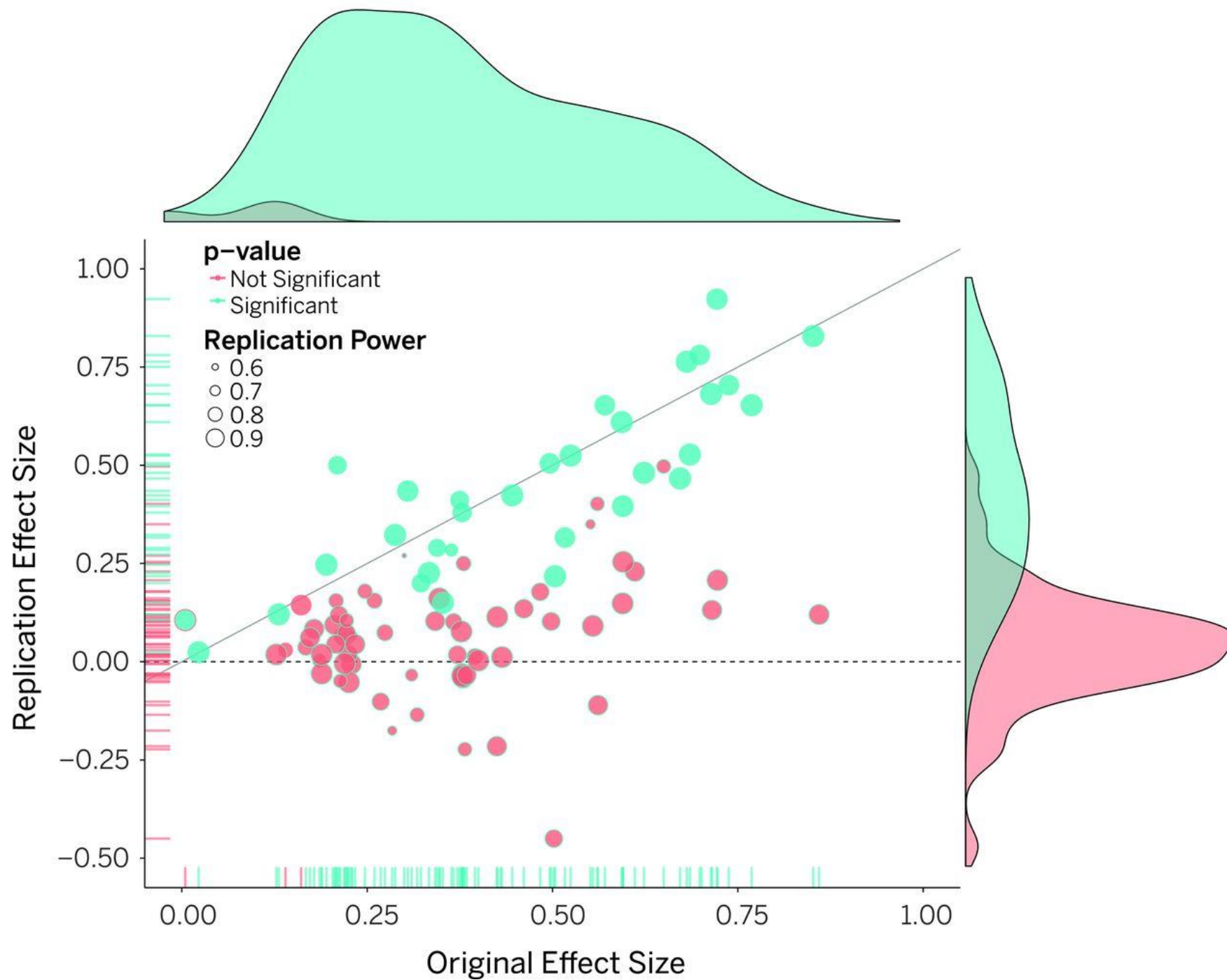


Open Science Practices in Cognitive Psychology

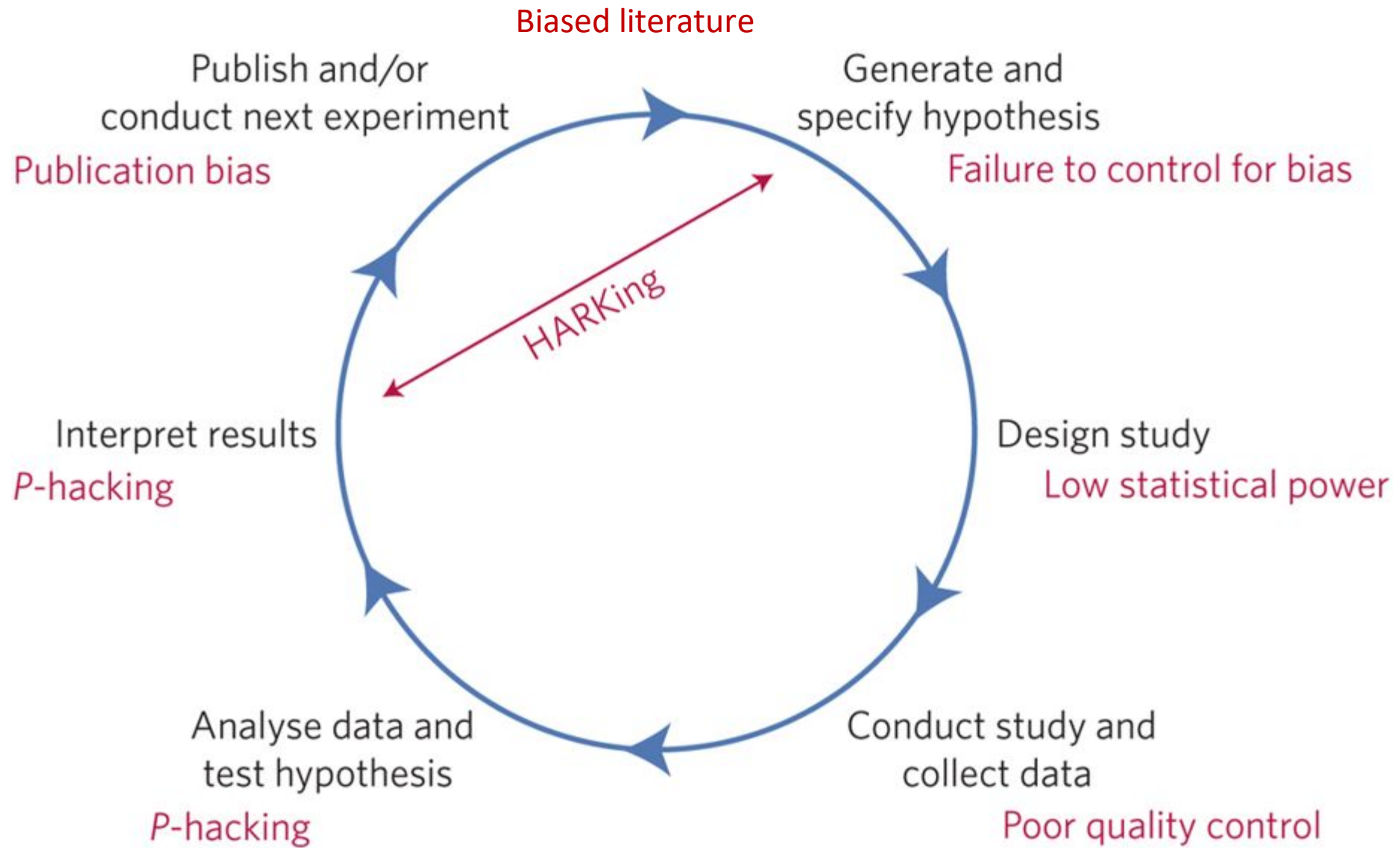
Naomi Havron



Why?



Open Science
Collaboration, 2015
Science



from Munafò
et al. (2017)

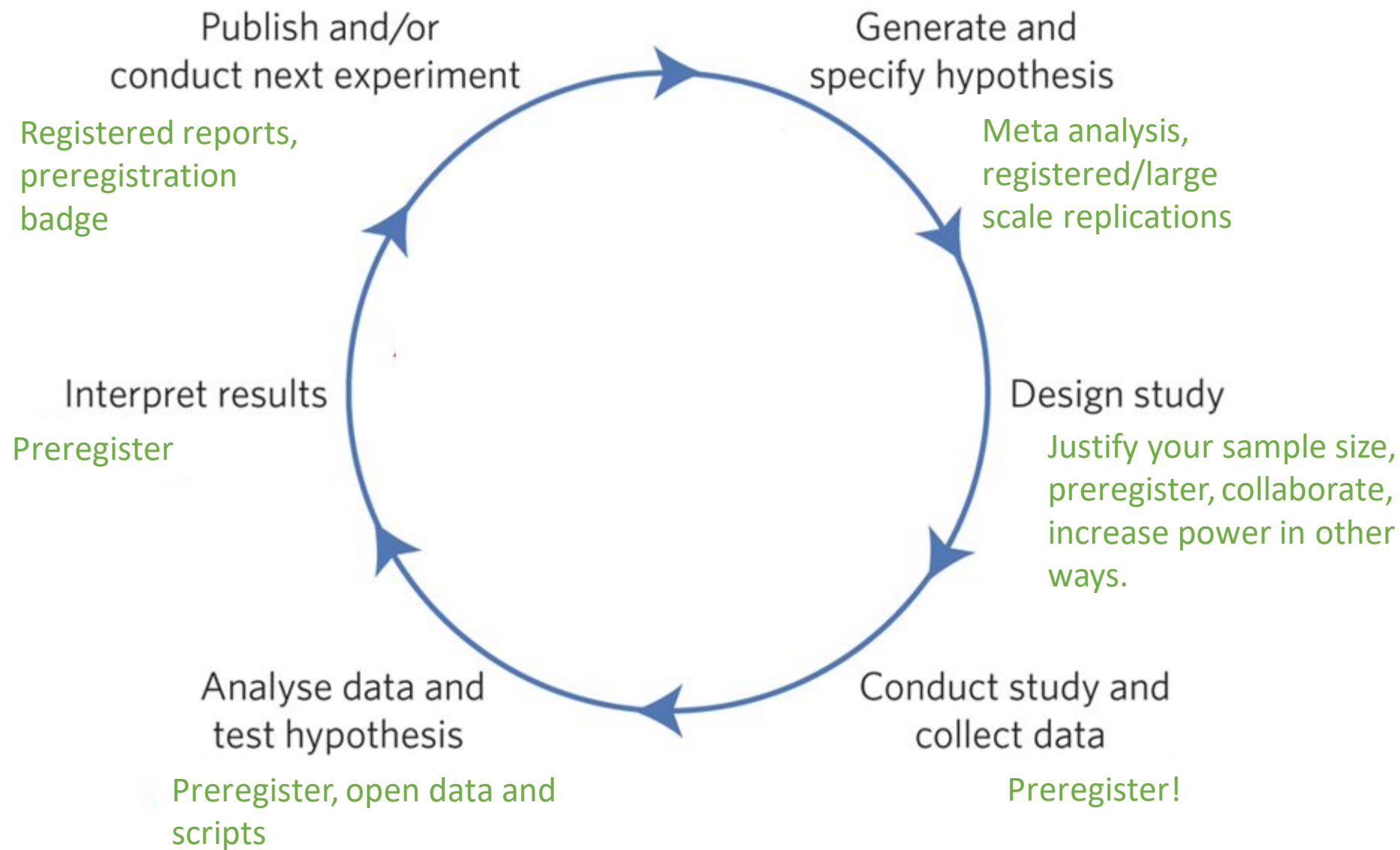
Why?

<http://shinyapps.org/apps/p-hacker/>

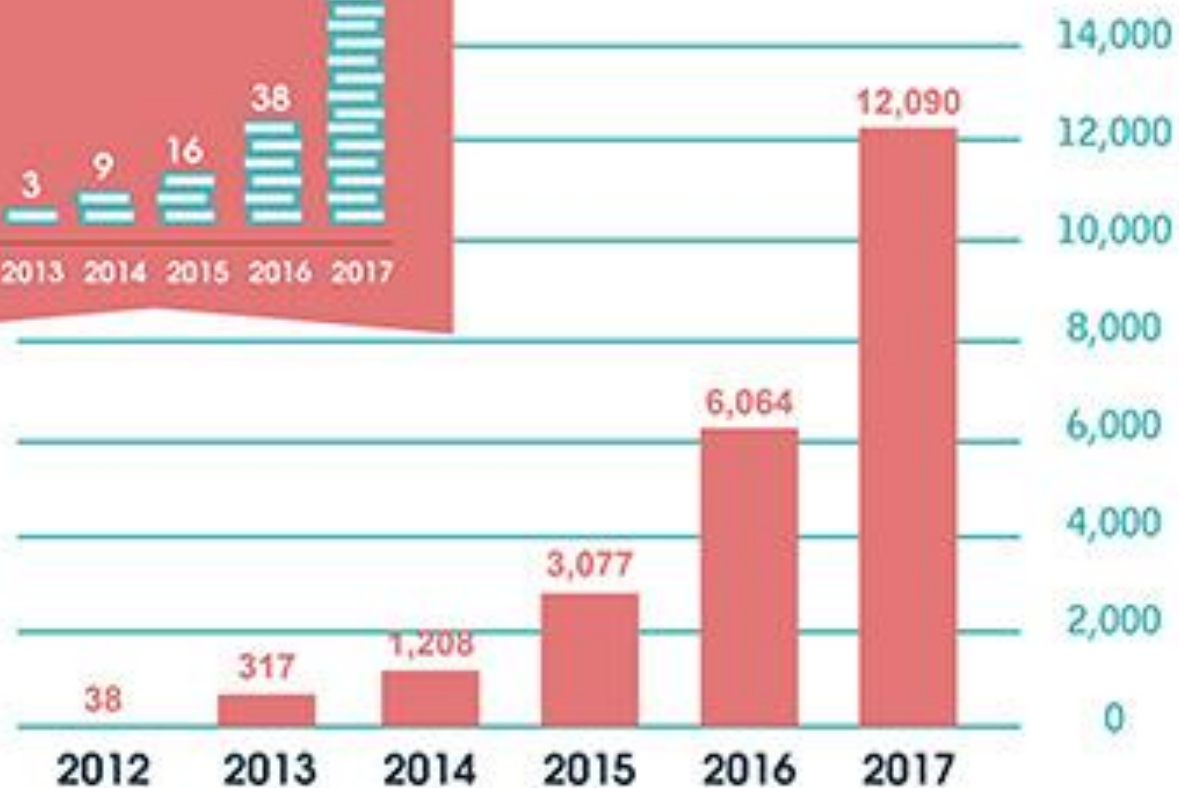
Why?

	Self-admission rate (%)	Defensibility rating (across groups)
1. In a paper, failing to report all of a study's dependent measures	63.4	66.5
2. Deciding whether to collect more data after looking to see whether the results were significant	55.9	58.0
3. In a paper, failing to report all of a study's conditions	27.7	27.4
4. Stopping collecting data earlier than planned because one found the result that one had been looking for	15.6	22.5
5. In a paper, "rounding off" a p value (e.g., reporting that a p value of .054 is less than .05)	22.0	23.3
6. In a paper, selectively reporting studies that "worked"	45.8	50.0
7. Deciding whether to exclude data after looking at the impact of doing so on the results	38.2	43.4
8. In a paper, reporting an unexpected finding as having been predicted from the start	27.0	35.0
9. In a paper, claiming that results are unaffected by demographic variables (e.g., gender) when one is actually unsure (or knows that they do)	3.0	4.5
10. Falsifying data	0.6	1.7

(John et al. 2012 Psyc Sci)



Cumulative Registered
Report Journals



Cumulative OSF Registrations

4:31 PM



Home



♥ Timo B. Roettger liked



Daniël Lakens ✓ @lakens · 8h



People sometimes wonder if pre-registration is worth the effort. I show them Kaplan & Irvin's 2015 ([journals.plos.org/plosone/articl...](https://journals.plos.org/plosone/article/doi/10.1371/journal.pone.0123456)) findings on the likelihood of null-effects before and after pre-reg became required in medicine, and ask if they want a drug discovered in 1998 or 2002.



2

30

48



My (@NaomiHavron) support group



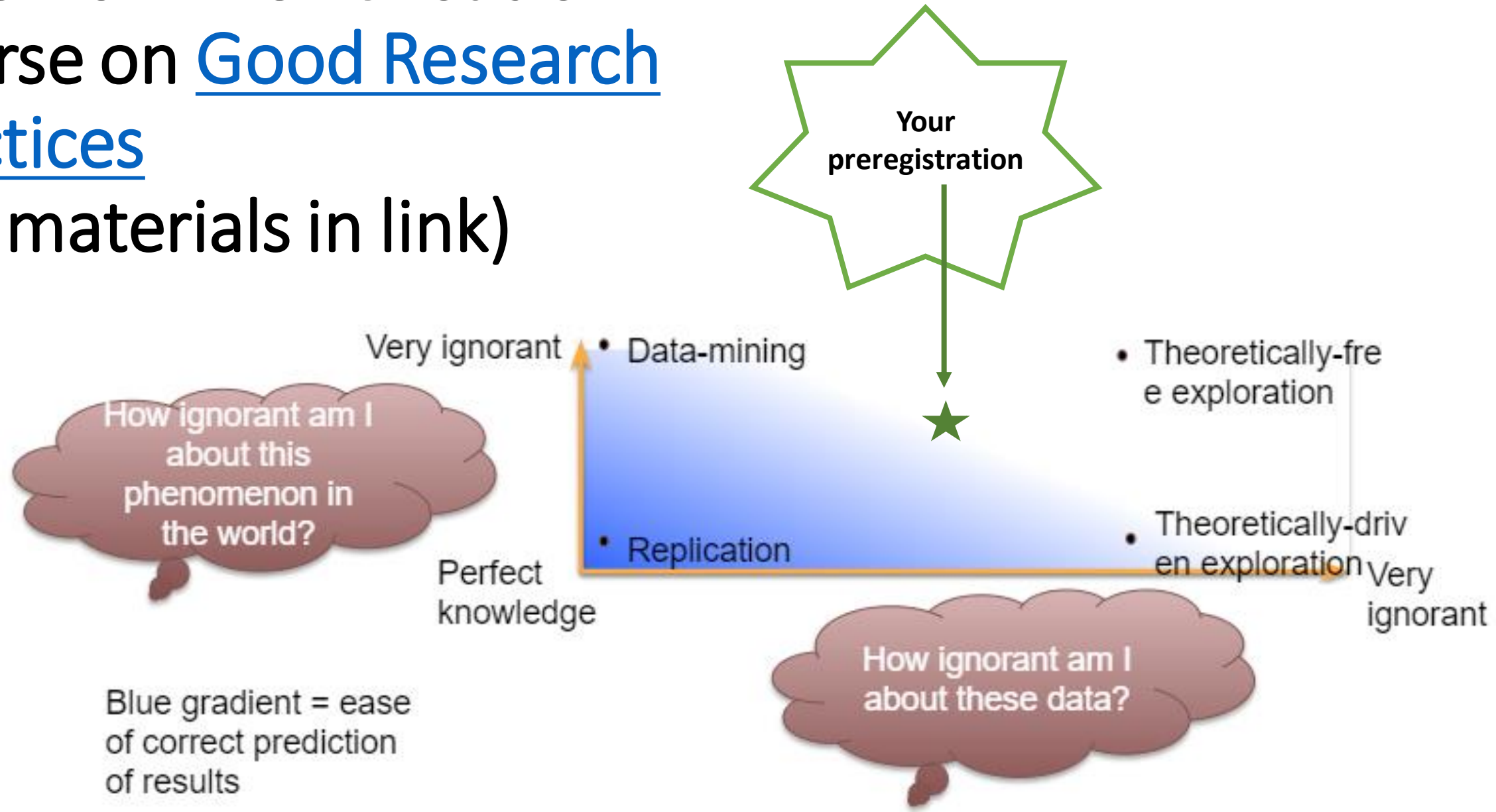
Some senior Scientists that tweet about good practices: @mcxfrank @siminevazire @hardsci @shravanvasishth @lakens, @Neuro_Skeptic, @IrisVanRooij, @AcademicBatgirl, @djnavarro, @zerdeve

Early career researchers that tweet about good practices: @chbergma @annemscheel @CogTalesTweet @Limor_Raviv

General/institutional accounts @ImprovingPsych @PsyBrief @UCBITSS and @OSFramework @PsyArXivBot

I recommend looking for central researchers in your field and following them.

Slide from Alex Cristia's Course on [Good Research Practices](#) (full materials in link)



How to preregister

- There are many templates out there, from the most minimal (e.g., [AsPredicted.org](https://aspredicted.org)) to the most comprehensive.
- You can even write freestyle (see [Github Alex Cristia](#))
- I will discuss the [Preregistration Challenge format](#), which might even win you money...
- If you want a live example, see [one of my completed projects](#). You will find there the preregistration, stimuli, results and analysis scripts.

How to get started

Study Information

1. Title

2. Authorship

3. Research Questions

4. Hypotheses

For each of the research questions listed in the previous section, provide one or multiple specific and testable hypotheses. Please state if the hypotheses are directional or non-directional. If directional, state the direction. A predicted effect is also appropriate here.

How to get started

Sampling Plan

Explanation of existing data

If you indicate that you will be using some data that already exist, please describe the steps you have taken to assure that you are unaware of any patterns or summary statistics in the data.

How to get started

Sampling Plan

7. Data collection procedures.

Please describe the process by which you will collect your data: the population from which you obtain subjects, recruitment efforts, payment for participation, how subjects will be selected for eligibility from the initial pool (e.g. inclusion and **exclusion rules**), and your study timeline.

How to get started

Sampling Plan

8. Sample size

9. Sample size rationale

This could include a power analysis or an arbitrary constraint such as time,

money, or personnel.

10. Stopping rule

How to get started

Variables

11. Manipulated variables

12. Measured variables

13. Indices

If any measurements are going to be combined into an index ... Include either a formula or a precise description of your method (e.g. a factor analysis)

How to get started

Design plan

14. Study type (experiment, cuprous analysis, observation etc.)

15. Blinding

16. Study design

17. Randomization

How to get started

Analysis plan

18. Statistical models

Please include the type of model (e.g. ANOVA, multiple regression, etc) and the specification of the model (this includes each variable that will be included as predictors, outcomes, or covariates). Please specify any interactions that will be tested.

19.Transformations

20. Follow-up analyses

How to get started

Analysis plan

21. Inference criteria

(e.g. p-values, Bayes factors, specific model fit indices) Will you be using one or two tailed tests for each of your analyses? If you are comparing multiple conditions or testing multiple hypotheses, will you account for this?

22. Data exclusion

23. Missing data

How will you deal with incomplete or missing data?

Preregistration

And you're done – phew...



Oh, your not??

Make honest revisions

Why might you deviate from the pre-registration?

You didn't know as much about the type of data as you thought → failed to foresee (post-hoc necessary) step

- pre-processing
- data transformations
- power (and in particular, N of participants)

You didn't know as much about the phenomenon as you thought you did → failed to foresee (post-hoc necessary) result
unexpected interaction or effect

Bonus - win shiny badges ;-)



Is there be anything even better than preregistration?

There is!

You can write a Registered Report – this way your paper is accepted whatever the result!

List of journals here:

<https://cos.io/rr/>

e.g.: Brain and Behavior, Cognition and Emotion, Cortex, Nature Human Behavior, Psychological Science...

RRs

The main benefits of this two-stage approach are:

- publication bias is reduced as negative results will not prevent publication.
- authors receive constructive critical feedback prior to conducting the experiment.
- This process can help reduce researcher bias.
- This process may enhance the credibility of the work.

Instruction for authors

Stage 1 manuscripts will include only an Introduction, Methods (including proposed analyses), and Pilot Data (where applicable).

In considering papers at Stage 1, reviewers will be asked to assess:

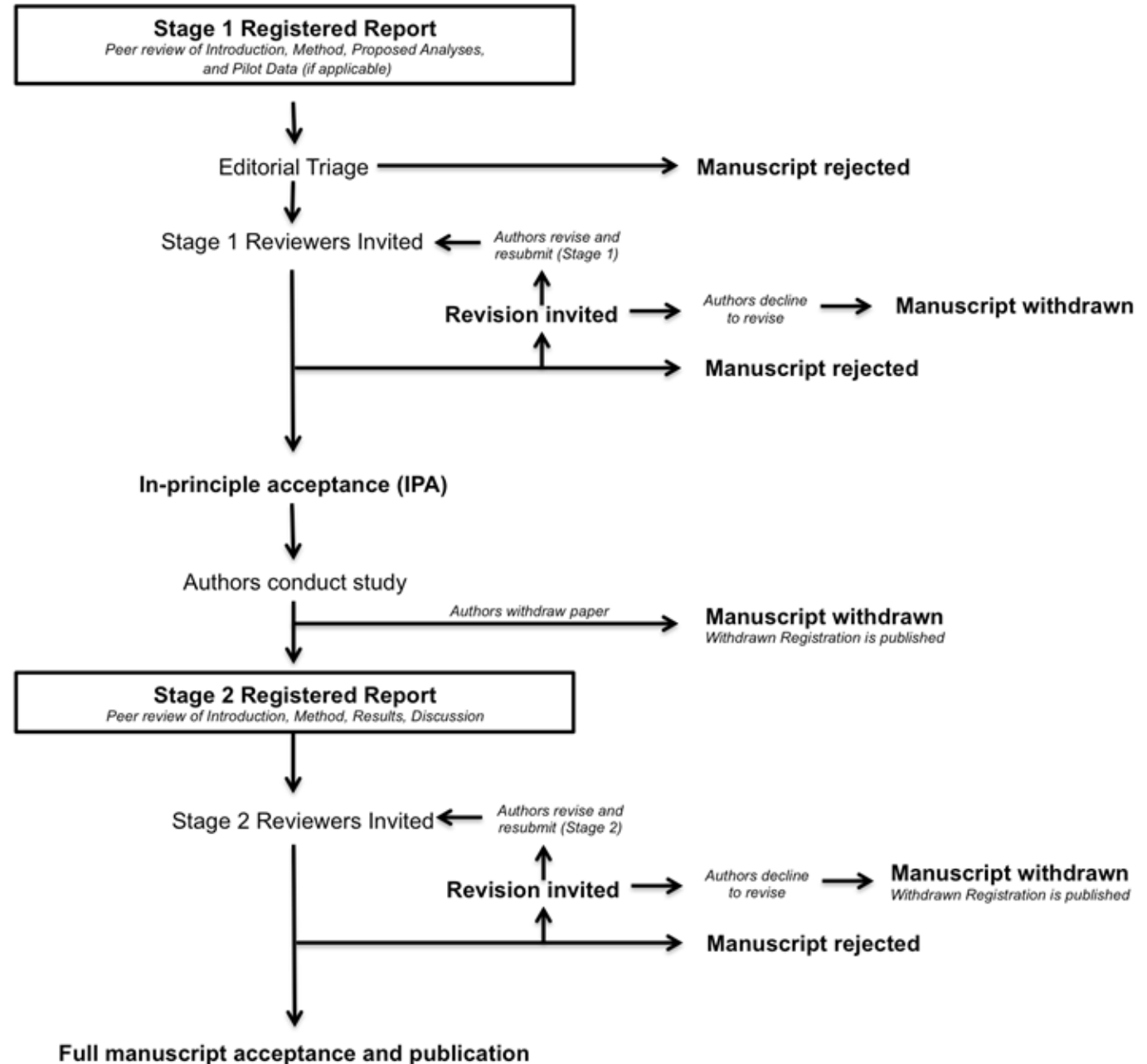
- importance of the research question(s).
- logic, rationale, and plausibility of the proposed hypotheses.
- soundness and feasibility of the methodology and analysis (including statistical power analysis).
- clarity and degree of methodological detail (sufficient to replicate).
- pre-specified outcome-neutral tests for ensuring that the results obtained test the hypotheses.

Stage 2

- the Introduction, rationale, and hypotheses are the same as approved.
- the authors adhered precisely to the registered experimental procedures.
- any unregistered post hoc analyses added by the authors are justified, methodologically sound, and informative.
- the authors' conclusions are justified given the data.

How it works

(description from
*Developmental
Science*)



Our cover letter

We are pleased to submit the attached manuscript... We believe this manuscript would be appropriate for *Developmental Science* because ...

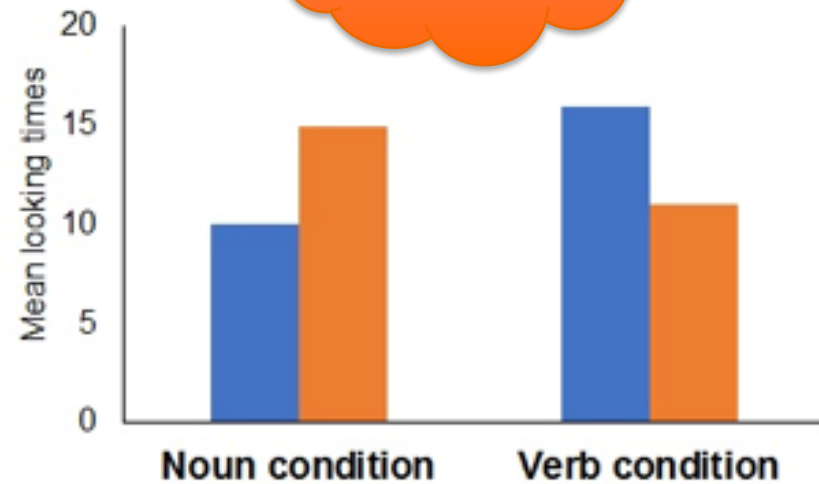
In this study, we manipulate whether a linguistic context predicts familiar nouns or verbs [...] Since a recent study using a different method has found that 3- to 4-year-olds indeed show this kind of syntactic adaptation, **our manuscript will be valuable whatever the results – if our hypothesis is supported, this would provide support that [...] If we do not find such evidence, this might suggest that [...] We present each possible outcome and our interpretation of it in the Expected Results section.**

...we conducted a power analysis [...] We base our estimation of our effect size on a similar study, and find that we would need to test 64 infants to achieve 91% power.[...] Our lab is well equipped to run habituation studies with this age group [...] Our database of volunteers should allow for about 10-30 infants a month, which will allow us to finish the data collection in about 3-5 months. All ethical approvals are also in place.

Possible results:

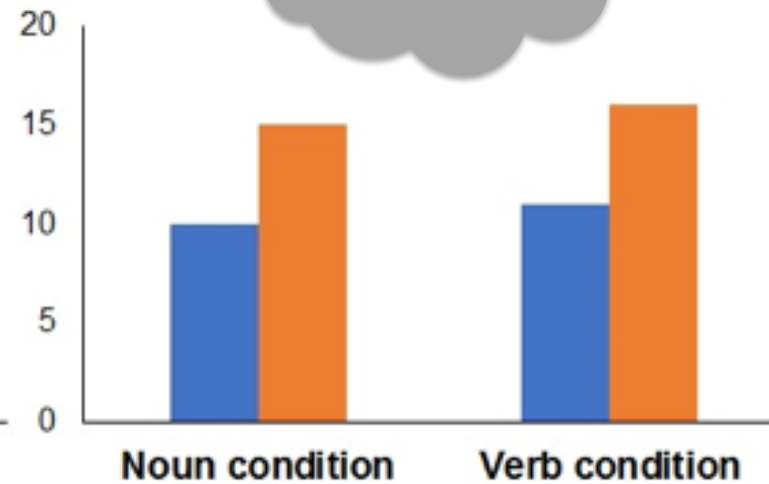
a)

Adaptation



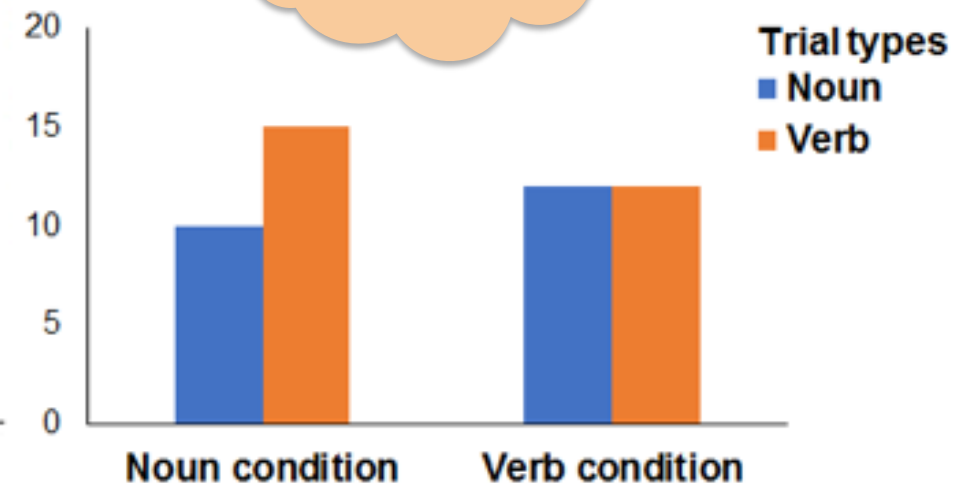
b)

No adaptation



c)

Weak adaptation



What did the reviewers say: Revise and Resubmit

1. The framing is too wide
2. Since infants in the study will only hear verbs (or nouns) in the habituation phase, they might interpret the novel words as verbs (or nouns), without needing to note that they appeared in the frame *la petite*.
3. Suggest to change our proposal to test $n = 64$ to sequential testing using Bayesian Factor Analysis (BFA)
4. Ask for outcome neutral criteria

Our revisions

1. Stepped back and made a more modest claim in the introduction.
2. Added verbs to the noun induction and nouns to the verb induction.
3. Switched to BFA
4. We clearly state outcome neutral criteria (we will compare our effect to a previous study that used unambiguous contexts)

BFA

“We will employ sequential hypothesis testing with Bayes factors with a pre-specified inference criterion of $BF_{10} > 3$ or less than 0.3, indicating evidence for H_0 . The Bayes factors will be obtained from a Bayesian t-test using JASP. The first analyses will be done after at least 20 infants have been tested in each condition, then for each eight new infants (four in each condition).”

Outcome neutral criteria

We rewrote the Expected Results section to incorporate any possible pattern of results. Following R1's suggestion to "go Bayesian" helps us compare to the results of Babineau et al., because we will be able to either reject or *accept* H_0

What did the reviewers have to say:

Reviewer: 1

The authors have done a **good job** of responding to my concerns (e.g., through changes in the experimental design, a move to Bayesian analysis, and so on). I'm excited to see the results of this study.

Reviewer: 2

The authors have completed a **responsive and thoughtful revision**. My significant concerns have been addressed [...]

Time flies...

Submitting: April 2018

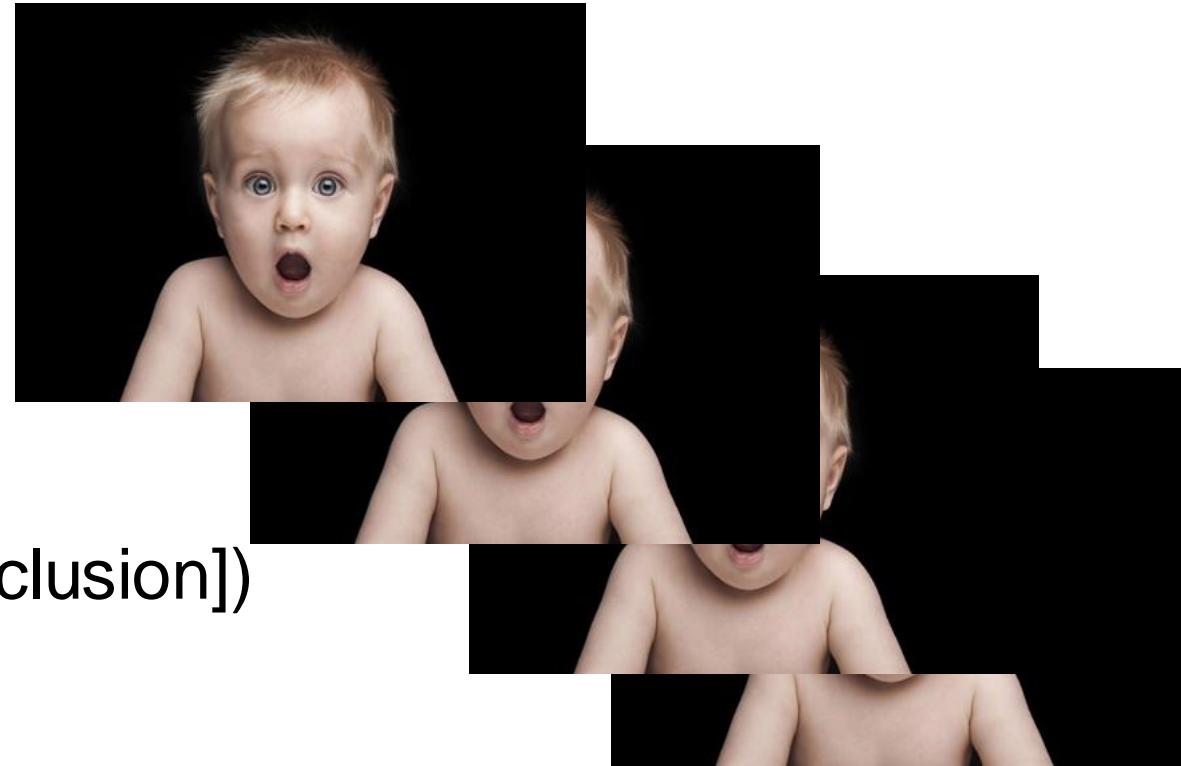
Review: June 2018

Resubmitting: July 2018

Good news: August 2018

Testing: September 8th- ???

(~35 good babies tested so far! [30% exclusion])



Replication Studies second round: again repetition of important research

[← List of news](#)

20 December 2018

For the second time, NWO is funding projects from the health and social sciences so that the research of others can be repeated. This concerns eight studies that in the past formed the basis for follow-up research or have assumed an important place in education, policy-making or the public debate.

By replicating such cornerstone research, NWO wants to contribute to increasing the transparency of research and the quality of how results are reported.

<https://www.nwo.nl/en/news-and-events/news/2018/12/replication-studies-second-round-again-repetition-of-important-research.html>

Preprints

- <https://psyarxiv.com/> - your preprints tweeted by psyArxivBot
- <https://osf.io/preprints/> - linked with psyArxiv as well
- If your research area fits: <https://www.biorxiv.org/>
- You might even just post your preprint on your personal website – just make sure before posting in any venue what is the policy of the journal you are submitting to/ were accepted to

Bonus: Rmd

- You can write your entire manuscript in R.
- “Knit” your R Mark Down script to produce a PDF or Word file.
- Results of analysis done in R will display in the document – no need to copy paste!
- Easy to reproduce your analysis – by you and others.
- For APA formatted manuscripts, [use papaja](#)
- Some more tutorials and information: [Rladies Github](#)
- Downsides: No track changes, some getting used to.