Research Transparency and Reproducibility Training (RT2)

Final Report

April 4-6, 2018
Amsterdam, The Netherlands

A. Overview

The Berkeley Initiative for Transparency in the Social Sciences (BITSS), an initiative of the Center for Effective Global Action (CEGA), held its second international Research Transparency and Reproducibility Training (RT2) at Impact Hub in Amsterdam, the Netherlands, April 4-6, 2018. This three-day RT2 event was the sixth training organized by BITSS since 2014. The event was sponsored by the Laura and John Arnold Foundation, the William and Flora Hewlett Foundation and an anonymous donor.

Through this training, participants were exposed to the theoretical and practical aspects of the research credibility crisis (including researcher degrees of freedom, publication bias, and failure to replicate), and were introduced to a number of tools and methods to implement transparency and reproducibility in their own workflows.[1] Some of the tools and methods discussed at RT2 include pre-registration and pre-analysis plans, replication, data management and de-identification, and meta-analysis techniques. Through hands-on training, participants were introduced to study registration using the Open Science Framework (OSF), version control using Git and GitHub, and dynamic documents using R Markdown and MarkDoc. A series of lightning talks presented new open science innovations and initiatives, including statcheck, Registered Reports at the *Journal of Development Economics*, BITSS Pre-prints, and a network approach to scholarly communication.

RT2 Amsterdam also provided ample opportunities for networking and collaboration and served as a platform for BITSS to identify and advise capable leaders for the Catalyst Program.

B. Participant Profile

For RT2 Amsterdam, BITSS received 316 applications from individuals from a wide range of academic disciplines, including economics (21.2%), political science (12.3%), public policy (10.8%), public health, biostatistics, or epidemiology (7.6%), psychology (7 %), sociology (4,1%), as well as other social science disciplines (30.4 %) and non-social science disciplines (6.3%). A quarter of the applicants (25.6%) were PhD students, and the rest were masters students

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[1] All training materials are available online at https://osf.io/fw28g/

(19.6%), research practitioners (18.4%), faculty (11.1%), post-doc researchers (4.7%), or worked in other research-related roles (19.6%).

Of the 316 applicants, 38 (with equal numbers of women and men) were selected and invited to attend RT2. Of the selected applicants, 32 attended the training. Among the 32 participants who were able to attend, there were 14 PhD students, 5 postdoctoral scholars, 4 research practitioners, 3 masters students, 2 faculty, and 4 in other research-related roles. In terms of academic disciplines, 11 participants came from economics, 5 from psychology, 4 from political science, 4 from public policy, 3 from public health, biostatistics, or epidemiology, and 5 from other social sciences. In addition to ensuring gender balance among participants, BITSS made an effort to ensure gender balance among faculty and presenters, as 6 of 14 faculty members were women.
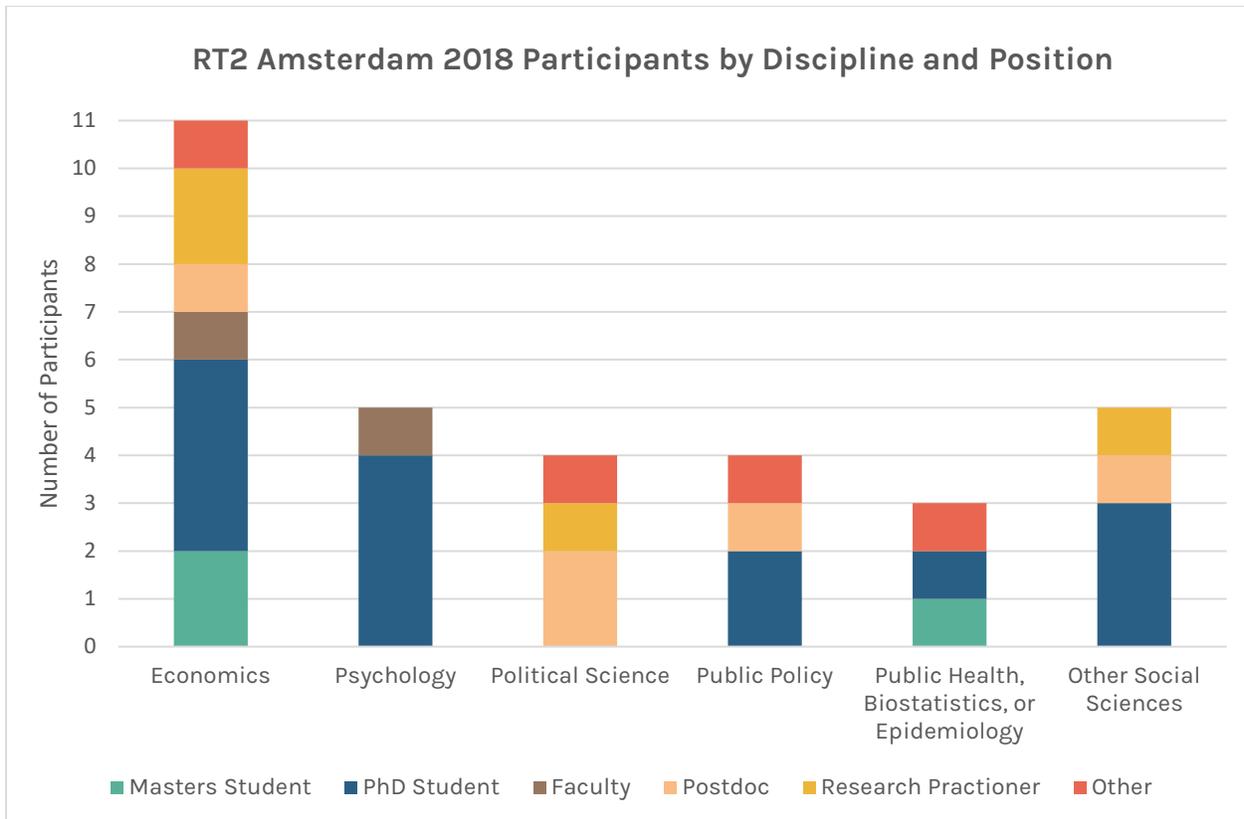

Figure 1: Distribution of RT2 Amsterdam participants by discipline and position.

Prior to the event, BITSS developed and distributed a Participant Manual to all participants and faculty. The manual included a brief overview of topics to be covered at the training, a suggested reading list, a list of actions to take before the training (e.g., software installations, OSF account registration), glossary with terms in the open science discourse, a list of useful BITSS-curated resources, a final agenda, and lists of RT2 faculty and participants.

C. Feedback and Lessons Learned

An evaluation survey was administered to participants at the end of each day to assess the usefulness, pace, and instructor preparedness for each session on a scale from 1 to 5 – with 5 being the highest rating. Participants provided additional comments in these daily surveys, as well as during a final wrap-up session on Day 3. The following is a summary of this feedback.

Participant Manual

In the first survey, all respondents reported that they had reviewed the Participant Manual before RT2 and gave it an average rating of 4.24 in terms of improving their knowledge of research transparency and reproducibility. This is an increase from the 4.13 average rating of the Participant Manual distributed at RT2 London.

Individual Sessions

Sessions were rated 4.35 on average, with the highest rated individual sessions being Replication (4.76), Version Control with GitHub and the Command Line (4.67), and Scientific Misconduct and Researcher Degrees of Freedom (4.62).

At the beginning of Day 1, participants were introduced to the 'RT2 Roadmap' (see Figure 2), which provided a structured overview of the upcoming curriculum. The RT2 Roadmap was designed to correspond with steps in the research workflow of a typical research project. Faculty presenters began each session with reference to the RT2 Roadmap to show where the topic would be useful in a workflow and reflected on their perspective or "lens," based on their discipline and research focus.

Following the RT2 Roadmap session, participants were introduced to different aspects of the credibility crisis in science in sessions dedicated to scientific misconduct and researcher degrees of freedom, research design pre-specification/pre-registration, and replication. These sessions received high ratings, with an average of 4.46 for all sessions on Day 1. A few common suggestions for improvement from the daily participant feedback forms were that these introductory sessions should not frame transparency as "required" (or being primarily important due to academic honesty), but rather as useful for even the most disinterested researcher in terms of improving both the efficiency of their workflow and the reproducibility and credibility of their research.
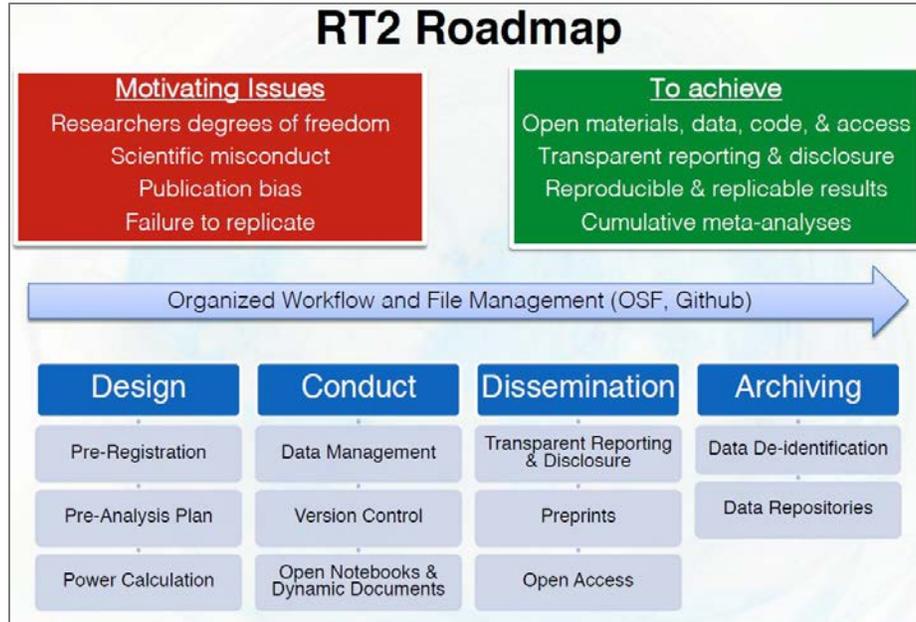
Figure 2: RT2 Roadmap for integrating research transparency and reproducibility into the research workflow

Day 1 also featured a practical session on pre-registration, during which participants were split into three groups to work on improving a mock registration using the OSF registration platform. All survey respondents were able to successfully set up an OSF account before the start of the session and welcomed the opportunity to practice the application of a theoretical concept in the hands-on session. Some participants suggested that perhaps even less time should be dedicated to theory and more to the practical element of pre-registration in the future. This may help participants without prior experience with the OSF familiarize themselves with the platform and be more active during the group discussions.

Day 2 was largely dedicated to hands-on sessions that introduced participants to version control using GitHub and the Command Line, as well as to dynamic documents using R Markdown and Markdoc. All respondents to the participant survey on Day 2 were able to install the required software in advance. Both sessions received positive ratings, with the session on version control receiving an average rating of 4.67 and dynamic documents receiving an average rating of 4.28. Multiple participants stated that they immediately saw how they could integrate both tools in their own workflows.

During the session on version control, participants were split in two groups, with less experienced users working with the GitHub app and GitHub, and more advanced users working with the Command Line Git and GitHub. More time was dedicated for this session than any other at RT2, which was especially beneficial for participants with limited experience with the tools. A few participants stated that they were curious about the experience of presenters in integrating these tools into their own workflows, as well securing buy-in from collaborators, peers, and students. Another participant suggested dedicating more time for makefiles. For

the session on dynamic documents, some participants suggested running parallel sessions similar to the sessions on version control, in order to allow more time for consultation with the instructor.

In addition to the hands-on sessions on Day 2, participants were also introduced to data management and de-identification and transparency in statistical reporting standards. Both of the sessions received positive feedback from participants, and many suggested that they found them relevant for their workflow. To improve their relevance for participants across all disciplines, participants suggested adding content about de-identification of large scale digital trace data (given its increased use among social scientists), and emphasizing why statistical reporting standards are beneficial for both the collective research enterprise and the individual researcher.

Day 3 opened up with presentations on 'radical' transparency in statistical reporting and creating reproducible papers, which provided participants with practical recommendations on how to reduce bias in their workflow and the way they report their research findings. The session on meta-analysis provided a useful reminder of the problem of publication bias, and led participants step-by-step through the process of producing a meta-analysis.

Participants welcomed the opportunity to learn about new tools in research transparency and reproducibility presented during the Lightning Talks. The presentation about the Registered Reports pilot at the *Journal of Development Economics* drew a lively discussion and participants expressed their enthusiasm about the potential of the project. Similarly, participants also saw preprints and statcheck as useful and relevant for their work.

Overall Curriculum

RT2 Amsterdam consisted of 16 presentations. Participants rated overall curriculum at 4.73 on average (see Table 1 below), an increase from the last RT2 events in Berkeley and London that had an average ranting of 4.64 and 4.71, respectively. In terms of faculty quality, RT2 participants provided an overall rating of 4.63, a slight increase in comparison to RT2 London 2017 faculty rating of 4.57. However, on average, participants expressed strong confidence in terms of the training's contribution to their understanding of fundamental problems in social science research (4.73) as well as their understanding of best practices in research transparency and reproducibility (4.82).

In addition to curriculum and faculty, RT2 Amsterdam received overwhelmingly positive feedback regarding logistics, including the venue, catering and organizing efforts in general. The venue was particularly well suited to the needs of the event, as it provided enough room for collaboration, and appropriate amount of daylight to help participants stay energized throughout the long day. Catering included vegetarian dishes that were provided by local, sustainably sourced businesses.

How would you rate RT2 in terms of:	RT2 Berkeley	RT2 London	RT2 Amsterdam
Overall curriculum quality?	4.64	4.71	**4.73**
Overall faculty quality?	4.68	4.57	**4.63**
Improving your overall knowledge on the problems facing social science research transparency and reproducibility?	4.55	4.59	**4.73**
Improving your overall knowledge on research transparency and reproducibility best practices?	4.68	4.68	**4.82**

Table 1: Comparison of participants rates between the last three RT2 events.

D. Long-Term Impact and Future Considerations

Three long-term implications for RT2 came out of the evaluation forms, faculty lunch, and post-session discussions.

First, many participants stressed the need to also introduce content on the pedagogy of education and adoption of transparency and reproducibility tools and practices. Some pointed out that, despite their personal enthusiasm, they would have difficulty advocating for transparent and reproducible research at their home instructions, and would therefore benefit from tips and strategies from faculty members on how to address this challenge. One suggestion was to frame RT2 tools and practices as beneficial not only for scientific integrity, but also for the purpose of enhancing efficiency in the research workflow. For example, faculty could include examples of how they integrated practices in their own workflow, and/or effective strategies for teaching research transparency and reproducibility. In addition, BITSS can continuously update and advertise the repository of teaching resources beyond those currently included in its Resource Library, including visual assets, videos, tutorials, apps, games, etc.

Second, participants noted that RT2 could also feature efforts to advance policies for reproducible research in/by research institutions and publishers. Representatives from such institutions could speak at RT2 events, or faculty members could share their experiences in working with such institutions.

Third, participants found hands-on sessions particularly useful and applicable to their work. After familiarizing themselves with issues related to the credibility crisis through the Participant Manual, many emphasized that the opportunity to learn through practice was a

unique, added value of the training. Dedicating more time to hands-on sessions could help participants further develop their proficiency in using and teaching RT2 tools and practices.

BITSS was excited to hear many of the participants express a readiness to implement research transparency tools and standards in their own workflows and help share best practices at their home institutions through the BITSS Catalyst Program.

We thank all of the RT2 faculty and participants for being part of this event and the broader open science movement!