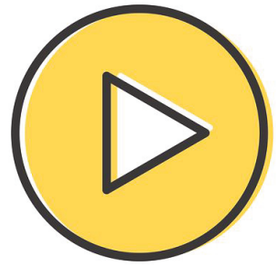
Preregistration
(in Psychology)

Lisa Spitzer

(Leibniz Institute for Psychology, ZPID)

Note

- Workshop will be recorded
- Video will be uploaded after our workshop
  - I will share the link via Twitter



About me

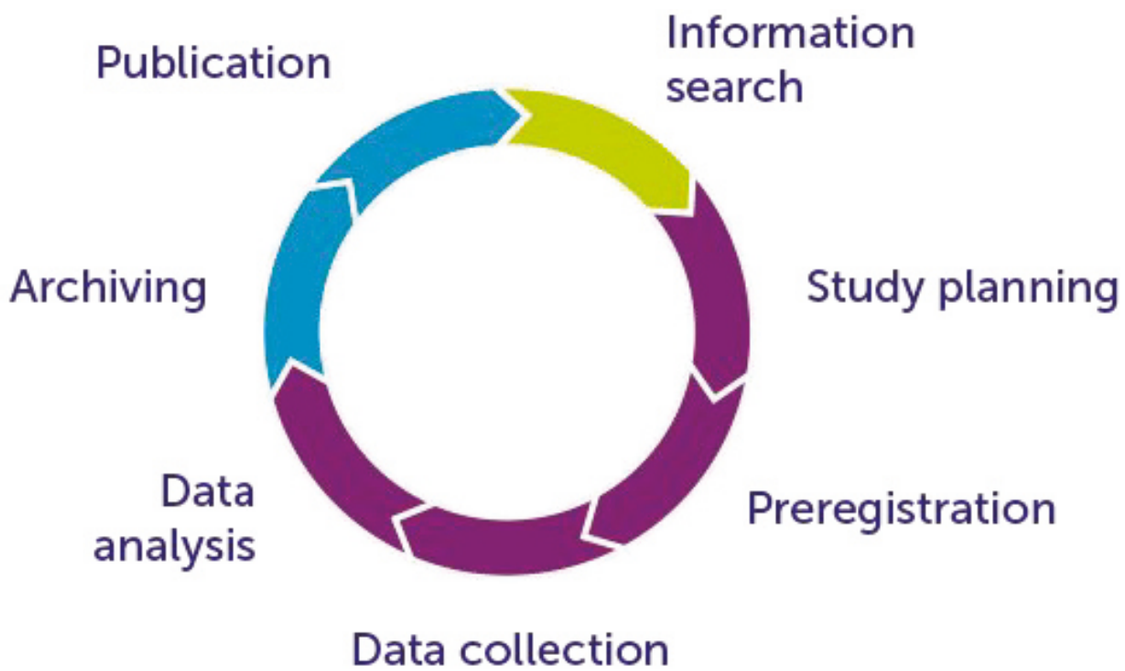
- Lisa Spitzer, M.Sc. (Psychology)
- PhD Student at the Leibniz Institute for Psychology (ZPID) in Germany
- Meta-scientific PhD Topic: Assessing and Increasing the Reproducibility of Psychological Research throughout the Research Cycle
- Open science enthusiast!

ls@leibniz-psychology.org
@lspitzer95

About the ZPID

~ Leibniz Institute for Psychology

- Public Open Science Institute for Psychology
- Offers services that support (psychological) researchers in all steps of the research cycle



And you?

slido

Regarding preregistration, would you say you are ...

ⓘ Start presenting to display the poll results on this slide.

slido

What research area do you work in?

ⓘ Start presenting to display the poll results on this slide.

slido

What do you associate with preregistration?

ⓘ Start presenting to display the poll results on this slide.

Overall information

- Ask lots of questions!

- Google Doc including all important links
- Slides are available at PsychArchives
  - DOI: 10.23668/psycharchives.4375

Today's schedule

Part I
Introduction

- What is a preregistration?
- Why is it important to preregister?
- Why should YOU preregister?

Part II
The preregistration process

- Templates
- Formats
- Platforms

Part I: Introduction

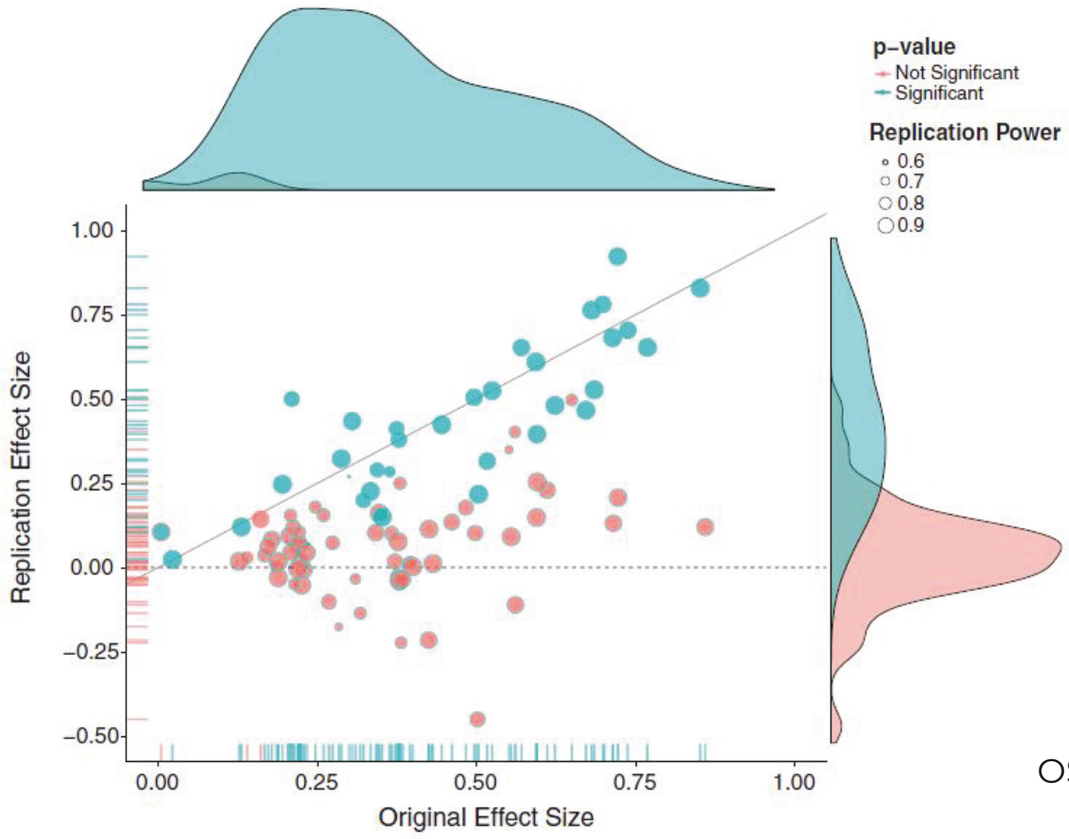
What is a preregistration?

Working definition:

A preregistration is a **study plan** that is **registered with an independent party** (e.g., a repository) **before the data has been collected or examined**. Upon registration, a **time-stamped** record of the study plan is created that will eventually be **published (possibly after an embargo period)**. If the study plan changes afterwards, either a new record needs to be created or the deviations will be apparent when comparing the preregistration to the final manuscript. Thus, preregistration allows a **transparent presentation of what was planned at a certain time point and what changes may have been made to a study till its publication.**

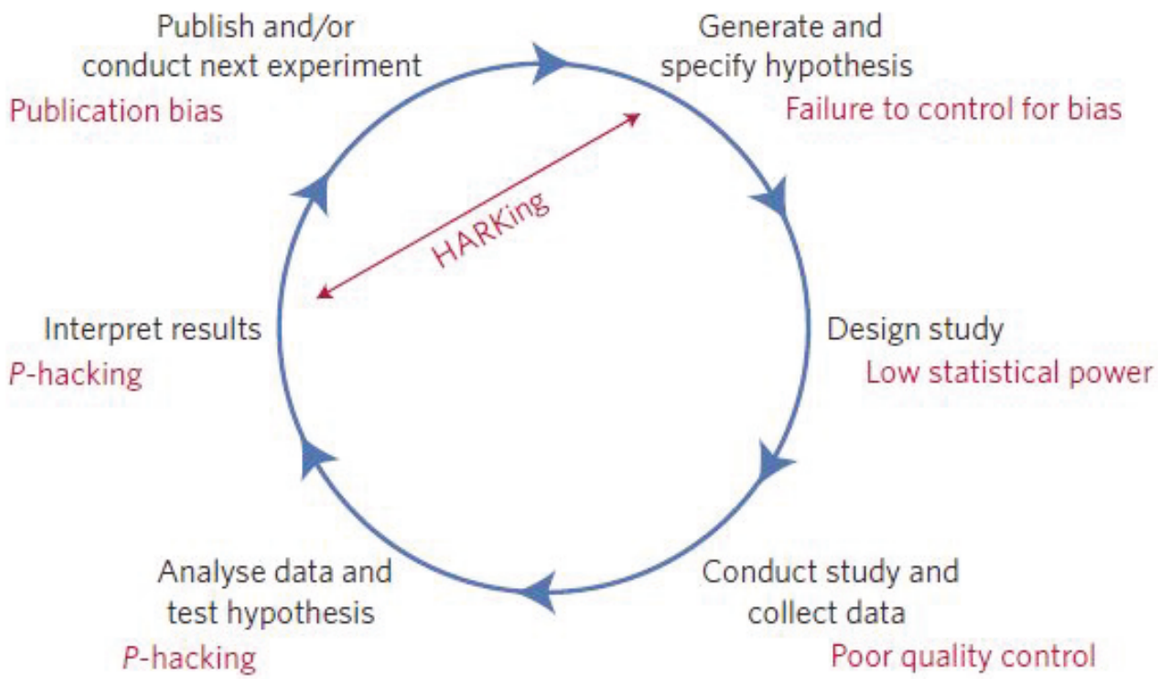
Why is it important to preregister?

Credibility crisis



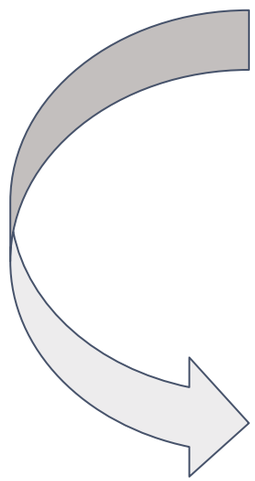
OSC (2015)

Questionable research practices (QRPs)



Munafò et al. (2017)

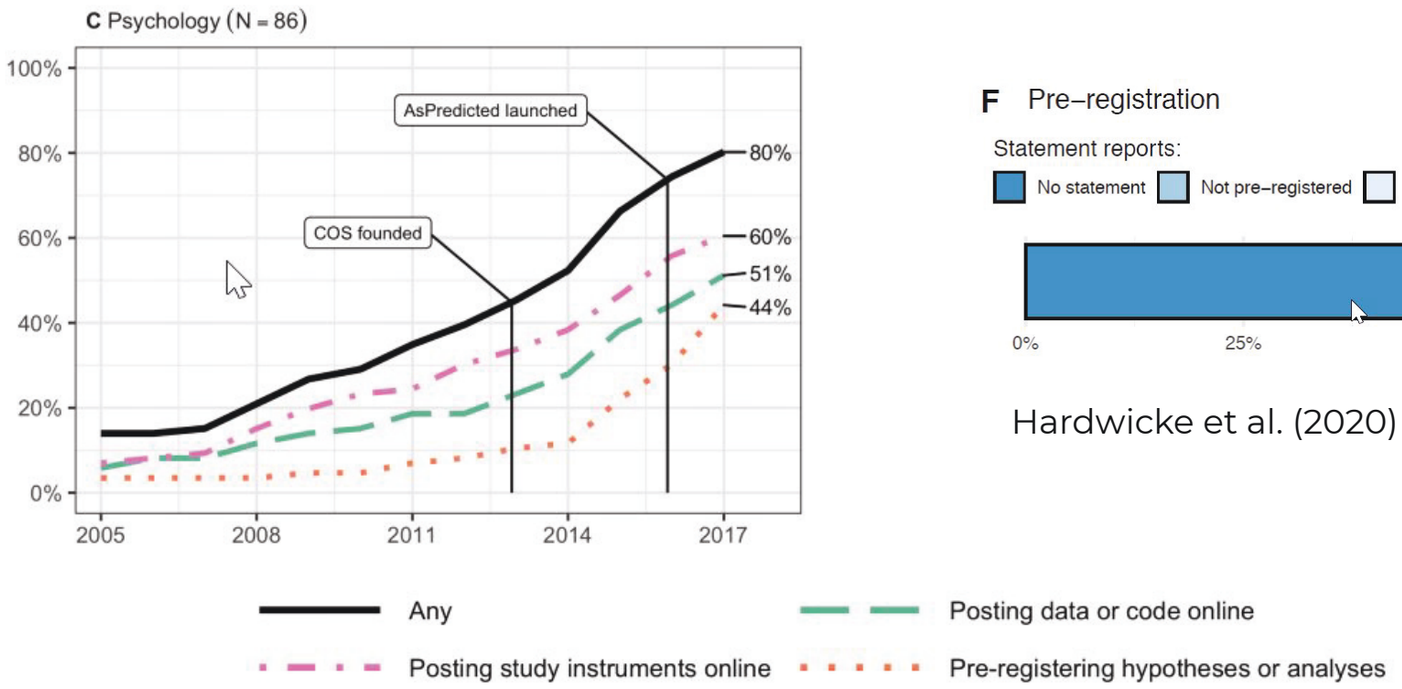
Credibility *revolution*

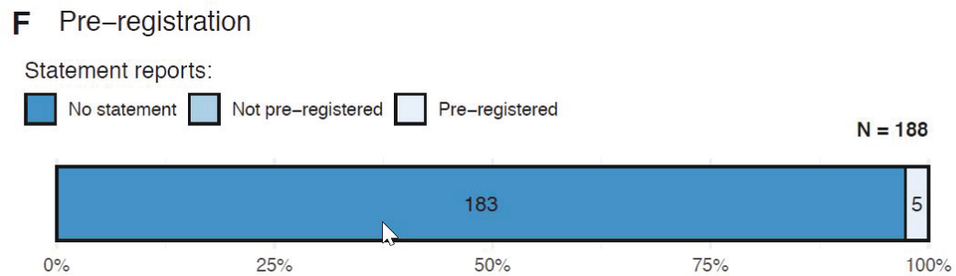


Open science

Preregistration of studies

Adoption of preregistration in psychology





Hardwicke et al. (2020)

Christensen et al. (2019)

Why should YOU preregister?

- Increases transparency
- Decreases QRPs
- Allows for a clear differentiation of confirmatory and exploratory analyses
- Can serve as a plan to adhere to during study administration
- Helps gather feedback by others and supports collaboration

Good scientific practice

Potential obstacles …?

- No flexibility (e.g., exploratory analyses)
- Scooping
- Time and effort
- Cannot prevent some QRPs
- Does not fit all research types

Questions & Break

Part II: The preregistration process

How to create a preregistration?

A lot of options!

Templates

Formats

Platforms

Step I: Templates

Templates

- Registered Report Protocol Preregistration
- van ‘t Veer and Giner-Sorolla (2016)
- Replication recipe (Brandt et al., 2013)
- AsPredicted
- OSF-Standard Pre-Data Collection Registration
- COS Preregistration Challenge Template (OSF)
- …
- NEW: Preregistration for Quantitative Research in Psychology Template

van 't Veer and Giner-Sorolla (2016)

Available on osf.io as an online pre-registration form that includes time stamping.

Section	Essential elements	Recommended elements
A. Hypotheses	1. Describe the (numbered) hypotheses in terms of relationships between your variables. 2. For interaction effects, describe the expected shape of the interactions. 3. If you are manipulating a variable, make predictions for successful check variables or explain why no manipulation check is included.	4. A figure or table may be helpful to describe complex interactions. 5. For original research, add rationales or theoretical frameworks for why a certain hypothesis is tested. 6. If multiple predictions can be made for the same IV-DV combination, describe what outcome would be predicted by which theory.
B. Method		
Design	List, based on your hypotheses from section A: 1. Independent variables and all their levels a. whether they are within- or between-participants; b. the relationship between them (e.g., orthogonal, nested). 2. Dependent variables. 3. Third variables acting as covariates or moderators.	
Planned sample	4. If applicable, describe pre-selection rules. 5. Indicate where, from whom and how the data will be collected. 6. Justify planned sample size. 7. Describe data collection termination rule.	
Exclusion criteria	8. Describe anticipated data exclusion criteria. Some examples of exclusion criteria are: a. missing, erroneous, or overly consistent responses; b. failing check-tests or suspicion probes; c. demographic exclusions; d. data-based outlier criteria; e. method-based outlier criteria (e.g. too short or long response times).	9. Set fail-safe levels of exclusion at which the whole study needs to be stopped, altered, and restarted.
Procedure	10. Describe all manipulations, measures, materials and procedures including the order of presentation and the method of randomization and blinding (e.g., single or double blind), as in a published Methods section.	
C. Analysis plan		
Confirmatory analyses	Describe the analyses that will test each main prediction from the hypotheses section. For each one, include: 1. the relevant variables and how they are calculated; 2. the statistical technique; 3. each variable's role in the technique (e.g., IV, DV, moderator, mediator, covariate); 4. rationale for each covariate to be used, if any; 5. if using techniques other than null hypothesis testing (for example, Bayesian statistics), describe your criteria and inputs towards making an evidential conclusion, including prior values or distributions.	Specify contingencies and assumptions, such as: 6. method of correction for multiple tests; 7. the method of missing data handling (e.g., pairwise or listwise deletion, imputation, interpolation); 8. reliability criteria for item inclusion in scale; 9. anticipated data transformations; 10. assumptions of analyses, and plans for alternative/corrected analyses if each assumption is violated.

AsPredicted

1) Data collection. Have any data been collected for this study already?

- (●) Yes, we already collected the data.
- ( ) No, no data have been collected for this study yet.
- ( ) It's complicated. We have already collected some data but explain in Question 8 why readers may consider this a valid **pre**-registration nevertheless. (Note: *"Yes"* is not an accepted answer.)

2) Hypothesis. What's the main question being asked or hypothesis being tested in this study?

Example: A month-long academic summer program for disadvantaged kids will reduce the drop in academic performance that occurs during the summer

3) Dependent variable. Describe the key dependent variable(s) specifying how they will be measured.

Example: Simple average GPA across all courses during the first semester after the intervention.

4) Conditions. How many and which conditions will participants be assigned to?

Example 1: Two conditions: Offering summer program: yes vs no.
Example 2: 12 conditions in a mixed design lab study. Participants will be assigned to one of four conditions: math training, verbal training, memory task, or control (4 between-subject conditions). Each participant will complete a math test, a verbal test, and a memory test (3 within-subject conditions).

5) Analyses. Specify exactly which analyses you will conduct to examine the main question/hypothesis.

Example. Linear regression predicting the simple average GPA in the semester after the intervention with a dummy variable indicating whether the participant was offered the summer program or not (intention-to-treat analysis). We will also conduct the same regression controlling for simple average GPA during the semester before the intervention, gender, & household income (an 8-point scale ranging from 1 = below $20,000 and 8 = above $150,000).

AsPredicted

6) Outliers and Exclusions. Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

Example 1. We will compute the overall mean and standard deviation across all conditions, and winsorize at 2.5 SD above/below the mean.
Example 2: We will exclude participants who incorrectly answer at least 2 of our 3 attention check questions.
Example 3. We will exclude any participants who complete the survey in less than 30 seconds.

7) Sample Size. How many observations will be collected or what will determine sample size?
No need to justify decision, but be precise about exactly how the number will be determined.

Example: We will offer the program until 500 people have agreed to participate in it or until June 30, 2016 (whichever comes first).

8) Other. Anything else you would like to pre-register?
(e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)

Example: We will include a battery of questions for exploratory purposes, including life satisfaction, amount of videogame playing, and family activity. We will also provide an additional survey with 24 questions assessing achievement orientation.We will not report the results of those analyses for the project being pre-registered.
NOTE: If you leave this blank it will read 'Nothing else to pre-register.'

9) Name. Give a title for this AsPredicted pre-registration
Suggestion: use the name of the project, followed by study description.

Example: SUMMER PROGRAMS - GPA performance, Chicago, July 2018

Finally. For record keeping purposes, please tell us the type of study you are pre-registering.

- ○ Class project or assignment
- ○ Experiment
- ○ Survey
- ○ Observational/archival study
- ○ Other:

Preregistration for Quantitative Research in Psychology Template

Preregistration for Quantitative Research in Psychology Template

- T Title and Title Page
- A Abstract
- I Introduction
- M Method
- AP Analysis Plan
- O Other Information (optional)

Templates: Resumé

- A lot of templates are available
- Many similarities
- Differences: e.g., focus on specific research situations (e.g. replications) ↔ universality
- Which one to choose?

Personal preference

Study type

Research area

Exercise

- Take a look at some of the templates that sound interesting to you

~ 10 minutes

Questions & Break

Step II: Formats

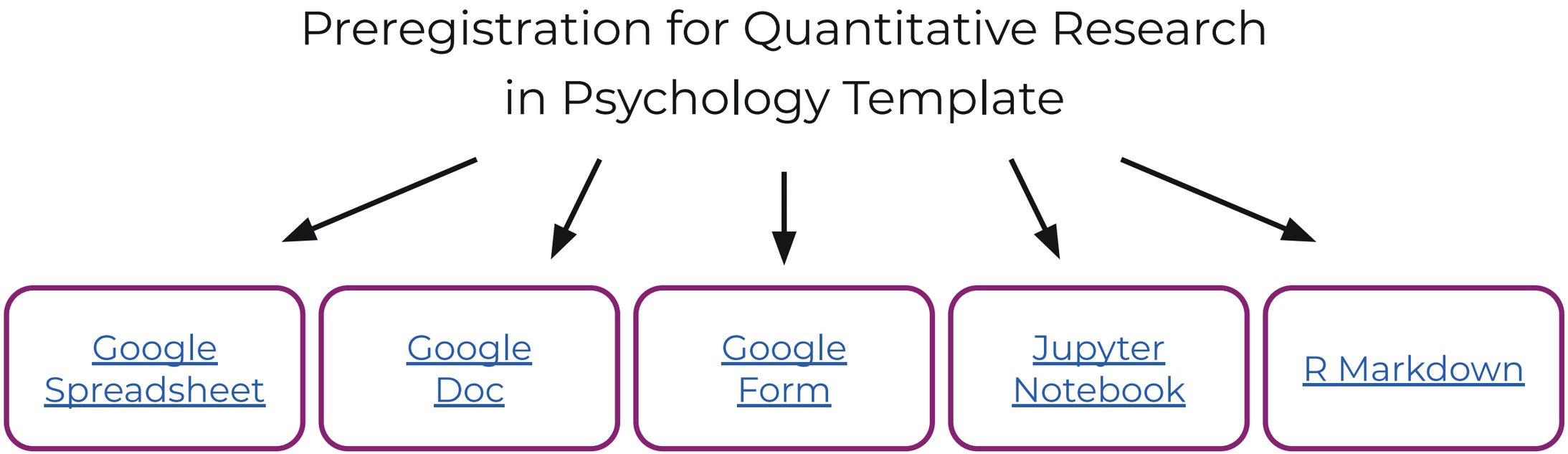
Formats

- Word/Google Doc
- Excel/Google Spreadsheet (table format)
- Online form
- Jupyter Notebook
- RMarkdown

```
prereg {prereg}

R Markdown Templates to
Preregister Scientific
Studies
```

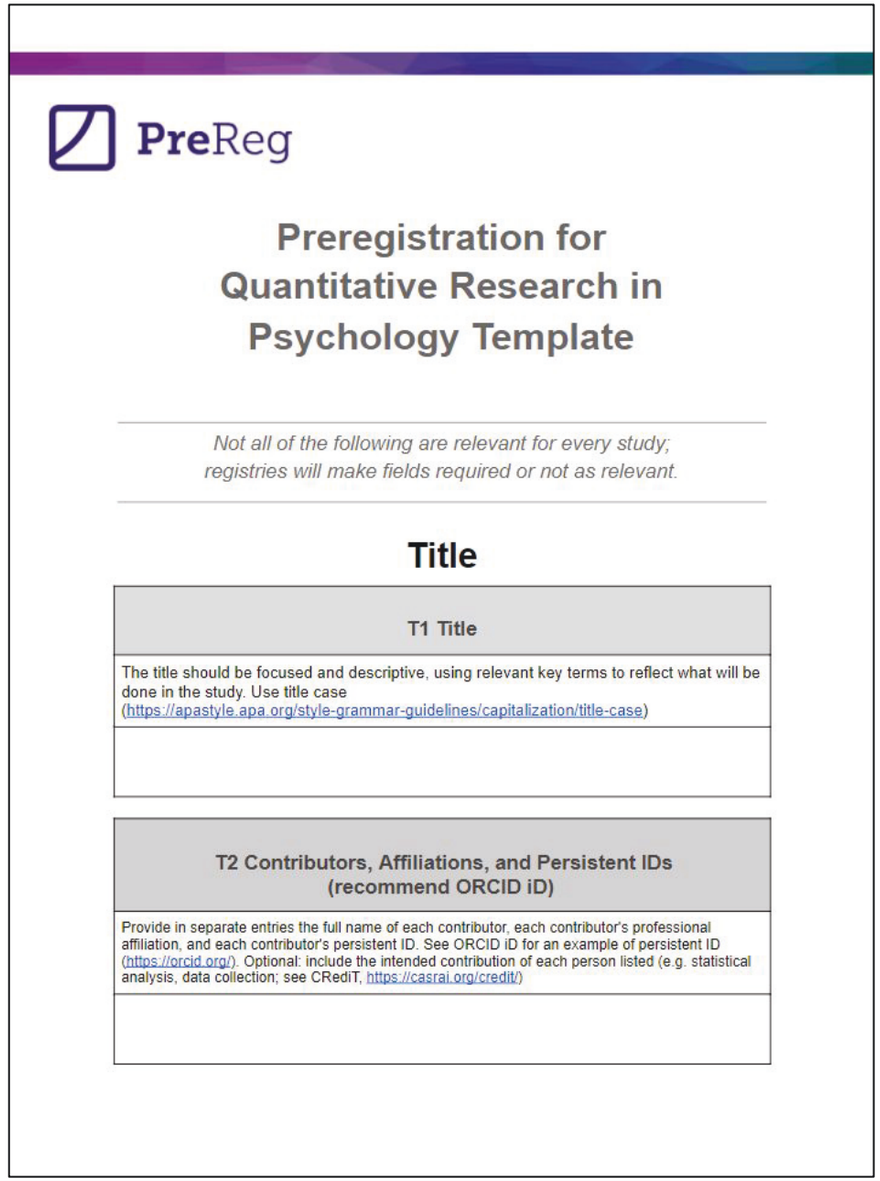
Formats


Preregistration for Quantitative Research in Psychology Template
Google Spreadsheet
Google Doc
Google Form
Jupyter Notebook
R Markdown

Google Spreadsheet

	Preregistration for Quantitative Research in Psychology Template Orange = heading		
	Not all of the following are relevant for every study; registries will make fields required or not as relevant		
T=Title	Title and title page		My Preregistration
Label	Name	Description	
T1	Title	The title should be focused and descriptive, using relevant key terms to reflect what will be done in the study. Use title case (hyperlink: https://apastyle.apa.org/style-grammar-guidelines/capitalization/title-case)	
T2	Contributors, Affiliations, and Persistent IDs (recommend ORCID iD)	Provide in separate entries the full name of each contributor, each contributor's professional affiliation, and each contributor's persistent ID. See ORCID iD for an example of persistent ID (hyperlink: https://orcid.org/). Optional: include the intended contribution of each person listed (e.g. statistical analysis, data collection; see CRediT, hyperlink: https://casrai.org/credit/)	
T3	Date of Preregistration	This is assigned by the system upon preregistration submission.	
T4	Versioning information	This is assigned by the system upon submission of original and subsequent revisions. Should be a persistent identifier, if not a DOI.	
T5	Identifier	This unique identifier is assigned by the system upon submission.	
T6	Estimated duration of project	Include best estimate for how long the project will take from preregistration submission to project completion.	
T7	IRB Status (Institutional Review Board/Independent Ethics Committee/Ethical Review Board/Research Ethics Board)	If the study will include humans or animals subjects, provide a brief overview of plans for the treatment of those subjects in accordance with established ethical guidelines. If appropriate institutional approval has been obtained for the study, provide the relevant identifier here. If the study will be exempt from ethical board review, provide reasoning here.	
T8	Conflict of Interest Statement	Identify any real or perceived conflicts of interest with this study execution. For example, any interests or activities that might be seen as influencing the research (e.g., financial interests in a test or procedure, funding by pharmaceutical companies for research).	
T9	Keywords	Include terms specific to your topic, methodology, and population. Use natural language and avoid words used in the title or overly general terms. If you need help with keywords, try a keyword search using your proposed keywords in a search engine to check results.	
T10	Data accessibility statement and planned repository	We plan to make the data available (drop down; yes, no) If "yes", please specify the planned data availability level (drop down): - Data access via download; usage of data for all purposes (public use file) - Data access via download; usage of data restricted to scientific purposes (scientific use file) - Data access via download; usage of data has to be agreed and defined on an individual case basis - Data access via secure data center (no download, usage/analysis only in a secure data center) - Data available upon email request by member of scientific community -Other (please specify)	
T11	Optional: Code availability	We plan to make the code available (drop down; yes, no)	

Google Doc



PreReg

Preregistration for Quantitative Research in Psychology Template

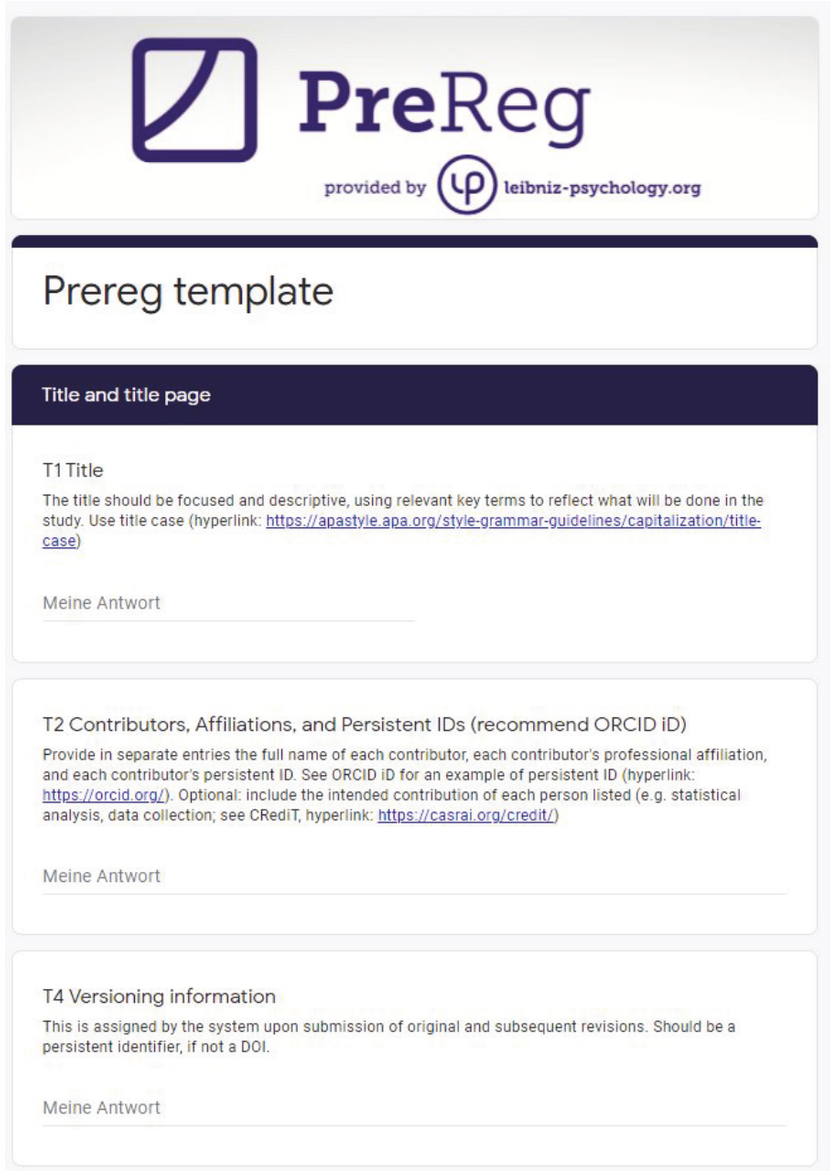
Not all of the following are relevant for every study; registries will make fields required or not as relevant.

Title

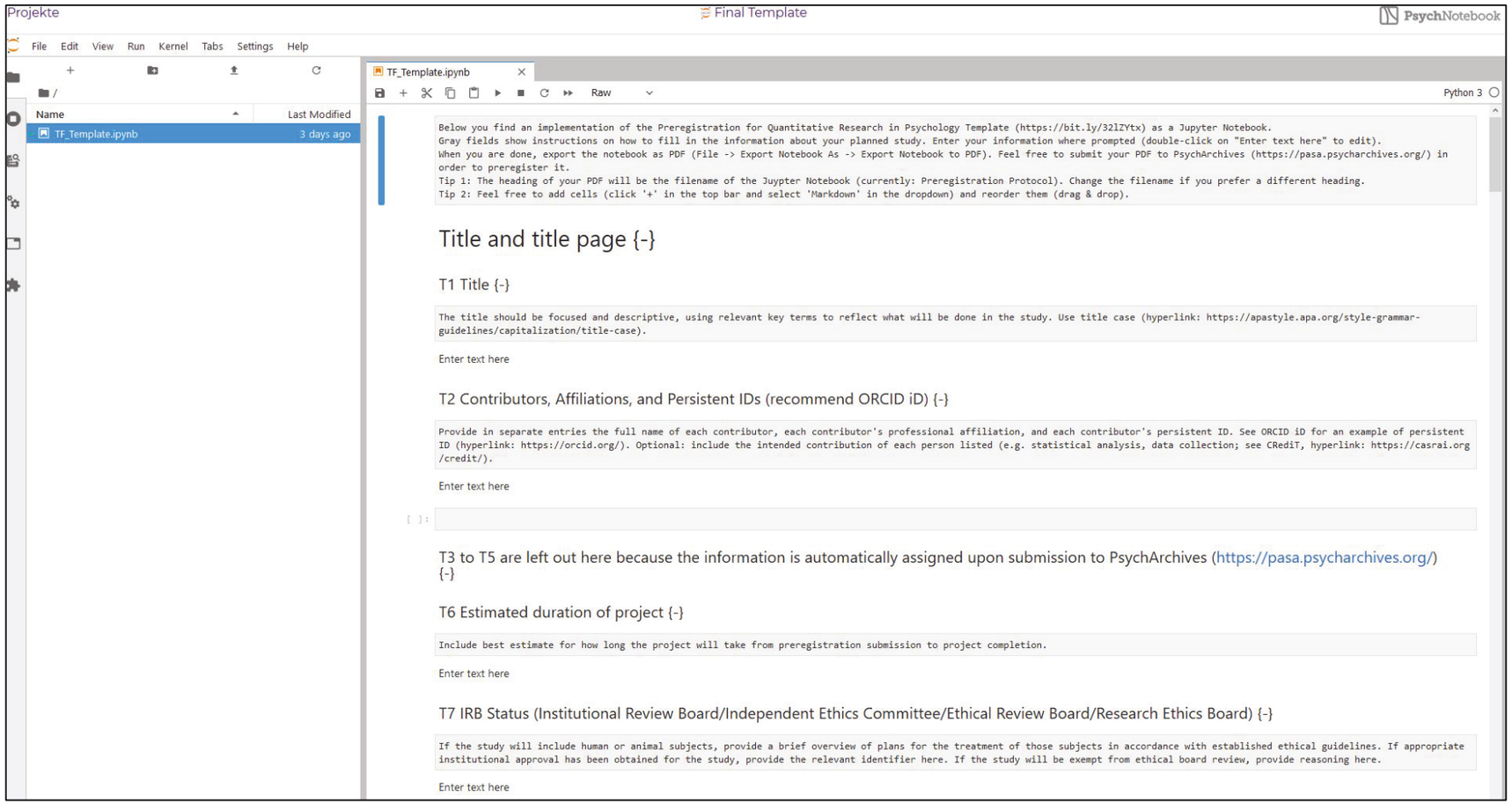
T1 Title
The title should be focused and descriptive, using relevant key terms to reflect what will be done in the study. Use title case (https://apastyle.apa.org/style-grammar-guidelines/capitalization/title-case)

T2 Contributors, Affiliations, and Persistent IDs (recommend ORCID iD)
Provide in separate entries the full name of each contributor, each contributor's professional affiliation, and each contributor's persistent ID. See ORCID iD for an example of persistent ID (https://orcid.org/). Optional: include the intended contribution of each person listed (e.g. statistical analysis, data collection; see CRediT, https://casrai.org/credit/)

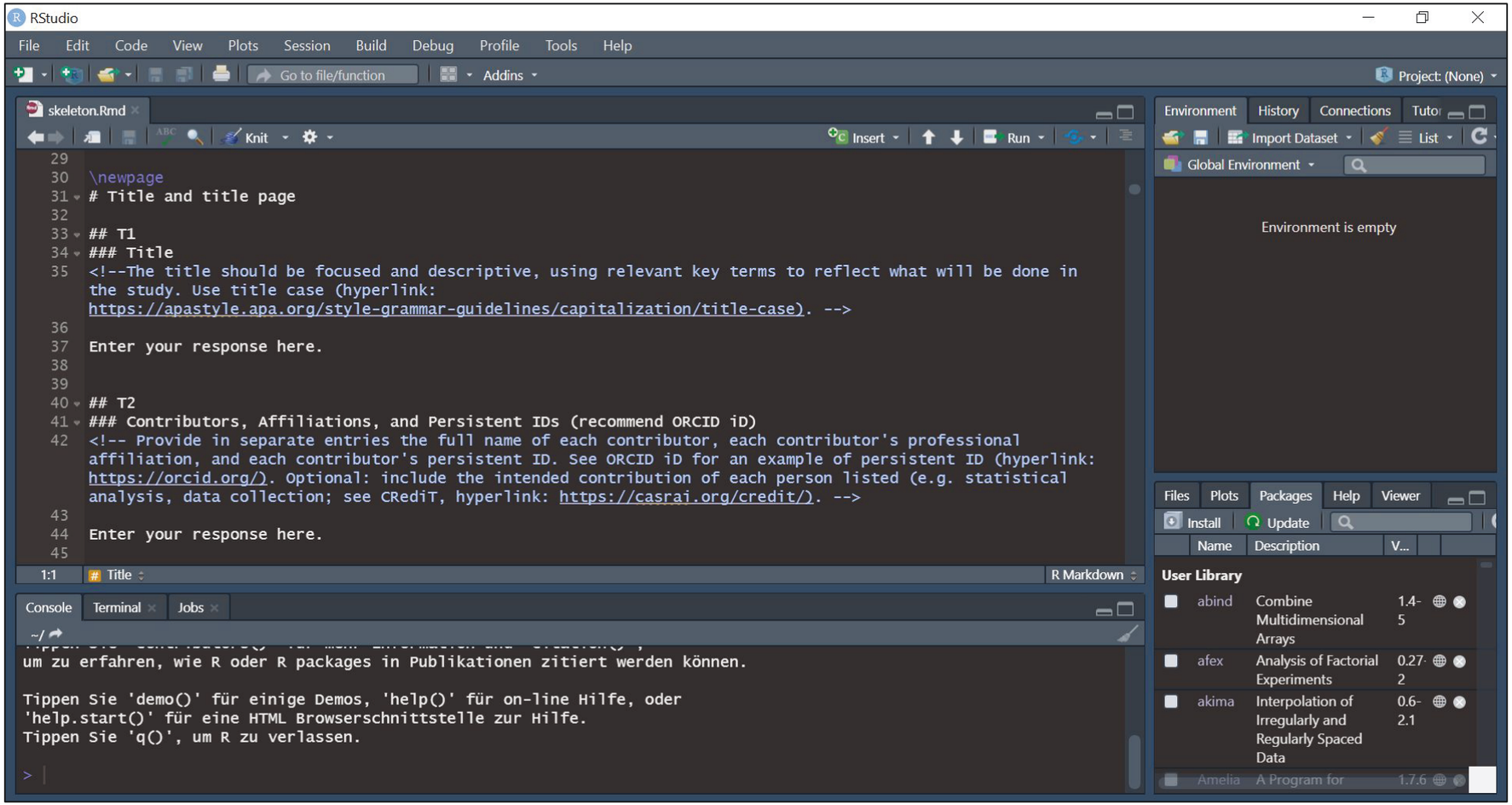
Google Form


PreReg
provided by leibniz-psychology.org
Prereg template
Title and title page
T1 Title
The title should be focused and descriptive, using relevant key terms to reflect what will be done in the study. Use title case (hyperlink: https://apastyle.apa.org/style-grammar-guidelines/capitalization/title-case)
Meine Antwort
T2 Contributors, Affiliations, and Persistent IDs (recommend ORCID iD)
Provide in separate entries the full name of each contributor, each contributor's professional affiliation, and each contributor's persistent ID. See ORCID iD for an example of persistent ID (hyperlink: https://orcid.org/). Optional: include the intended contribution of each person listed (e.g. statistical analysis, data collection; see CRediT, hyperlink: https://casrai.org/credit/)
Meine Antwort
T4 Versioning information
This is assigned by the system upon submission of original and subsequent revisions. Should be a persistent identifier, if not a DOI.
Meine Antwort

Jupyter Notebook



R Markdown


RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function
Addins
Project: (None)
skeleton.Rmd
Knit
Insert
Run
29
30 \newpage
31 # Title and title page
32
33 ## T1
34 ### Title
35 <!--The title should be focused and descriptive, using relevant key terms to reflect what will be done in the study. Use title case (hyperlink: https://apastyle.apa.org/style-grammar-guidelines/capitalization/title-case). -->
36
37 Enter your response here.
38
39
40 ## T2
41 ### Contributors, Affiliations, and Persistent IDs (recommend ORCID iD)
42 <!-- Provide in separate entries the full name of each contributor, each contributor's professional affiliation, and each contributor's persistent ID. See ORCID iD for an example of persistent ID (hyperlink: https://orcid.org/). Optional: include the intended contribution of each person listed (e.g. statistical analysis, data collection; see CRediT, hyperlink: https://casrai.org/credit/). -->
43
44 Enter your response here.
45
1:1
Title
R Markdown
Console
Terminal
Jobs
um zu erfahren, wie R oder R packages in Publikationen zitiert werden können.
Tippen Sie 'demo()' für einige Demos, 'help()' für on-line Hilfe, oder
'help.start()' für eine HTML Browserschnittstelle zur Hilfe.
Tippen Sie 'q()', um R zu verlassen.
>
Environment
History
Connections
Import Dataset
List
Global Environment
Environment is empty
Files
Plots
Packages
Help
Viewer
Install
Update
Name
Description
V...
User Library
abind
Combine Multidimensional Arrays
1.4-5
afex
Analysis of Factorial Experiments
0.27-2
akima
Interpolation of Irregularly and Regularly Spaced Data
0.6-2.1
Amelia
A Program for
1.7.6

One possible route to create preregistrations: R Markdown

What is R?

- Programming language
- Free of charge and open source
- Focus on data
  - Processing
  - Analysis
  - Visualization
- https://www.r-project.org/

Working with R

- R is based on analysis scripts/code

  → Analysis scripts
  - Complete analysis protocol
  - Can be distributed and published
  - Reproducible

RStudio

- R can be used with various software, one of which is RStudio
- Provides an interface to work with R
- https://www.rstudio.com/

R Markdown

- Interactive document format
- Includes chunks of embedded R code
  - Lets you combine data analysis and reporting
- R Markdown documents can be knitted to:
  - HTML
  - PDF
  - Word

prereg {prereg}

- Provides R Markdown templates to preregister scientific (psychological) studies
- Available templates:
  - AsPredicted
  - Replication recipe (Brandt et al., 2013)
  - van 't Veer and Giner-Sorolla (2016)
  - Registered Report Protocol Preregistration
  - COS Preregistration Challenge
  - Preregistration for Quantitative Research in Psychology Template

Additional note: Miktex

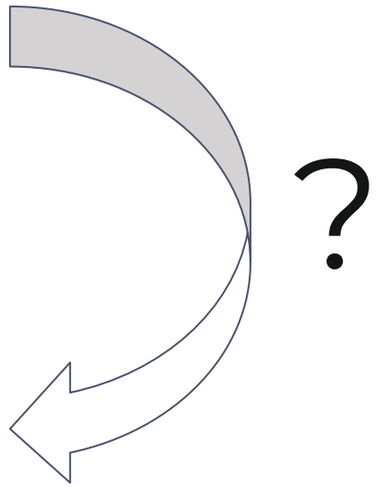
- To use the ‘prereg’ package, it is also necessary to install a Latex distribution (recommended for Windows Users: Miktex, https://miktex.org/)

- More information about setting up the ‘prereg’ package is given on its Github page: https://github.com/crsh/prereg

Using R Markdown to create preregistrations

Writing manuscripts in R Markdown

- Possibility to combine data analyses and reporting
- Highly reproducible



?

Writing preregistrations in R Markdown

- Same format for the whole project
- Nicely formatted (e.g., in PDF)
- References can be included automatically

Preregistrations with R Markdown

Walkthrough

Exercise

- Try creating your very own preregistration using R Markdown and the `prereg` package
- Use the Preregistration for Quantitative Research in Psychology Template or any other template you want

~ 20 minutes

Questions & Break

Step III: Platforms

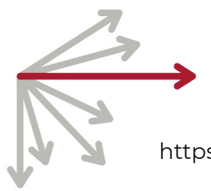
Overview over platforms

PreReg

https://prereg-psych.org/

OSF PREREGISTRATION

https://osf.io/prereg/



AS PREDICTED

https://aspredicted.org/

Platforms:
PreReg in Psychology

- Repository Track
  - Archived in PsychArchives
  - Timestamped
  - Assigned a DOI

- Lab Track
  - Protocol is reviewed by external reviewers
  - Successful applications are awarded a *free-of-charge data collection* by ZPID's service PsychLab (online or offline)

prereg-psych.org

Submission via PreReg

Walkthrough

You can then easily submit the preregistration on PreReg (demo)

Links

- ZPID: leibniz-psychology.org
- Preregistration for Quantitative Research in Psychology Template:
  - Google Spreadsheet
  - Google Doc
  - Google Form
  - Jupyter Notebook
  - Webcast
- PreReg in Psychology: prereg-psych.org
- Slides are available on PsychArchives

Research Synthesis & Big Data

17 - 21/05/2021
Frankfurt am Main

And a little advertising …

- The conference is devoted to
  - research addressing methods and applications of **research syntheses** (including systematic reviews and meta-analyses)
  - **Big Data** analyses (including large data sets, intensive longitudinal data, and machine learning)

    ~ in psychology and related fields
- Deadline for submitting abstracts: December 31, 2020
- More information is available here

Thank you!

Do you have any questions?

ls@leibniz-psychology.org
@lspitzer95

References

Brandt, M. J., IJzerman, H., Dijksterhuis, A., Farach, F. J., Geller, J., Giner-Sorolla, R., . . . van 't Veer, A. (2014). The Replication Recipe: What makes for a convincing replication? *Journal of Experimental Social Psychology, 50*, 217–224. https://doi.org/10.1016/j.jesp.2013.10.005

Christensen, G., Wang, Z., Paluck, E. L., Swanson, N., Birke, D. J., Miguel, E., & Littman, R. (2019, October 18). Open Science Practices are on the Rise: The State of Social Science (3S) Survey. https://doi.org/10.31222/osf.io/5rksu

Hardwicke, T. E., Thibault, R. T., Kosie, J. E., Wallach, J. D., Kidwell, M., & Ioannidis, j. (2020, January 2). Estimating the prevalence of transparency and reproducibility-related research practices in psychology (2014-2017). https://doi.org/10.31222/osf.io/9sz2y

Munafò, M. R., Nosek, B. A., Bishop, D. V. M., Button, K. S., Chambers, C. D., Du Percie Sert, N., . . . Ioannidis, J. P. A. (2017). A manifesto for reproducible science. *Nature Human Behaviour, 1*(1), e124. https://doi.org/10.1038/s41562-016-0021

Open Science Collaboration (2015). Estimating the reproducibility of psychological science. *Science (New York, N.Y.), 349*(6251), aac4716. https://doi.org/10.1126/science.aac4716

van 't Veer, A. E., & Giner-Sorolla, R. (2016). Pre-registration in social psychology—A discussion and suggested template. *Journal of Experimental Social Psychology, 67*, 2–12. https://doi.org/10.1016/j.jesp.2016.03.004