many of BITSS's trainings both in the U.S. and abroad, leads and conducts BITSS research, and is finalizing a forthcoming textbook on research transparency with Dr. Miguel. He received his PhD in Economics from UC Berkeley in 2011 and has since conducted research for Innovations for Poverty Action (IPA) and Emory University in Kenya, and has taught economics at Swarthmore College. He is in interested in research transparency, reproducibility, and questions of causal inference in labor economics, particularly with regard to child health and education programs. Much of his current research focuses on the US Supplemental Nutrition Assistance Program (SNAP).

Fernando Hoces de la Guardia (Postdoc, RT2 Faculty – Dynamic Documents & Version Control)

Fernando Hoces de la Guardia is a Postdoctoral researcher with the BITSS. Fernando works on bridging research-to-policy gaps in regards to transparency and reproducibility and supports BITSS trainings. He received his PhD in Policy Analysis from the Pardee RAND Graduate School where his research focused on increasing the transparency and reproducibility in policy analysis as a way to strengthen the connection between policy and evidence. Before RAND, he studied economics and conducted impact evaluations and economic analyses of various social policies. Fernando has also supported BITSS-led trainings in the past and led a series of Catalyst trainings in Chile, Peru, and Bolivia in 2017.

Kelsey Mulcahy (Program Manager)

Kelsey manages the development of BITSS programs, partnerships, and events. Previously, she served as the Sex Trafficking Policy Fellow at the Los Angeles County Commission on Human Relations, working to reduce the commercial sex trafficking of minors in LA County. She has also conducted quantitative evaluations of livelihoods-focused community driven development projects in South Asia. She holds a Masters in Public Policy from UCLA and a BA in Global and International Studies from UC Santa Barbara.

Katie Hoeberling (Senior Program Associate)

Katie leads BITSS's education and network building programs, including the MOOC and Catalyst programs, as well as BITSS Preprints. Before joining CEGA and BITSS, she served as a Borlaug Fellow in Global Food Security studying savings-led microfinance and farmer-centered innovation in Cambodia, and supported environmental impact assessments and the development of sustainability policies for California state and local governments. Katie has an MSc in International Agricultural Development from UC Davis and a BSc in Environmental Science from UCLA.

Aleks Bogdanoski (Program Associate)

Aleks's work at BITSS facilitates the introduction of transparency norms in journal review procedures. Before joining CEGA and BITSS, Aleks worked as a research consultant on anti-corruption research projects with the United Nations Development Program (UNDP) and US Agency for International Development (USAID). He also interned with the Organization for Security and Co-operation in Europe (OSCE) Mission to Bosnia and Herzegovina. He holds a Master's degree in Public Policy from the University of York and Central European University.

Jennifer Sturdy (Program Advisor)

Jen splits her time between BITSS and the Millennium Challenge Corporation (MCC). At MCC, she spearheads several transparency initiatives, including the establishment of the MCC Evaluation Catalog and the MCC Disclosure Review Board for releasing de-identified, public use micro-data. Jen also instituted several internal protocols for strengthening the design and implementation of the MCC independent evaluation portfolio. Before MCC, she spent six years as a consultant for the World Bank, working on several large-scale impact evaluations in the health sector. She completed her MA in International and Development Economics at the University of San Francisco.

Meet your fellow RT2 Participants!

Name	Institution (Discipline)
Abiola Oyebanjo	University of Lagos (Sociology)
Aline Claesen	KU Leuven (Psychology)
Ani Movsisyan	University of Oxford (Social Intervention)
Arlind Rama	University of Tirana (Economics)
Bálint Németh	Central European University, World Bank (Public Policy)
Benjamin Daniels	World Bank Group (Economics)
Bilal Kirkici	Middle East Technical University (Psycholinguistics)
Branko Stanic	Institute of Public Finance (Public Policy)
Corinne Stephenson	Barcelona Graduate School of Economics (Economics)
Dagim Belay	University of Copenhagen (Economics)
Daria Gerashchenko	European University at St. Petersburg (Political Science)
David Hagmann	Carnegie Mellon University (Economics)
Denise Ferris	BRAC (Public Health, Epidemiology)
Edris Seid	The Horn Economic and Social Policy Institute (Economics)
Eike Mark Rinke	University of Mannheim MZES (Communication)
Fiona O' Donovan	Royal College of Surgeons in Ireland (Psychology)
Ian Jones	University of Liverpool (History)
Ioana Vrabiescu	University of Amsterdam (Anthropology)
Jasmina Okicic	University of Tuzla (Economics)
Julia Egger	Max Planck Institute for Psycholinguistics (Psycholinguistics)
Kakia Chatsiou	University of Essex (Public Administration)
Kennedy Ndirangu	Paris Descartes University (Public Health)
Ketevan Glonti	University of Split (Epidemiology)
Linda Zhao	Harvard University (Sociology)
Lisa Matthias	Independent Researcher, OpenAIRE (Political Science)
Marcel Schliebs	Zeppelin University Friedrichshafen (Political Science)
Matheus Soares	Institute for Applied Economic Research (International Relations)
Maty Konte	United Nations University (UNU)-MERIT (Economics)
Muhammad Nasir	Pakistan Institute of Development Economics (Economics)
Oliana Sula	Aleksandër Moisiu University of Durrës (Economics)
Oul Han	Freie Universität Berlin (Political Science)
Richard Artner	KU Leuven (Psychology)
Sami Miaari	Oxford University (Economics)
Sanja Hajdinjak	University of Vienna (Political Science)
Yannick Ngongang Mbunang	African School of Economics (Economics)
Yulia Shenderovich	University of Cambridge, Rand Europe (Public Policy)

Appendix A: OSF Pre-Registration

Prepared by Erica Baranski (UC Riverside)

Study Information

1. Title
    1.1. Provide the working title of your study. It may be the same title that you submit for publication of your final manuscript, but it is not a requirement.

2. Authorship

3. Research Questions
    3.1. Please list each research question included in this study.

4. Hypotheses
    4.1. For each of the research questions listed in the previous section, provide one or multiple specific and testable hypotheses. Please state if the hypotheses are directional or non-directional. If directional, state the direction. A predicted effect is also appropriate here.

Sampling Plan

In this section we will ask you to describe how you plan to collect samples, as well as the number of samples you plan to collect and your rationale for this decision. Please keep in mind that the data described in this section should be the actual data used for analysis, so if you are using a subset of a larger dataset, please describe the subset that will actually be used in your study.

5. Existing data
    5.1. Preregistration is designed to make clear the distinction between confirmatory tests, specified prior to seeing the data, and exploratory analyses conducted after observing the data. Therefore, creating a research plan in which existing data will be used presents unique challenges. Please select the description that best describes your situation. Please do not hesitate to contact us if you have questions about how to answer this question (prereg@cos.io).
        5.1.1. Registration prior to creation of data: As of the date of submission of this research plan for preregistration, the data have not yet been collected, created, or realized.
        5.1.2. Registration prior to any human observation of the data: As of the date of submission, the data exist but have not yet been quantified, constructed, observed, or reported by anyone - including individuals that are not associated with the proposed study. Examples include museum specimens that have not been measured and data that have been collected by non-human collectors and are inaccessible.
        5.1.3. Registration prior to accessing the data: As of the date of submission, the data exist, but have not been accessed by you or your collaborators.

Commonly, this includes data that has been collected by another researcher or institution.

5.1.4. Registration prior to analysis of the data: As of the date of submission, the data exist and you have accessed it, though no analysis has been conducted related to the research plan (including calculation of summary statistics). A common situation for this scenario when a large dataset exists that is used for many different studies over time, or when a data set is randomly split into a sample for exploratory analyses, and the other section of data is reserved for later confirmatory data analysis.

5.1.5. Registration following analysis of the data: As of the date of submission, you have accessed and analyzed some of the data relevant to the research plan. This includes preliminary analysis of variables, calculation of descriptive statistics, and observation of data distributions. Studies that fall into this category are ineligible for the Pre-Reg Challenge. Please contact us (prereg@cos.io) and we will be happy to help you.

6. Explanation of existing data
    6.1. If you indicate that you will be using some data that already exist in this study, please describe the steps you have taken to assure that you are unaware of any patterns or summary statistics in the data. This may include an explanation of how access to the data has been limited, who has observed the data, or how you have avoided observing any analysis of the specific data you will use in your study. The purpose of this question is to assure that the line between confirmatory and exploratory analysis is clear.

7. Data collection procedures.
    7.1. Please describe the process by which you will collect your data. If you are using human subjects, this should include the population from which you obtain subjects, recruitment efforts, payment for participation, how subjects will be selected for eligibility from the initial pool (e.g. inclusion and exclusion rules), and your study timeline. For studies that don't include human subjects, include information about how you will collect samples, duration of data gathering efforts, source or location of samples, or batch numbers you will use.

8. Sample size
    8.1. Describe the sample size of your study. How many units will be analyzed in the study? This could be the number of people, birds, classrooms, plots, interactions, or countries included. If the units are not individuals, then describe the size requirements for each unit. If you are using a clustered or multilevel design, how many units are you collecting at each level of the analysis?

9. Sample size rationale
    9.1. This could include a power analysis or an arbitrary constraint such as time, money, or personnel.

10. Stopping rule
    10.1. If your data collection procedures do not give you full control over your exact sample size, specify how you will decide when to terminate your data collection.

Variables

In this section you can describe all variables (both manipulated and measured variables) that will later be used in your confirmatory analysis plan. In your analysis plan, you will have the opportunity to describe how each variable will be used. If you have variables that you are measuring for exploratory analyses, you are not required to list them, though you are permitted to do so.

11. Manipulated variables
    11.1. Describe all variables you plan to manipulate and the levels or treatment arms of each variable. For observational studies and meta-analyses, simply state that this is not applicable.

12. Measured variables
    12.1. Describe each variable that you will measure. This will include outcome measures, as well as any predictors or covariates that you will measure. You do not need to include any variables that you plan on collecting if they are not going to be included in the confirmatory analyses of this study.

13. Indices
    13.1. If any measurements are going to be combined into an index (or even a mean), what measures will you use and how will they be combined? Include either a formula or a precise description of your method. If you are using a more complicated statistical method to combine measures (e.g. a factor analysis), you can note that here but describe the exact method in the analysis plan section.

Design Plan

In this section, you will be asked to describe the overall design of your study. Remember that this research plan is designed to register a single study, so if you have multiple experimental designs, please complete a separate preregistration.

14. Study type
    14.1. Experiment - A researcher randomly assigns treatments to study subjects, this includes field or lab experiments. This is also known as an intervention experiment and includes randomized controlled trials.
    14.2. Observational Study - Data is collected from study subjects that are not randomly assigned to a treatment. This includes surveys, natural experiments, and regression discontinuity designs.
    14.3. Meta-Analysis - A systematic review of published studies.

14.4. Other - please explain.

15. Blinding
    15.1. Blinding describes who is aware of the experimental manipulations within a study. Mark all that apply.
        15.1.1. No blinding is involved in this study.
        15.1.2. For studies that involve human subjects, they will not know the treatment group to which they have been assigned.
        15.1.3. Personnel who interact directly with the study subjects (either human or non-human subjects) will not be aware of the assigned treatments.
        15.1.4. Personnel who analyze the data collected from the study are not aware of the treatment applied to any given group.

16. Study design
    16.1. Describe your study design. Examples include two-group, factorial, randomized block, and repeated measures. Is it a between (unpaired), within-subject (paired), or mixed design? Describe any counterbalancing required. Typical study designs for observation studies include cohort, cross sectional, and case-control studies.

17. Randomization
    17.1. If you are doing a randomized study, how will you randomize, and at what level?

Analysis Plan

You may describe one or more confirmatory analysis in this preregistration. Please remember that all analyses specified below must be reported in the final article, and any additional analyses must be noted as exploratory or hypothesis generating.

A confirmatory analysis plan must state up front which variables are predictors (independent) and which are the outcomes (dependent), otherwise it is an exploratory analysis. You are allowed to describe any exploratory work here, but a clear confirmatory analysis is required.

18. Statistical models
    18.1. What statistical model will you use to test each hypothesis? Please include the type of model (e.g. ANOVA, multiple regression, SEM, etc) and the specification of the model (this includes each variable that will be included as predictors, outcomes, or covariates). Please specify any interactions that will be tested and remember that any test not included here must be noted as an exploratory test in your final article.

19. Transformations
    19.1. If you plan on transforming, centering, recoding the data, or will require a coding scheme for categorical variables, please describe that process.

20. Follow-up analyses

20.1. If not specified previously, will you be conducting any confirmatory analyses to follow up on effects in your statistical model, such as subgroup analyses, pairwise or complex contrasts, or follow-up tests from interactions. Remember that any analyses not specified in this research plan must be noted as exploratory.

21. Inference criteria
    21.1. What criteria will you use to make inferences? Please describe the information you will use (e.g. p-values, Bayes factors, specific model fit indices), as well as cut-off criterion, where appropriate. Will you be using one or two tailed tests for each of your analyses? If you are comparing multiple conditions or testing multiple hypotheses, will you account for this?

22. Data exclusion
    22.1. How will you determine what data or samples, if any, to exclude from your analyses? How will outliers be handled?

23. Missing data
    23.1. How will you deal with incomplete or missing data?

24. Exploratory analysis (optional)
    24.1. If you plan to explore your data set to look for unexpected differences or relationships, you may describe those tests here. An exploratory test is any test where a prediction is not made up front, or there are multiple possible tests that you are going to use. A statistically significant finding in an exploratory test is a great way to form a new confirmatory hypothesis, which could be registered at a later time.

Script (Optional)

The purpose of a fully commented analysis script is to unambiguously provide the responses to all of the questions raised in the analysis section. This step is not common, but we encourage you to try to create an analysis script, refine it using a modeled dataset, and use it in place of your written analysis plan.

25. Analysis scripts (Optional)
    25.1. (Optional) Upload an analysis script with clear comments. This optional step is helpful in order to create a process that is completely transparent and increase the likelihood that your analysis can be replicated. We recommend that you run the code on a simulated dataset in order to check that it will run without errors.

Other

26. Other
    26.1. If there is any additional information that you feel needs to be included in your pre-registration, please enter it here.