



university of
groningen



PSMCV-2 (2024)

Data Collection & Analysis for Cognitive Neuroscience

Preregistration

Olaf Dimigen

The Menu

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

Why pre-register?

False positives & the “Replication Crisis”

General Article

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

Joseph P. Simmons¹, Leif D. Nelson², and Uri Simonsohn¹

¹The Wharton School, University of Pennsylvania, and ²Haas School of Business, University of California, Berkeley

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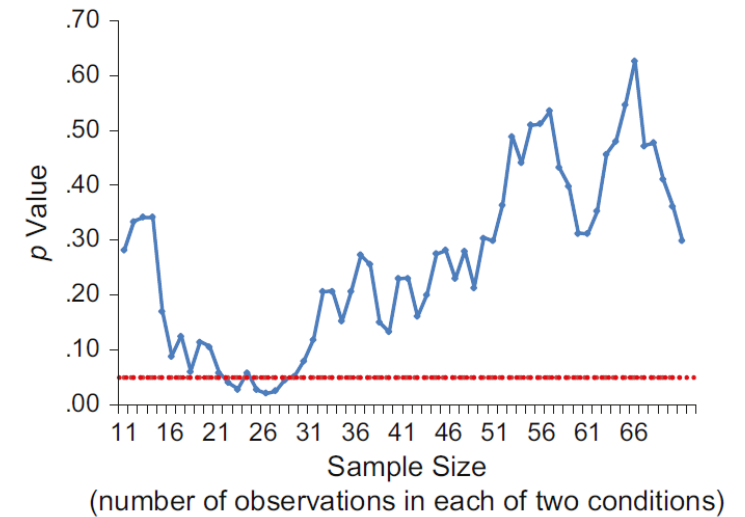


Fig. 2. Illustrative simulation of p values obtained by a researcher who continuously adds an observation to each of two conditions, conducting a t test after each addition. The dotted line highlights the conventional significance criterion of $p \leq .05$.

“p-hacking” & “HARKing”



The Texan Sharpshooter, HARKing

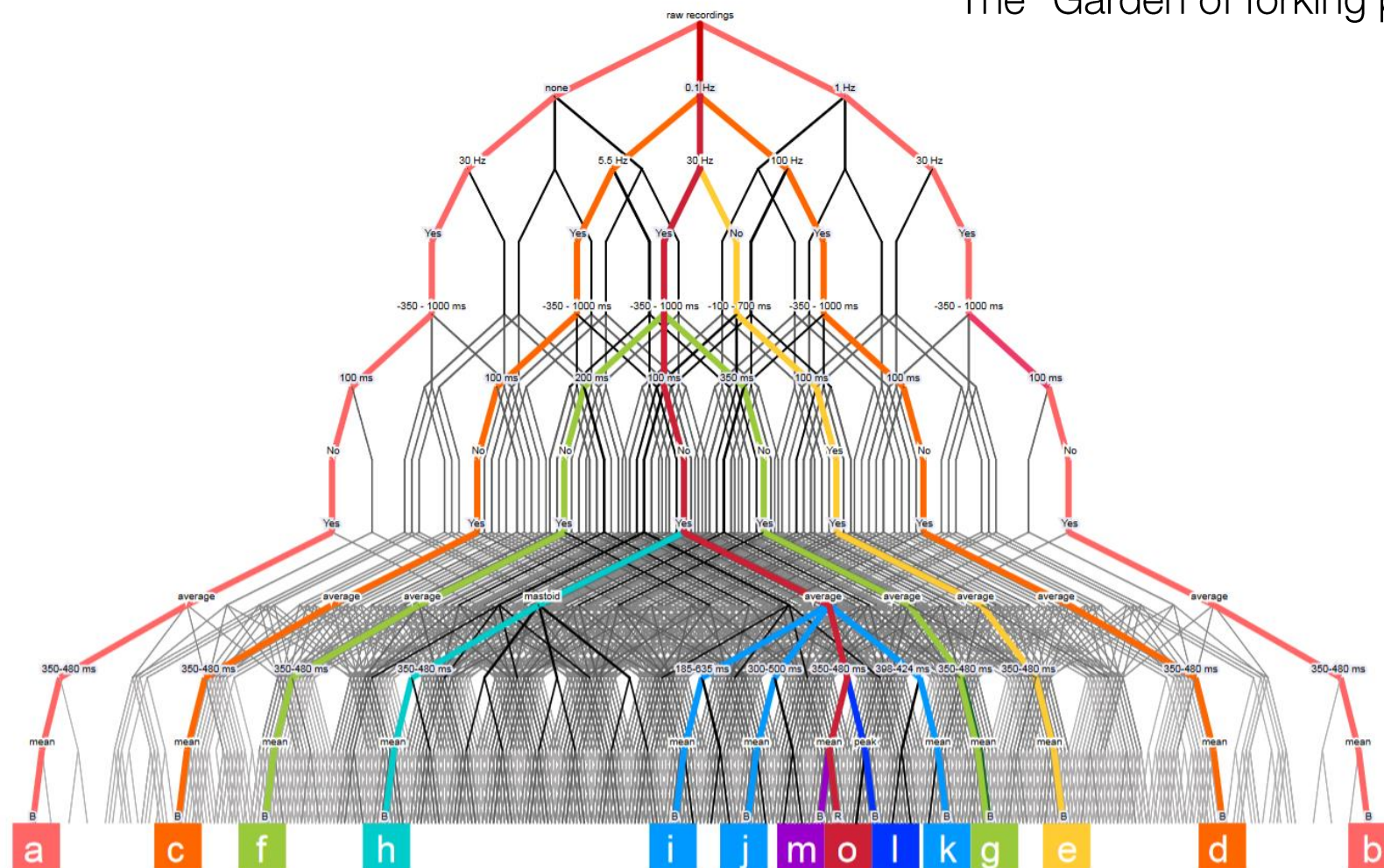
p-hacking is when someone collects more data, changes the specification of a statistical model, change the analysis sample, or does other changes to the study until the results become statistically significant (e.g., conduct multiple analysis, but only report those where $p < .05$)

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)

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

The “Garden of forking paths”



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

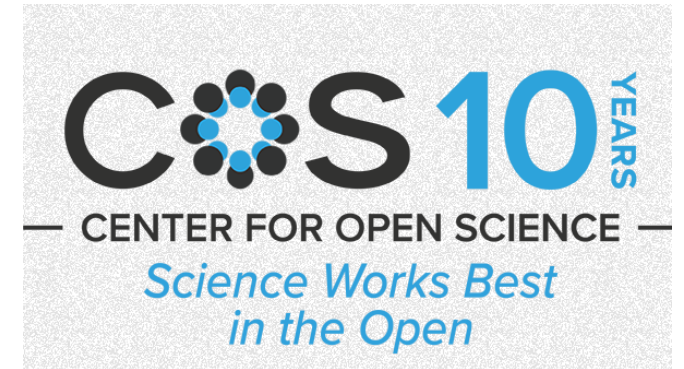
ORIGINAL ARTICLE

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

Andela Šošić^{1,2} | Suzy J. Styles^{1,4} | Emily S. Kappenman⁵ | Vanja Ković²

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

A screenshot of the AS PREDICTED website's "Creating a New Pre-Registration" page. The page has a white background with a grey header. The header contains the AS PREDICTED logo on the left, the Wharton University of Pennsylvania logo on the right, and a navigation bar with buttons for "RESEARCH", "MAIN", "SEE ALL", and "CREATE". A login status bar indicates the user is logged in as "olaf.dimigen@rug.nl" with links for "ACCOUNT" and "LOG OUT". A yellow warning bar says "Please add a 2nd email address". The main content area is titled "Creating a New Pre-Registration" and includes a checkbox for "I am just trying things out. (Check the box and the submission will self destruct within 24 hours)". Below this is a section for "Participating Authors (Up to 5)" with a table for adding authors. The table has columns for Order, First, Last, email, and Affiliation. The first row is pre-filled with "1", "olaf", "dimigen", "olaf.dimigen@rug.nl", and an empty affiliation field. There are five rows in total.

Order	First	Last	email	Affiliation
1	olaf	dimigen	olaf.dimigen@rug.nl	
2				
3				
4				
5				

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	<i>Bad answer</i>	<i>What's wrong with it?</i>	<i>Good answer</i>
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). Preference 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 attention checks that we will include

Seeing & saving your preregistration

The screenshot displays the ASPredicted web interface. At the top, the ASPredicted logo is on the left, and the Wharton University of Pennsylvania logo is on the right. Below the logos, there are navigation buttons: 'RESEARCH BOX', 'MAIN', and 'CREATE'. A user login status is shown: 'You are logged in as: olaf.dimigen@rug.nl'. There are also buttons for 'ACCOUNT' and 'LOG OUT'. A search bar is present with the text '... search by co-author or title or answers or number or folder...' and a 'CLEAR' button. Below the search bar, there are filters for 'Title' (with a note that titles are changeable and PDFs are updated automatically), 'PDF availability' (with options: None, Private, Public, ResearchBox), 'URL' (with a note to click 'SEE IT' button), 'Folder' (with a question mark), and 'AsPredicted#' (with an 'Archive' button). A table of preregistrations is shown below the filters. The first entry is titled 'Pupil study on the effect of head rotation' with a subtitle 'To be self-destroyed within 24 hours'. It has authors 'Test Testomat', a URL 'https://aspredicted.org /57B_H8V', and an 'AsPredicted#' of '145824' dated '10/04/2023'. There is a 'SEE IT' button next to the title and an 'Assign Folder' button next to the URL. A blue bar at the bottom of the table says 'Showing all (1) of your approved pre-registrations'.

PDF

SEE IT

Assign Folder

Showing all (1) of your approved pre-registrations

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