university of groningen

PSMCV-2 (2024)
Data Collection & Analysis for Cognitive Neuroscience

Preregistration

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The Menu

1. Why pre-register?
2. A quick preregistration with https://aspredicted.org

Why pre-register?

False positives & the “Replication Crisis”

General Article

aps ASSOCIATION FOR PSYCHOLOGICAL SCIENCE

False-Positive Psychology: Undisclosed Flexibility in Data Collection and Analysis Allows Presenting Anything as Significant

Psychological Science
22(11) 1359–1366

DOI: 10.1177/0956797611417632
http://pss.sagepub.com
SAGE

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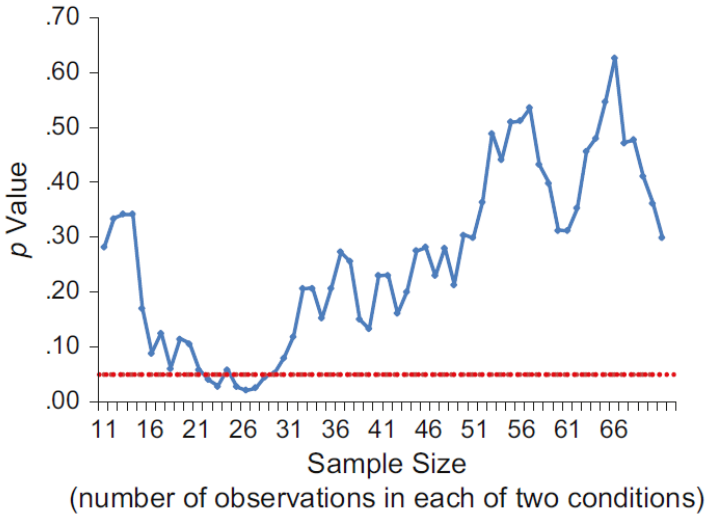

Fig. 2. Illustrative simulation of p values obtained by a researcher who continuously adds an observation to each of two conditions, conducting a t test after each addition. The dotted line highlights the conventional significance criterion of $p \leq .05$.

“*p*-hacking” & “HARKing”

The Texan Sharpshooter, HARKing

p-hacking is when someone collects more data, changes the specification of a statistical model, change the analysis sample, or does other changes to the study until the results become statistically significant (e.g., conduct multiple analysis, but only report those where $p < .05$)

HARKing (*Hypothesizing After the Results are Known*) is when someone generates a scientific hypothesis about the data *after* seeing the data (but presents it as if it was generated a-priori)

Formal definitions: https://forrt.org/glossary/harking | https://forrt.org/glossary/p-hacking

Example: Researchers degrees of freedom

Step	Setting
1	high-pass filter (none; 0.1 Hz; 1.0 Hz) a o b
2	low-pass filter (5.5 Hz; 30 Hz; 100 Hz) c o d
3	artifact correction (Yes; No) o e
	epoch (-350 - 1000 ms; -100 - 700 ms) o e
4	baseline (100 ms; 200 ms; 350 ms) o f g
	artifact rejection (No; Yes) o e
	averaging (Yes) o
5	reference (mastoid, average) h o
6	measurement window (185-635 ms; 300-500 ms; 350-480 ms; 398-424 ms) i j o k
7	amplitude measure (mean; peak) o l
8	electrode array (reviewed; original) m o

Received: 27 June 2023 | Revised: 24 May 2024 | Accepted: 28 May 2024
DOI: 10.1111/psyp.14628

ORIGINAL ARTICLE

Garden of forking paths in ERP research – Effects of varying pre-processing and analysis steps in an N400 experiment

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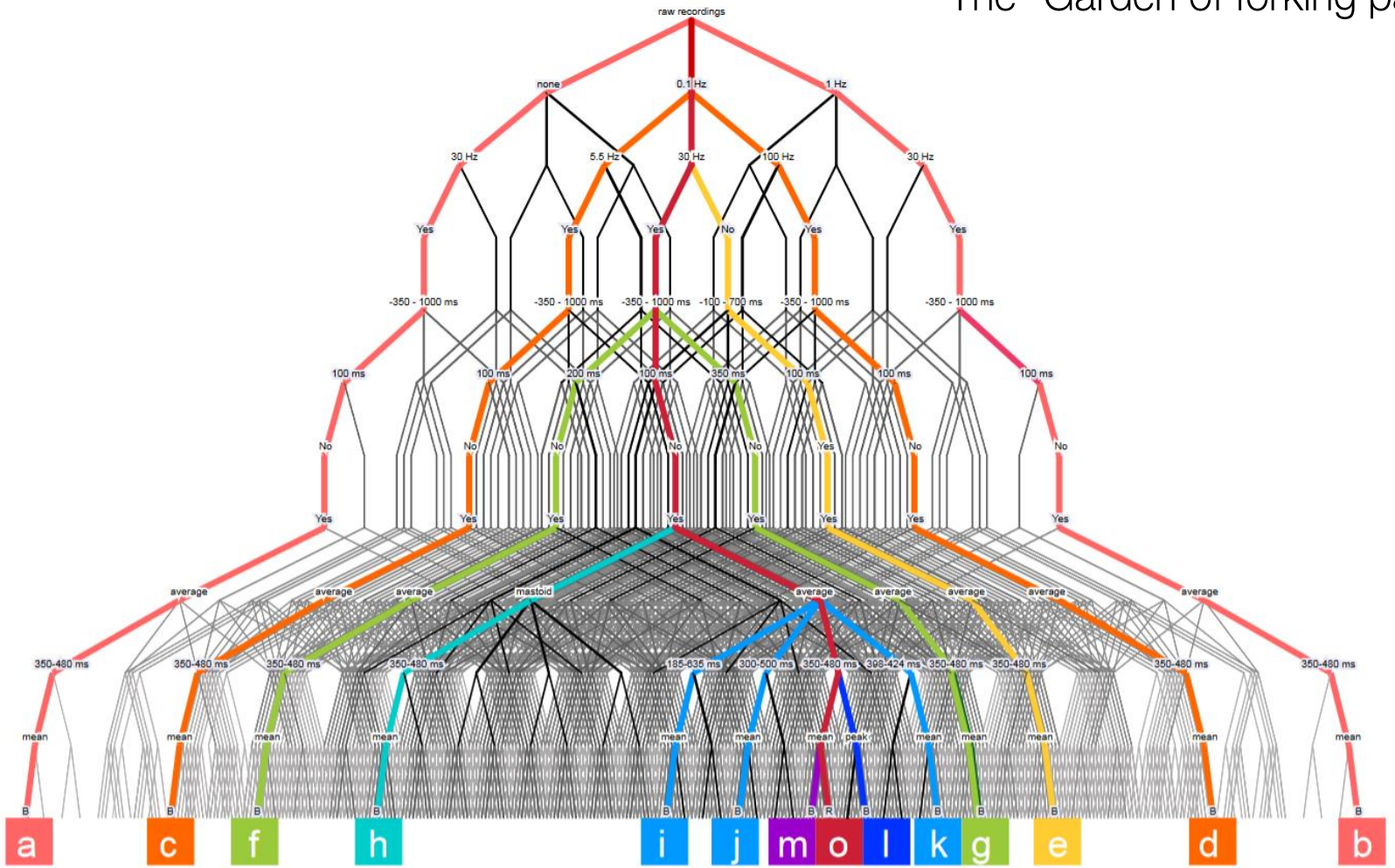
The “Garden of forking paths”



Solution: Pre-registration

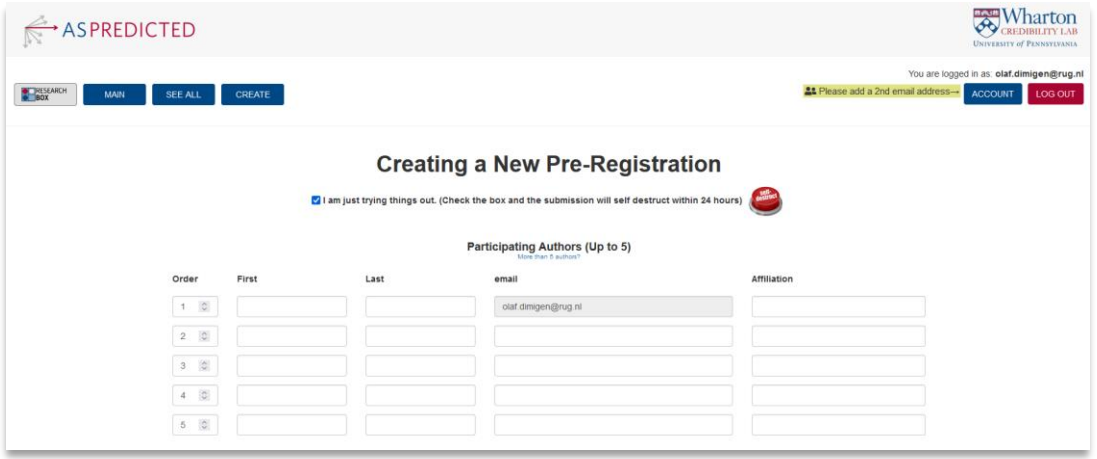
1. Separates the confirmatory aspects of the research from the exploratory ones
   (largely solves p-hacking & HARKing)
2. Ensures that research team shares a clear understanding of their goals and processes
   (saves lots of headaches in the analysis stage!)
3. Allows for early input by peers
4. Some scientific journals accept papers based on it, regardless of the outcome
   ("Registered Report" format)

http://osf.io

http://aspredicted.org

Simple preregistration: **aspredicted.org**

- Makes preregistration fast & easy
- Steps:
  - 1. Sign up
  - 2. Add authors
  - 3. 8 simple questions



Questions

1. Data collection: Have any data been collected for this study already?
2. Hypothesis: What's the main question being asked or hypothesis being tested in this study?
3. Dependent variable: Describe the key dependent variable(s) specifying how they will be measured.
4. Conditions: How many and which conditions will participants be assigned to?

Questions

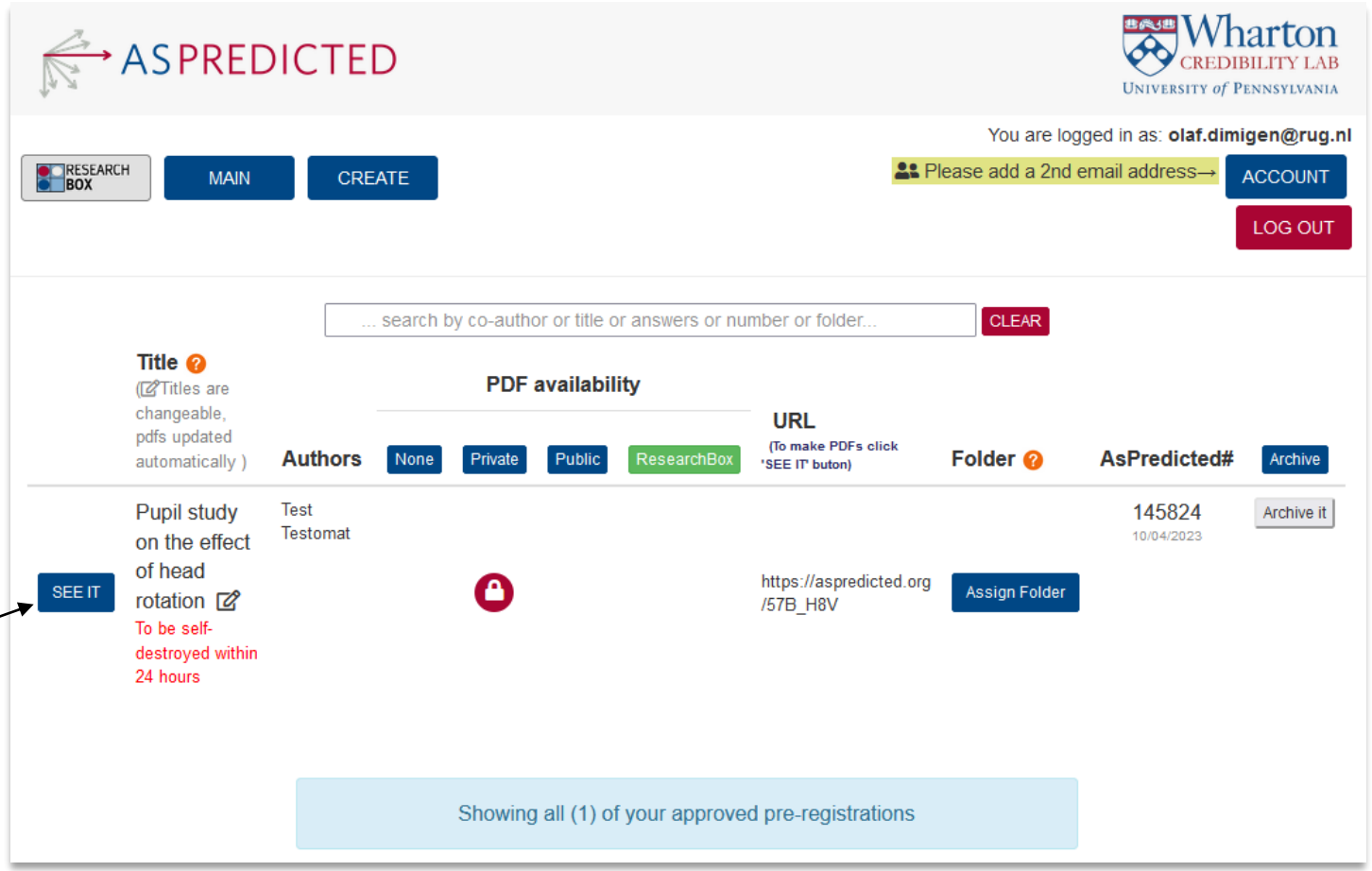
5. Analyses: Specify exactly which analyses you will conduct to examine the main question/hypothesis.
6. Outliers: and Exclusions Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.
7. Sample: Size How many observations will be collected or what will determine sample size?
8. Other: Anything else you would like to pre-register?

Tips: Bad & Good answers

https://datacolada.org/64

Item in preregistration	*Bad answer*	*What's wrong with it?*	*Good answer*
Research Question or Hypothesis	Building on the work of Picasso (1901-1904), we hypothesized that....	You don't need reasons for asking the research question because they do not inform possible p-hacking. Just state the question or hypothesis of interest.	Question: Does sadness increase preference for the color blue?
Dependent variable	Preference for the color blue	This preference can be measured in many different ways so this statement underspecifies how it will be measured.	Participants will rate their liking for red, blue, orange, and purple on 7-point scales (1 = not at all; 7 = an extreme amount). Prefereence for blue will be defined as the difference between a participant's rating for blue and their average rating of the three non-blue colors.
Manipulations/Conditions	We will manipulate mood by having participants watch different videos.	This leaves room for cherry-picking from amongst a larger set of conditions. Specify the exact conditions and the exact manipulations.	Before rating their color preferences, participants will be randomly assigned to one of three conditions in which they watch a clip from either a sad video (My Dog Skip), a happy video (Pitch Perfect), or a neutral video (Gone Curling) .
Analyses	We will regress preference for the color blue on mood condition	There are many ways to run these analyses. For example, are you including covariates? How will "mood condition" be coded? If applicable, how will the standard errors be computed?	We will run an OLS regression predicting preference for the color blue with condition (coded 1 = sad video; 0 = happy or neutral video). We will control for gender (1 = male; 0 = female) in this analysis.
	We will exclude participants who	What counts as "inattentive"?	We will exclude participants who fail at least two out of the three

Seeing & saving your preregistration



PDF

Fill out your aspredicted-preregistration, generate a PDF and upload it to Brightspace (deadline to be announced, but *before* you start collecting data)