A new era of large-scale replication and collaboration?

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@ceptional

Where science is *not* self-correcting

**False positive zones**

- researcher degrees of freedom high (*p*-hacking)
- victory declared whenever null hypothesis is rejected, where *size of effect, plausibility* considered unimportant.

The newer the domain, the more cutting-edge the tech...
"This one's Psych Science. 1998. Put your money on ‘will replicate’?"

"What, you think I was born yesterday?"

"Fine," muttered the bookie.
Well, Mr. Hacker, your luck is about to run out.

Down at the journals, they’re running a new game. They call it ‘preregistration’.
Open Science Framework

Badges to Acknowledge Open Practices

https://osf.io/tvyxz/wiki/home/
100% P-hacking Free

Here, check our numbers.

Here’s how you can replicate our result.

https://osf.io/tvyxz/wiki/home/
"This one's Psych Science. 1998. Put your money on ‘will replicate’?"

"What, you think I was born yesterday?"

"Fine," muttered the bookie.
Failed to replicate my result?

Have you considered the unknown moderators?
Any one of us alone, he’ll say we messed up. But if we all run the replication together, we can show the big guy we’re right.
### Meta-analysis forest plot

#### Completed Both RRR Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Verbal</th>
<th>Control</th>
<th>Difference [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aloigna, Haibertstadi, Jong, Jackson, Ng</td>
<td>57.1</td>
<td>70.2</td>
<td>-0.13 [-0.31, 0.05]</td>
</tr>
<tr>
<td>Birch</td>
<td>66.1</td>
<td>66</td>
<td>0.00 [-0.18, 0.18]</td>
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<tr>
<td>Bet, Aucoll</td>
<td>33.3</td>
<td>36</td>
<td>-0.03 [-0.21, 0.15]</td>
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<tr>
<td>Brandimonte</td>
<td>49.6</td>
<td>58.6</td>
<td>0.10 [-0.06, 0.26]</td>
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<tr>
<td>Carlson, Weatherford, Carlson</td>
<td>42.7</td>
<td>56</td>
<td>-0.13 [-0.29, 0.00]</td>
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<tr>
<td>Delipacopera, Borstein</td>
<td>39.2</td>
<td>53.9</td>
<td>-0.15 [-0.31, 0.01]</td>
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<tr>
<td>Delvenne, Brown, Portch, Zaksite</td>
<td>67.8</td>
<td>65.6</td>
<td>0.02 [-0.15, 0.19]</td>
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<tr>
<td>Echtenhoff, Kopeitz</td>
<td>36.6</td>
<td>52.2</td>
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<tr>
<td>Eggpleston, Lai, Gilbert</td>
<td>49.4</td>
<td>56.5</td>
<td>-0.07 [-0.23, 0.00]</td>
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<tr>
<td>Greenberg, Mugayar-Baldocci</td>
<td>48</td>
<td>58</td>
<td>-0.08 [-0.28, 0.12]</td>
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<tr>
<td>Kehn, Schweitzer, Gamblin, Wiseman, Nunez</td>
<td>52.4</td>
<td>57.4</td>
<td>-0.05 [-0.22, 0.12]</td>
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<tr>
<td>Koch, Gentry, Shaheed, Buswell</td>
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<td>45.8</td>
<td>0.08 [-0.12, 0.28]</td>
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<td>Mmmmerante, Fairfield, Di Domenico</td>
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<td>52.7</td>
<td>-0.12 [-0.25, 0.01]</td>
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<td>McCoy, Recourt</td>
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<td>57.4</td>
<td>-0.15 [-0.33, 0.02]</td>
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<tr>
<td>Mitchell, Petro</td>
<td>54.8</td>
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<td>0.04 [-0.15, 0.22]</td>
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<td>Muselman, Colasusso</td>
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<td>40</td>
<td>-0.16 [-0.34, 0.01]</td>
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<tr>
<td>Potter, Attaya, McConnaughty, Pappagianopoulos, Sullivan</td>
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<td>56.4</td>
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<td>Novilinos, Tramira, Panin</td>
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<td>Nisbet, McConnell</td>
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<td>Thompson</td>
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<td>Ulatovska, Cislak</td>
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<td>Wade, Kinner, Coloff, Kunar</td>
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<td>65</td>
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</tbody>
</table>

#### Completed RRR Study 1 Only

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<tr>
<td>Chu, Marsh, Skepton</td>
<td>45</td>
<td>62.7</td>
<td>-0.09 [-0.28, 0.10]</td>
</tr>
<tr>
<td>Edlund, Nichols</td>
<td>54.9</td>
<td>42.6</td>
<td>0.12 [-0.06, 0.31]</td>
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<tr>
<td>Gabbert, Valentine</td>
<td>61.8</td>
<td>58.5</td>
<td>0.03 [-0.15, 0.22]</td>
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<td>Lefére</td>
<td>38.5</td>
<td>56</td>
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<tr>
<td>McPhyre, Langton, Hancock</td>
<td>71.2</td>
<td>72.5</td>
<td>-0.01 [-0.19, 0.16]</td>
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<tr>
<td>Michael, Franco, Sanson, Gavr</td>
<td>56.3</td>
<td>56.1</td>
<td>0.00 [-0.14, 0.15]</td>
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<tr>
<td>Palmer et al</td>
<td>57.1</td>
<td>58.8</td>
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<td>Verheugen, Buurmaester, Zwaan</td>
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<td>55.6</td>
<td>-0.05 [-0.24, 0.15]</td>
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<tr>
<td>Wes, Hirsch, Tandor, Remig</td>
<td>53.7</td>
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#### Meta-analytic effect for laboratory replications only

-0.04 [-0.07, -0.01]
You messed up!

Failed to replicate my result?

Have you considered the unknown moderators?

meta-analytic effect for laboratory replications only

-0.04 [-0.07, -0.01]
Registered Replication Reports

Replication Proposal and Review Form

The first section of this form asks for a complete description of the original study and the proposed protocol for replicating that study. The sections after that address the procedures and mechanics of conducting the replication.


This site includes the application used by those who joined this registered replication project (it's now underway so application...
Participating Research Groups

The following groups are participating. Each of these laboratories has been approved to conduct an independent replication by following the approved protocol.

- Anita Eerland, A. Sherrill, J. Magliano, R. Zwaan - Northern Illinois University; Open University; Erasmus University Rotterdam - USA and The Netherlands
- Michael Knepp; University of Mount Union
- Jason Prenoveau, Marianna Carlucci - Loyola University Maryland, USA
- Angela Birt - Mount Saint Vincent University, Canada
- Christopher Kurby - Grand Valley State University, USA
- Stephen Michael - Mercer University
- Jack Arnal - McDaniel College, USA
- Todd Ferretti - Wilfrid Laurier University, Canada
- Joseph Melcher - St. Cloud State University, USA
- Stephanie Berger - College of Mount Saint Vincent, New York, USA
- Christopher Poirier - Stonehill College, MA, USA

The link provided with each group's OSF project webpage for their replication study. However they may be private until shortly before the associated paper is published.
A new era of large-scale replication and collaboration?

Registered Replication Reports

Preregistration
Large-scale replication
Open data
Open protocol and code

Can we do this bottom-up?
Registered Replication Report: Schooler and Engstler-Schooler (1990)

Proposing Authors: This proposal was initiated by the editors


Protocol vetted by: Jonathan W. Schooler
Protocol edited by: Daniel J. Simons

The first principle is that you must not fool yourself, and you are the easiest person to fool.
~Richard Feynman
“No data, no paper. And make that alright? I don’t want a bunch of p-hacked p-values. stinkin’ summaries.”
The first principle is that you must not fool yourself, and you are the easiest person to fool.

~Richard Feynman
HOW SCIENTISTS FOOL THEMSELVES — AND HOW THEY CAN STOP

Humans are remarkably good at self-deception. But growing concern about reproducibility is driving many researchers to seek ways to fight their own worst instincts.

COGNITIVE FALLACIES IN RESEARCH

HYPOTHESIS MYOPIA
Collecting evidence to support a hypothesis, not looking for evidence against it, and ignoring other explanations.

TEXAS SHARPSHOOTER
Seizing on random patterns in the data and mistaking them for interesting findings.

ASYMMETRIC ATTENTION
Rigorously checking unexpected results, but giving expected ones a free pass.

JUST-SO STORYTELLING
Finding stories after the fact to rationalize whatever the results turn out to be.

DEBIASING TECHNIQUES

DEVIL’S ADVOCACY
Explicitly consider alternative hypotheses — then test them out head-to-head.

PRE-COMMITMENT
Publicly declare a data collection and analysis plan before starting the study.

TEAM OF RIVALS
Invite your academic adversaries to collaborate with you on a study.

BLIND DATA ANALYSIS
Analyse data that look real but are not exactly what you collected — and then lift the blind.

go.nature.com/nqyohl © Nature

Reproducibility workshop 26 Nov
How open science wins

Cultural change
• Early adopters
• Researcher training
• Advocacy, lobbying
• Journals strengthen sharing policies

Tech work at grassroots
• Altmetrics
• Streamlining repositories
• Software for reproducible research

Research funders ramp up requirement that code, data be posted

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