

Social science webinar series on reproducibility and replications

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We developed a webinar series guiding reproductions and replications in light of the increasing awareness of the limited reproducibility and replicability in empirical social research. Experts from various fields of economics and other social sciences gave an introduction to replication and shed light on institutional aspects like the role of journal editors or founders and differences in conventions and institutions across the fields. We incentivize contributions to our project through a collaboration with a peer-reviewed journal that offers the publication of special issues based on our findings. In addition, we prepare a textbook with practical examples and a companion website that supports learning through reproductions and replications, independent of preferred software or programming language. Here, we will reflect on our experiences and discuss how an interdisciplinary and internationally organized webinar can improve our understanding of the varieties of threats to reproducible science and how to counteract them individually but also collectively.

CCS CONCEPTS • **Applied computing~Law, social and behavioral sciences** • **Applied computing~Education** • Mathematics of computing~Mathematical software

Additional Keywords and Phrases: Computational reproduction, Replication, Computing education, Webinar, Economics, Social sciences

1 INTRODUCTION

The replication crisis in psychology [16], and well-known cases of non-reproducible results in economics [11] have recently reinvigorated concerns about replicability and reproducibility, some studies revealing a hidden universe of uncertainty [3]. Early discussions in economics [5, 14, 8], and political science [15] had already motivated various approaches to advance the reproducibility of research like repositories for reproduction material [4, 17, 18]. The new attention has spurred a multitude of institutional and methodological changes in many social sciences [7, 9], in particular, reproducibility checks before publication by some journals [12]. We follow the advice of Daniel Hamermesh [10], who recommended using the workforce of students for replications, as they are less under pressure to publish but focus on learning and can benefit a lot even from reproductions with the original data.

2 OUR WEBINAR

2.1 Framework

To permit an interdisciplinary exchange for an international audience, we developed a webinar series about constructive reproducible science [2]. As quantitative social sciences are dominated by research based on data from North America and Europe, we contribute to a broader understanding of social processes with our international approach, supporting comparisons of results based on data from other countries. In our webinar, students learn about reproducibility tools like organizing data, code, and research reports with the TIER protocol 4.0 [1] and crowdsourcing platforms like the ReplicationWiki [13] alongside improving their practical skills in statistical and computational methods. We use computational reproductions as a tool for learning and evaluating previous research, which can often serve as a first cornerstone for additional empirical tests with replications or robustness checks through alternative analytical choices [6]. Hence, students are encouraged to use the deep understanding they gained to expand on the research they were reproducing either with new data, alternative methods, or critical reflections on theoretical and epistemological issues of the original study.

For the webinar series, we used pre-recorded videos made available before live discussions, thus employing a flipped classroom approach, so that everyone had time to prepare before the sessions. This facilitates participation from whatever time zone as presenters and other participants can also view contributions, ask and answer questions, and comment before and after the live sessions. Thereby, we could attract presenters from more than a dozen countries and participants from several others. The videos, as well as recordings of the live sessions, are made available for future use.

2.2 Expert Talks

In our first session, we introduced the concept and relevancy of replication and advised how to proceed, where to find studies suitable for replication and data, and how to communicate with original authors. The next session focused on the importance of making one's own research (and replication) reproducible and gave practical advice on the use of an online repository like the Open Science Framework [19] for code, data, and text. In the following sessions, experts from various fields like quantitative macroeconomics, behavioral economics, agricultural economics, political science, sociology, and criminology presented the particularities of replication in their fields. They gave information on which journals provide replication material or publish replications, what kind of research about replication has already been done in the respective field and talked about their own experiences. Some presenters had worked on individual replications, some had used replication in their teaching, one had co-led a crowdsourced replication initiative, some had done meta-research on replications, some had founded institutions promoting integrity and transparency in research and teaching, and one had co-

edited a special journal issue on replications in his field and co-edits for a journal that invites replications. A session with a journal editor focused on the incentives actors like editors, reviewers, and authors of both, original work and replications, face in the context of replications and how this can lead to conflicts, but also what solutions could be found to improve transparency and reliability of research.

2.3 Insights from Individual Reproductions and Replications

The presentations of individual replications covered a broad range of topics and approaches from a complex model in quantitative macroeconomics to research about COVID-19, the impact of a minimum wage in a developing country, discrimination, and the influence of women's participation in peace processes. One of the computational reproductions failed to generate the same effect sizes and significance levels for spending checks as the original paper, concluding that the source of divergence most likely lies within the data-cleaning process. An extension of the sample period showed that the higher power is insufficient to restore significance. A second project identified differential effects comparing the successful computational reproduction with alternative operationalization of discrimination. Finally, the reexamination of the impact of female signatories on the duration of peace processes found errors in the presented sample sizes of an already very unbalanced sample and discussed severe limitations of the causal interpretations of the original study.

They all shed light on various typical challenges replicators often face, like difficulties in obtaining original replication material or when updating data, difficulties trying to compare results of original research with those based on data from another country, lack of documentation and errors in original materials, or original authors who sometimes do not communicate. In one case, the replication was based on a working paper available online, which then got published in a journal in a new version while the replication was still ongoing. Different statistical software was used, that have their own particularities with versioning and documentation. Ultimately the participants replicated each other's replications, were involved in the reviews, and helped to prepare conference contributions, like this one, and funding applications for the textbook project, introducing them to further academic practices.

3 OUTLOOK

The project is ongoing with further sessions planned to start in September 2024, and a second special journal issue in preparation. We believe that our reflections on our experience in teaching and working on reproductions and replications with a broad international field of young scholars in a multitude of social sciences will aid scholars from other fields as well. Often the particularities of data and research methods in our disciplines fall behind the increasing need for robust approaches to reproducible science. This is especially true with the encroaching dominion of new computational methods in all the sciences, which will also put forward new challenges for developing and teaching about e.g., documentation, versioning, package managing, and non-deterministic software environments alongside social and organizational issues of reproducible and replicable research. We see increased collaboration and exchange between computer scientists, methodologists, statisticians, and applied empirical researchers as pivotal to moving forward with reproducibility in research, and this conference as an opportunity for a step in this direction.

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