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The promise of pre-registration in psychological research

Encouraging a priori research and decreasing publication bias.

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Nothing about the scientific process, or the dissemination of scientific research in particular, should be inherently problematic for the scientific community or the advancement of scientific knowledge (e.g., Anderson, Bonds-Raacke, & Raacke, 2015; Berman, 2008; Brielmaier, 2008; Dunn, 2007). However, with strong competition for jobs and grants it is possible for researchers to develop a “publish or perish” mentality (Leis & Newman, 2011; Pain, 2013; O'Neill & Sachis, 1994; van Dijk, Manor, & Carey, 2014). This viewpoint, coupled with a well established bias in publications for novel and statistically significant effects (e.g., Ferguson & Brannick, 2012; Kühberger, Fritz, & Scherndl, 2014; Rosenthal, 1979), can result in the use of questionable research practices (John, Loewenstein, & Prelec, 2012; Simmons, Nelson, & Simonsohn, 2011) and even outright research scandals, such as those surrounding Lawrence Sanna (Yong, 2012) and Diederik Stapel (Bhattacharjee, 2013).

While these conditions in no way excuse scientific dishonesty, they do highlight how features of the current publication system motivate problematic research practices, such as “p-hacking” (i.e., manipulating data analyses in order to obtain significant effects; Simmons, Nelson, & Simonsohn, 2011) and hypothesizing after the results are known (“HARKing,” Kerr, 1998). In response to these issues, psychological science, along with other scientific disciplines, has begun to adopt practices aimed at reducing the frequency of publishing poor research. In particular, data sharing (Cunningham & Gonzales, 2014) and provision of outlets for publication of replication studies (Rovenpor & Gonzales, 2015) can help to increase the capacity of the peer-review process to critically evaluate scientific contributions. Another practice that is becoming more common is the pre-registration of studies, with the aim of reducing the publication bias for results that are novel and statistically significant.

What is Pre-Registration?

Pre-registration is an open research practice that some journals are developing and implementing; *Attention, Perception, & Psychophysics* (<http://www.springer.com/psychology/cognitive+psychology/journal/13414>), *Comprehensive Results in Social Psychology* (<http://www.tandfonline.com/doi/full/10.1080/23743603.2015.1070611#.VbqfRunbJdg>), *Cortex* (http://cdn.elsevier.com/promis_misc/PROMIS%20pub_idt_CORTEX%20Guidelines_RR_29_04_2013.pdf) (PDF, 340KB), *Perspectives on Psychological Science* (<http://pps.sagepub.com/>) and *Psychological Science* (http://www.psychologicalscience.org/index.php/publications/journals/psychological_science/badges) (see list of journals with pre-registration (https://docs.google.com/spreadsheets/d/1D4_k-8C_UENTRtbPzXfhjEyu3BfLxdOsn9j-otrO870/edit#gid=0)). Researchers either have the option or are required to submit their research rationale, hypotheses, design and analytic strategy to the journal for peer review before beginning the study. (This is a critical step in research design that should, but is sometimes not appropriately addressed, e.g., Mistler, 2012.) This submission can undergo rejection and revision just as in the typical journal review processes. If accepted at this stage, then researchers can begin their study knowing that it has been approved in principle.

Once the study is completed, the full article is prepared and submitted to the journal for a second round of reviews. While the article cannot be rejected at this point due to the outcome of the study (e.g., non-significant effects), the article can still be rejected for outcome-neutral reasons. Examples of these include failing to employ proposed manipulation checks, if the data are insufficient to test hypotheses (e.g., if there are floor or ceiling effects), or if there are modifications to the pre-registered research design without sufficient justification for the changes (Center for Open Science, 2015).

Positive Expectations of Pre-Registration

While no single change to publication policy can guarantee complete amelioration of problematic research practices, advocates (e.g., Chambers, 2014) have outlined some positive consequences to be expected from implementing pre-registration. These include:

- Improved use of theory and stronger research methods due to the initial review. Because researchers are forced to formulate a proposal for a new study without seeing results first, there is an expectation that they will do a better job of addressing research motivation and design. The result should be better studies that respond clearly to precisely formulated questions.
- A decline in false-positive publications. If publication decisions are based on outcome-neutral criteria — which are largely addressed before conducting the study — then researchers will not be motivated to engage in practices that increase the likelihood of making a type I error. Results from studies that utilize such practices, separate from a pre-registered analytic plan, would be publishable strictly as exploratory research.

Concerns Regarding Pre-Registration

Just as no single change in practices will fully ameliorate existing problems, skeptics of implementing research registration (e.g., Scott, 2013) have outlined some possible negative consequences of implementing pre-registration:

- Pre-registration could lead to undervaluing exploratory research. If pre-registered studies have greater merit because they are less susceptible to publication bias via such practices as p-hacking and HARKing, then studies using exploratory analyses may not be held in the esteem they presently enjoy. This could lead to a decline in funding for such projects, and the discoveries that such research can yield.
- Without research results to help indicate the value of a study, editors and reviewers for nonblind journals may rely more on researcher prestige to make decisions about accepting articles for pre-registration. This could have a negative impact on the ability of graduate students and early career researchers to publish their work, impairing their career development.

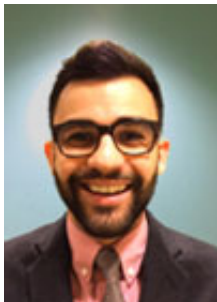
The Future of Pre-Registration

It is not clear at this time what the future of pre-registration will be. While some researchers and journals enthusiastically support the move to pre-registration, others are hesitant. Journals, for example, may be reluctant to endorse pre-registration out of concern that they will commit to publishing articles that may have null, dull or controversial conclusions; that in turn could lead to criticism of the journal, fewer citations, and declines in both impact scores and future submissions. And researchers may be concerned that a strong swing toward pre-registration could create a negative stigma for exploratory research, in contrast to an explicitly hypothetico-deductive approach.

These reasonable concerns aside, pre-registration does present a means for reducing the frequency at which exploratory research masquerades as having an a priori design. Furthermore, as implemented so far, pre-registration often incorporates other recent efforts to make psychological science more rigorous and transparent, such as procedures to encourage data sharing and replication.

Regardless of your current view of pre-registration, this is an important issue, and is one that will require further consideration. The best way to ensure that your views are expressed is to stay abreast of these topics and to actively contribute your opinion, thereby helping to shape how such policies are designed and implemented in the future.

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