HOW WE TEACH NOW

The GSTA Guide to Transformative Teaching

Editors

Teresa M. Ober

Elizabeth S. Che

Jessica E. Brodsky

Charles Raffaele

Patricia J. Brooks

SOCIETY2THE
TEACHING OF
PSYCHOLOGY

Gernsbacher, M. A. (2020). Teaching research transparency in psychological science. In T. M. Ober, E. Che, J. E. Brodsky, C. Raffaele, & P. J. Brooks (Eds.), *How we teach now: The GSTA guide to transformative teaching* (pp. 487-500). American Psychological Association.

Chapter 34: Teaching Research Transparency in Psychological Science: How and Why

Morton Ann Gernsbacher, PhD

University of Wisconsin-Madison

Introduction

Ask your students – or yourself: Have you ever felt, when you were reading a rather brief Method section in a journal article, like you were competing in the Great British Baking Show, particularly during the Technical Challenge when contestants must replicate a classic dessert with only the briefest of instructions? Have you ever felt, when you were trying to re-create a published study's set of experimental materials with only a few published examples to guide you, like you were trying to re-create one of those amazing Pinterest projects – but you lacked sufficient examples to ensure your success?

Have you ever been given a set of already collected data to begin analyzing? You are ecstatic; receiving a set of data to analyze feels like Christmas morning (Bartlett, 2019), so you eagerly jump in. But upon closer inspection, you see that all the variable names are alphanumeric strings, such as GLVar2, BWVar6, and KGVar21. You have no clue what those variables names mean; you are even more clueless about how those variables were formed. You did not get the memo, literally, because there is no memo. All the information about what the variable names mean, how the variables were formed, and what inclusion and exclusion criteria were applied is stored in one and only one place. That one place is inside a senior graduate student's head, and that senior graduate student is single-mindedly working on their dissertation; not responding to your phone calls, email, or text messages; and leaving you to spend days, then weeks, maybe even months struggling to understand a poorly documented data file.

Have you ever found through Google Scholar what appears to be the ideal article for your literature review? But after clicking the Google Scholar entry, you fall headfirst into a revolving door of despair.

Correspondence to: Morton Ann Gernsbacher, Vilas Research Professor and Sir Frederic Bartlett Professor, Department of Psychology, 1202 W. Johnson St., University of Wisconsin-Madison, Madison, WI 53706, Email: MAGernsb@wisc.edu

The Google Scholar entry takes you directly to an APA PsycNET entry, which is helpful. But the APA PsycNET entry lacks a clickable link. Determined, you click over to your university's library website, where you painstakingly copy and paste in all the bibliographic information, click on "Get It," only to read the dreaded words, "No full text available." You could request a copy through inter-library loan – and being able to do so is one of the myriad privileges we enjoy from being affiliated with a university. However, it will probably take two or three days until the PDF is yours, and you want it now. Therefore, you decide to freebase it: You search on regular Google, where you find an entry on ResearchGate. Things are looking up! But then you see the woeful words "Request Full-Text," which means you will have to make a request from the authors to obtain the article, and that could take days or weeks.

The difficulty in replicating published experiments from minimal methods sections; the struggle of reproducing previously published research materials with only a handful of examples to guide you; the challenge of understanding poorly documented data files; and the quest to read journal articles locked away behind paywalls are all excellent reasons to teach research transparency. So, too, are the reasons that have made headlines, such as *The New York Times*' report that "Many psychology findings [are] not as strong as claimed" (Carey, 2015) and the journal *Nature*'s proclamation that "Over half of psychology studies fail reproducibility test" (Baker, 2015). These headlines referred to a study in the prestigious journal *Science* in which 269 co-authors tried to replicate nearly 100 psychology studies previously published in three prominent psychology journals. Over half the studies failed to replicate (Open Science Collaboration, 2015).

Even earlier, a headline in *WIRED* magazine reported that "Scanning dead salmon in fMRI machine highlights risk of red herrings" (Madrigal, 2009). This punning headline referred to a high-profile brain imaging study showing that placing a dead salmon in a brain scanner and giving the dead salmon a Theory of Mind task lead to false positives (Bennett, Miller, & Wolford, 2009). Or at least we think they were false positives because the salmon was, after all, dead. And who can forget the headlines that followed Bem's (2011) article in the *Journal of Personality and Social Psychology,* purporting to show that undergraduates can see into the future? As the headline in *Slate* remarked, "Daryl Bem proved ESP is real, which means science is broken" (Engber, 2017). All these headlines provide excellent motivation to teach research transparency. How can we do that?

In this chapter, I outline six steps that we can teach our students to improve the transparency of their research. These steps are relevant to undergraduates enrolled in their first research methods course and doctoral students embarking upon their dissertations. The steps are relatively low effort, but with big dividends. These steps include students (1) preregistering their studies' goals and analysis plans; (2) posting their completed studies' research materials to public repositories; (3) uploading their studies' data and analysis scripts to public repositories; (4) writing transparent manuscripts; (5) uploading open access versions of their published articles; and (6) submitting their manuscripts to journals that accept registered reports.

Teaching Transparency: Open Data

Another step we can teach students about research transparency is how to make their research data open. That means making all their study's data available to peer reviewers when they submit their manuscript for peer review and, later, making all their study's data available to readers of the published article. The parallel in the classroom is the requirement for students make all their study's data available to the instructor, and to other students, when they submit their study for peer review or grading.

Of all the steps toward transparency that researchers can take, making their data available is one of the most desirable but also one of the most fear inducing (Houtkoop et al., 2018). One way I have lowered my own anxiety about making my data available is that I first arrange a data-checking swap with another colleague. I send my data to another colleague to check, and they send me their data to check. We try to reproduce each other's reported results prior to each of us posting our data – or submitting our manuscripts (Gernsbacher, 2018b). I feel considerably more confident about the accuracy of my data and my analyses and submitting them to further scrutiny after another colleague has checked them. And accuracy is everyone's goal.

In my classes, I also have students swap-check their data with other students. In fact, even in my undergraduate entry-level research methods class (Gernsbacher, no date), I require each student to share their data with two other students. And the other two students have to use those data to draw the same conclusions as the student who shared the data with them. I require students to swap-check their data whenever they collect and report data. Getting their data into a format that other students can work with it is also a valuable skill to learn. Many funding agencies, an increasing number of journals, and the Transparency and Openness Promotion (TOP) Guidelines require researchers to post their data (Culley, 2017), and most researchers believe that is the ethical and ecological thing to do (Nature Communications, 2018).

Best practices for organizing data are similar to those for organizing research materials. Data sets should be comprehensive (all data that contributed to the results should be included); self-explanatory (all data should be well cataloged, with full annotations rather than researcher-created abbreviations); self-contained (all data should be made available in one place or, if needed, with links to other places); and organized (a good rule of thumb is to order the data in the sequence with which they are discussed in the manuscript). As with other documentation, good data documentation serves researchers themselves as well as the research community (Hunt, 2019).

Resources for Teaching Open Data
Soderberg's (2018) article, "Using OSF to share data: A step-by-step guide" is an excellent resource, as is Toelch and Ostwald's (2018) free, online course, "Digital Open Science." The TIER (Teaching Integrity in Empirical Research) Protocol (https://www.projecttier.org/tier-protocol) is a marvelous resource for students that provides step-by-step guidance on managing files, creating data catalogs, and more. Krypotos, Klugkist, Mertens, and Engelhard (2019) provide recommendations for anonymizing sensitive data, and Levenstein and Lyle (2018) provide recommendations for wording statements of informed consents to address data sharing. Brooks, Brodsky, and Che (this volume) also provide guidance on using existing open-source data for instruction.