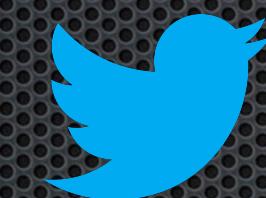


# Understanding and practising open science

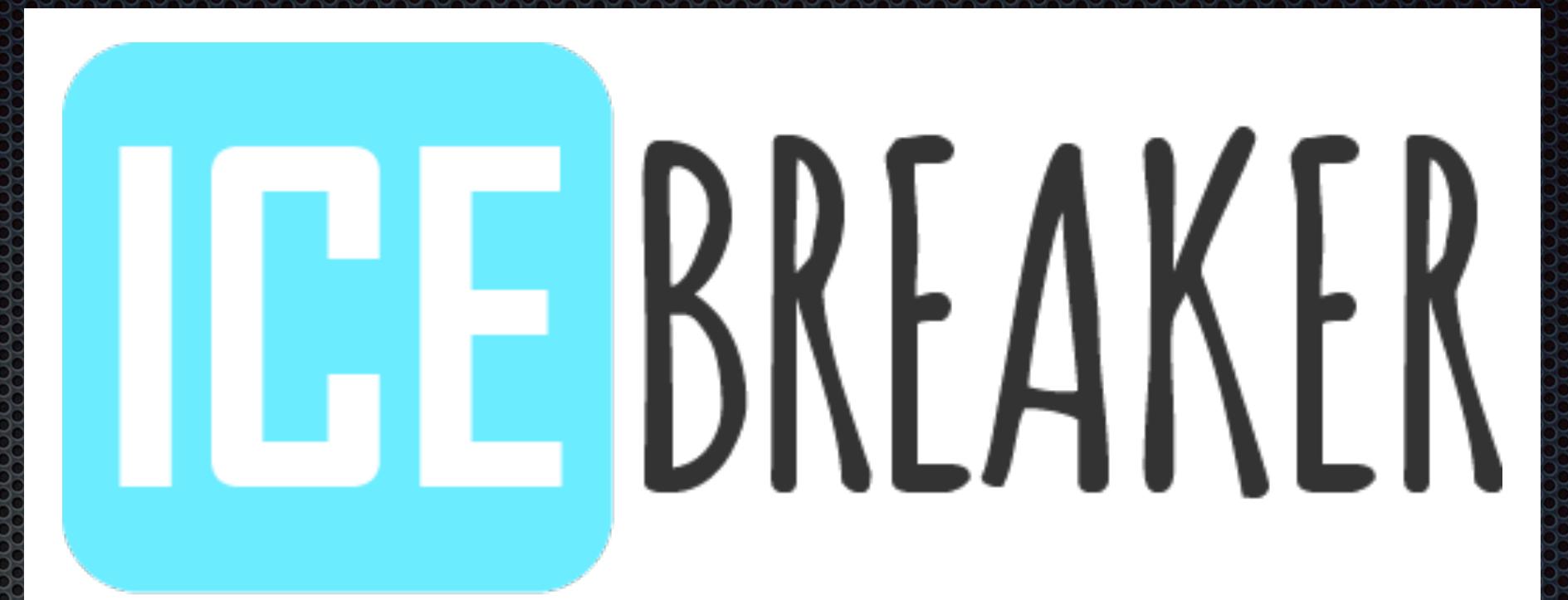


Angelos Krypotos  
@AngelosVanKr

KU LEUVEN



Universiteit Utrecht



- What is your first name?
- Which part of the world are you now?
- Research interests?
- Favourite food?

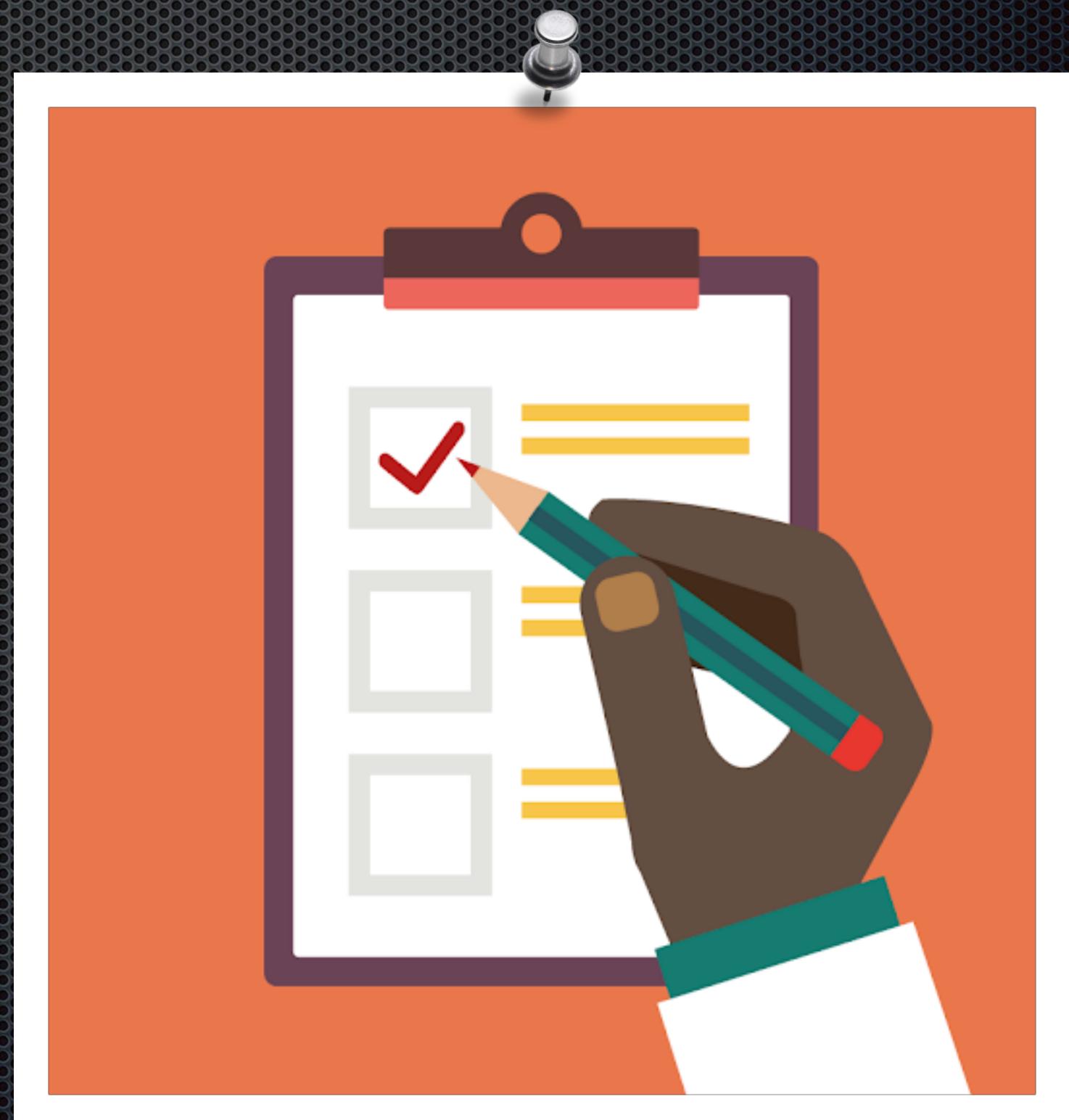
# Conflict of interest statement

I am in not commercially affiliated to any of the software that I present here

# Agenda

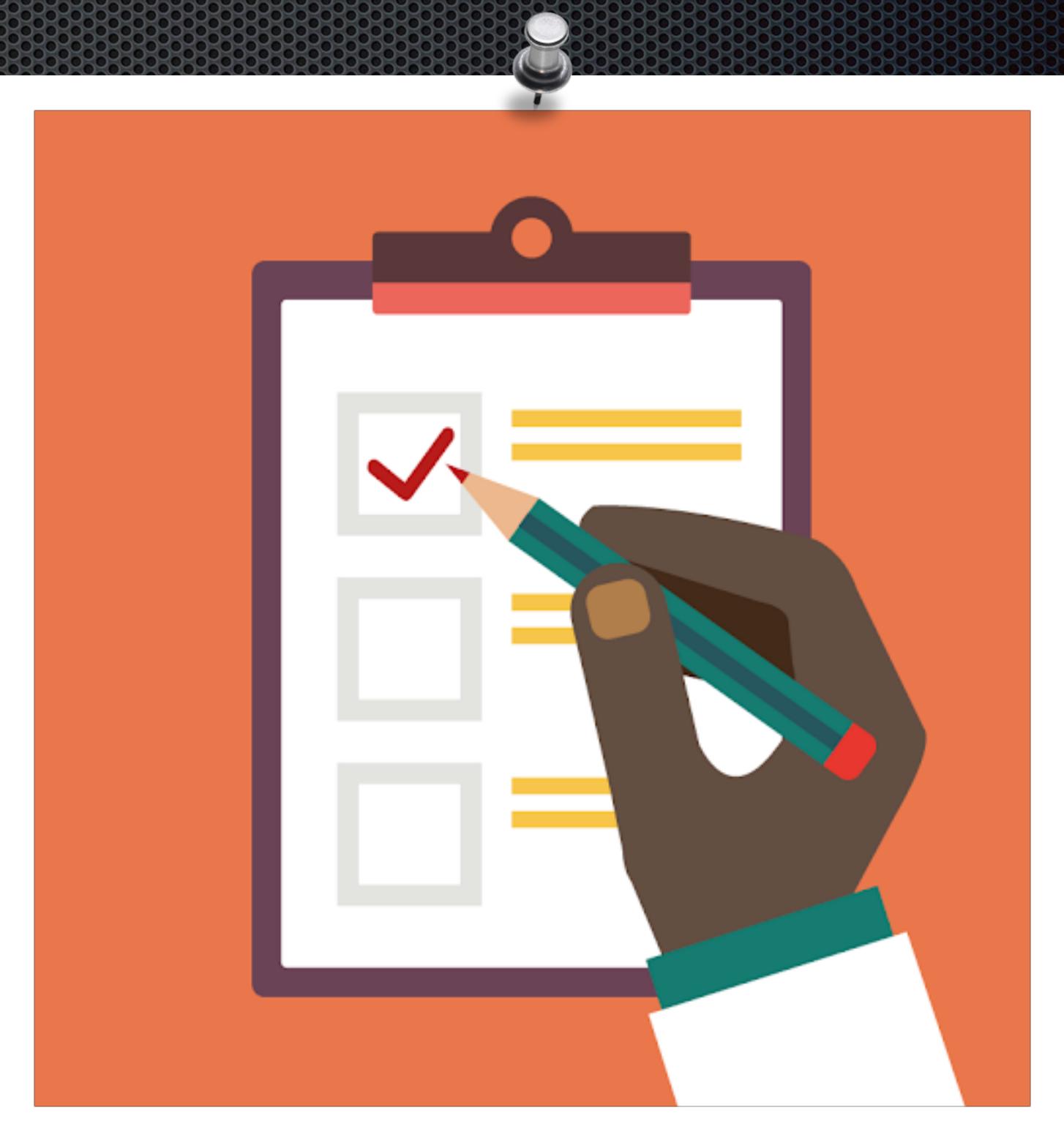
- Principles of open science
- Preregistration
- Open data
- Open code
- Preprints
- Wrapping up

HIIT blocks:  
45 min on  
15 min off

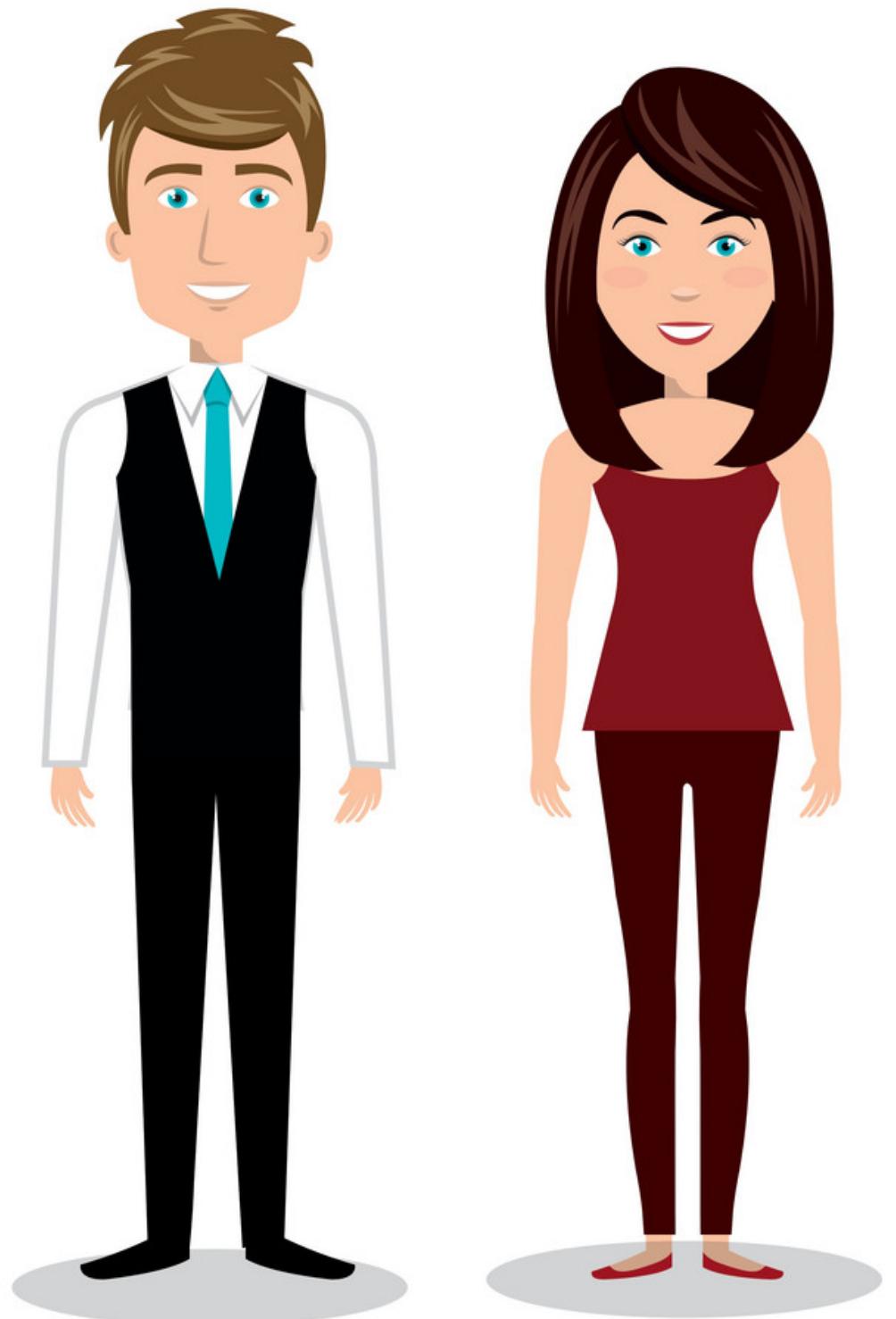


# Agenda

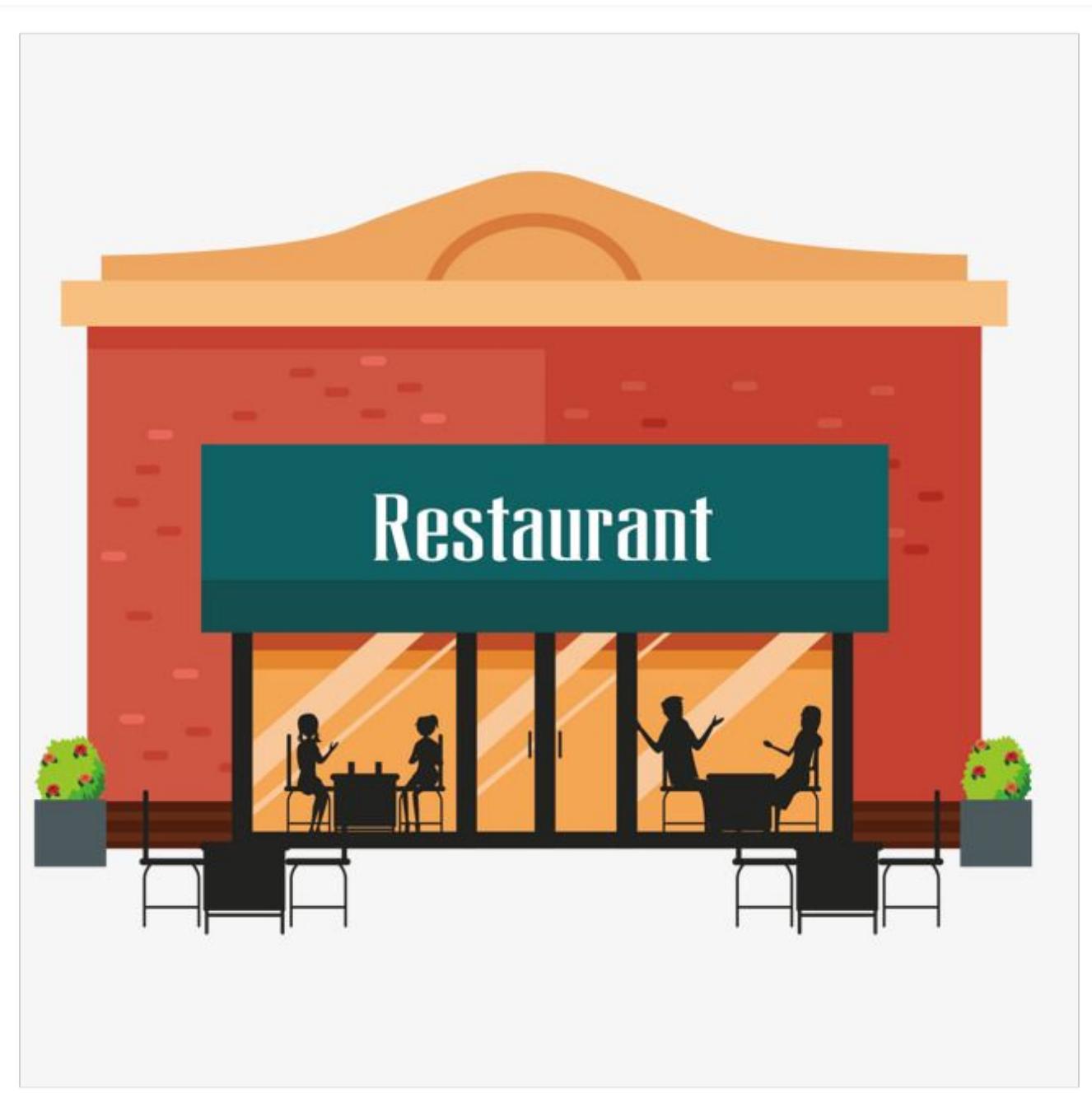
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Ben Barbara



Secrets



Open

# Traditional Approach

- Carry out a study
- Share preliminary results with collaborators/conferences
- Publish the report of the paper
- Advantages: Many people know how to do it (but that does not mean they are right)

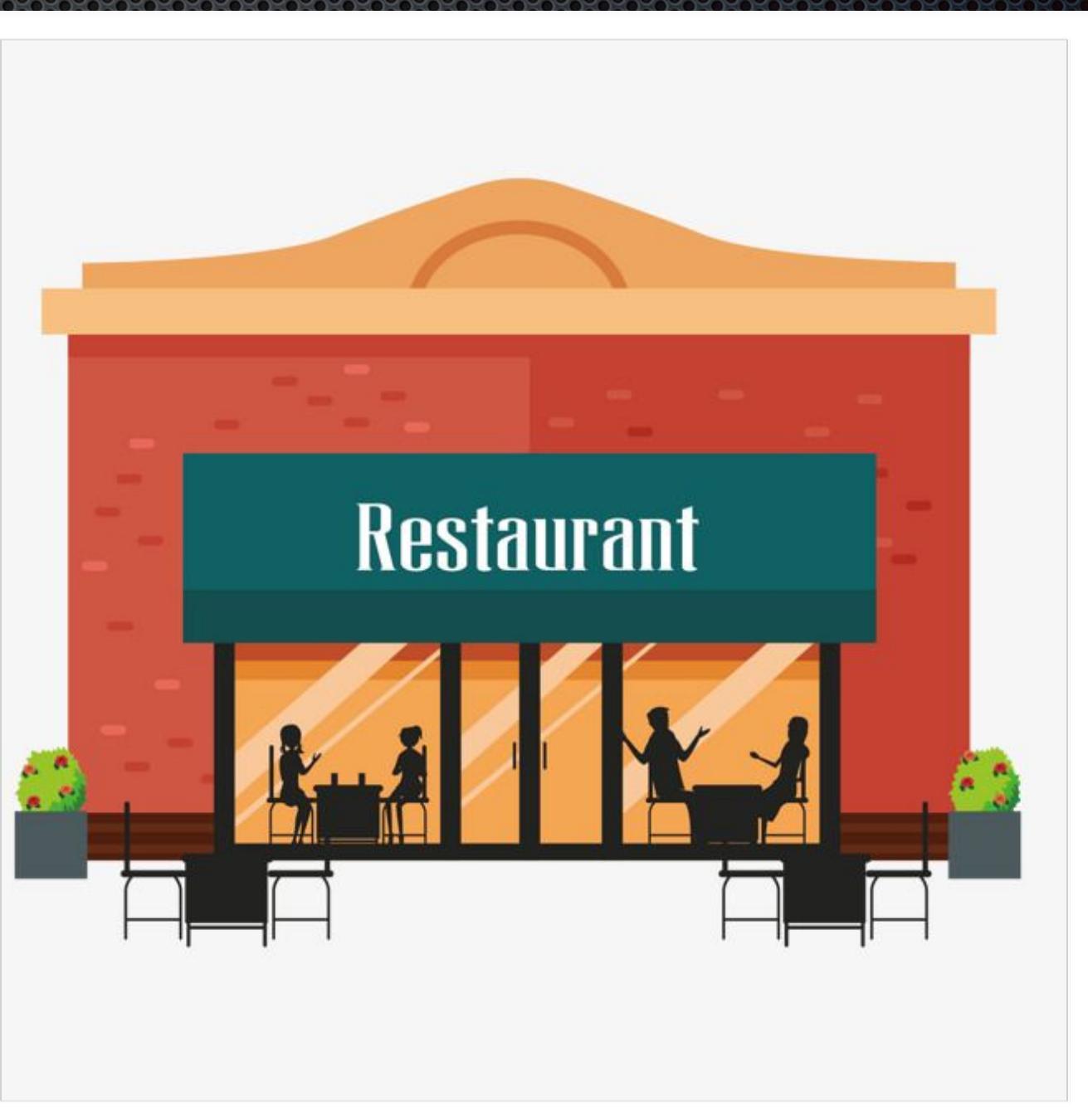


# Disadvantages of current research practices

- Not transparent methods
- HARKing
- P-hacking
- Slow communication
- Often research not available to the public

# The Open Science approach

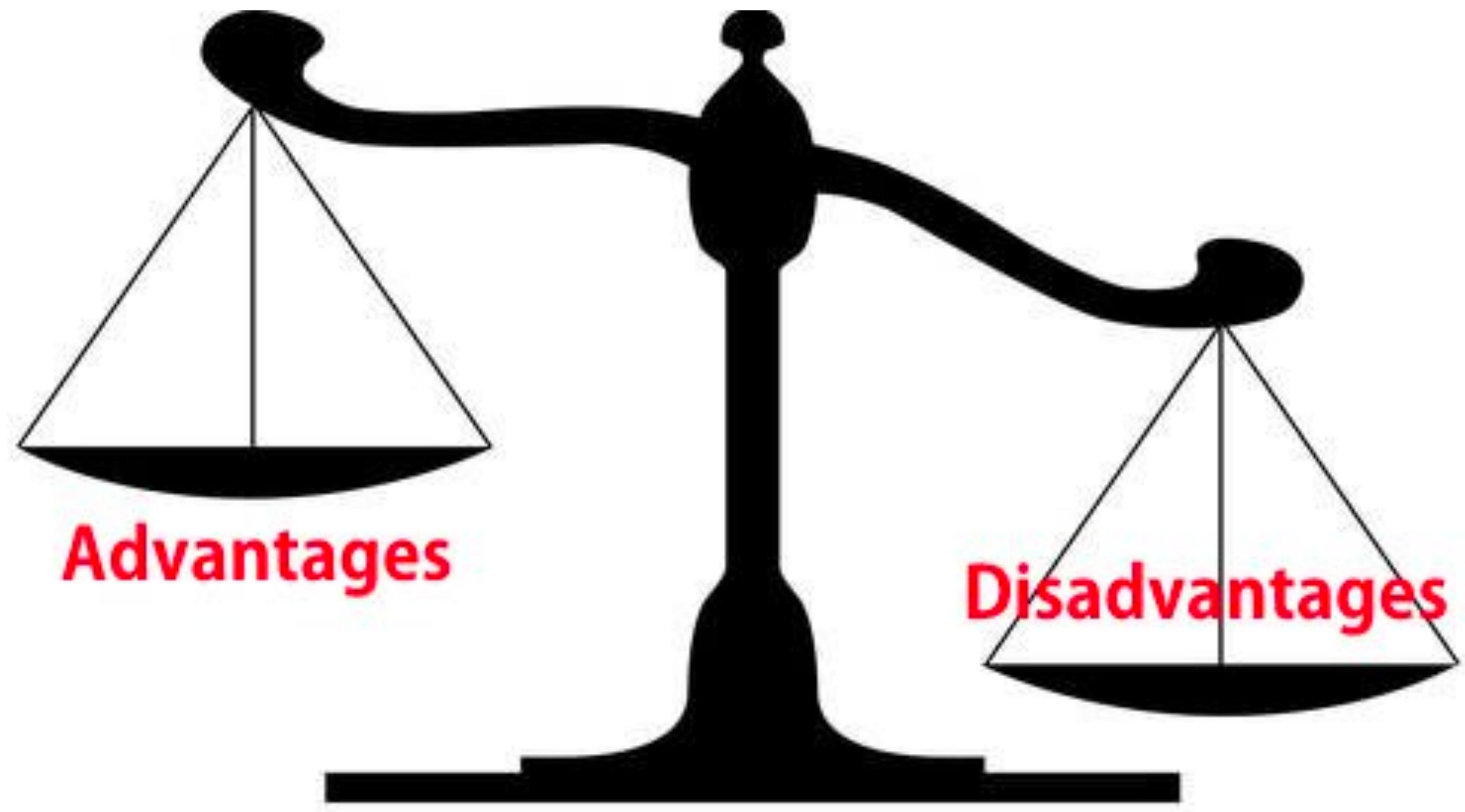
- Share the design/analyses before data collection
- Carry out the planned analyses as soon as the data are in
- Deviations from the plan always explained
- Share data and material
- Advantages: Transparency, not loss of enthusiasm, increase in trust



# Disadvantages of open science

- You have to attend workshops to know how to do it
- Too broad a definition
- Not standard practices
- Not one size fits all



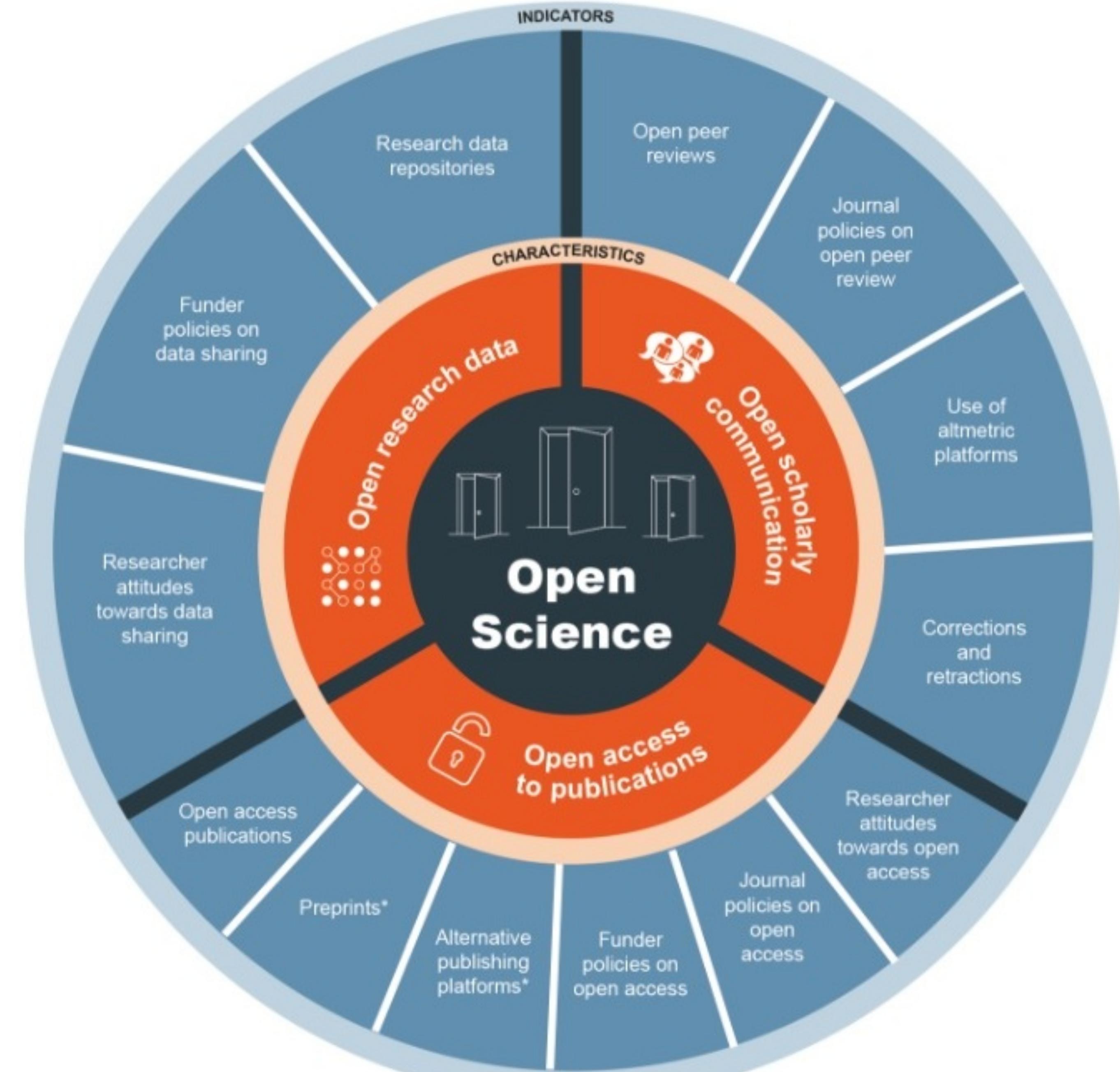


# What is open science anyway?

*Open Science represents a new approach to the scientific process based on cooperative work and new ways of diffusing knowledge by using digital technologies and new collaborative tools. The idea captures a systemic change to the way science and research have been carried out for the last fifty years: shifting from the standard practices of publishing research results in scientific publications towards sharing and using all available knowledge at an earlier stage in the research process ([European Commission](#))*

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# Research circle/Open Science Practices

Hypotheses

Preregistration

Data collection

Open material  
Logbook

Data analyses

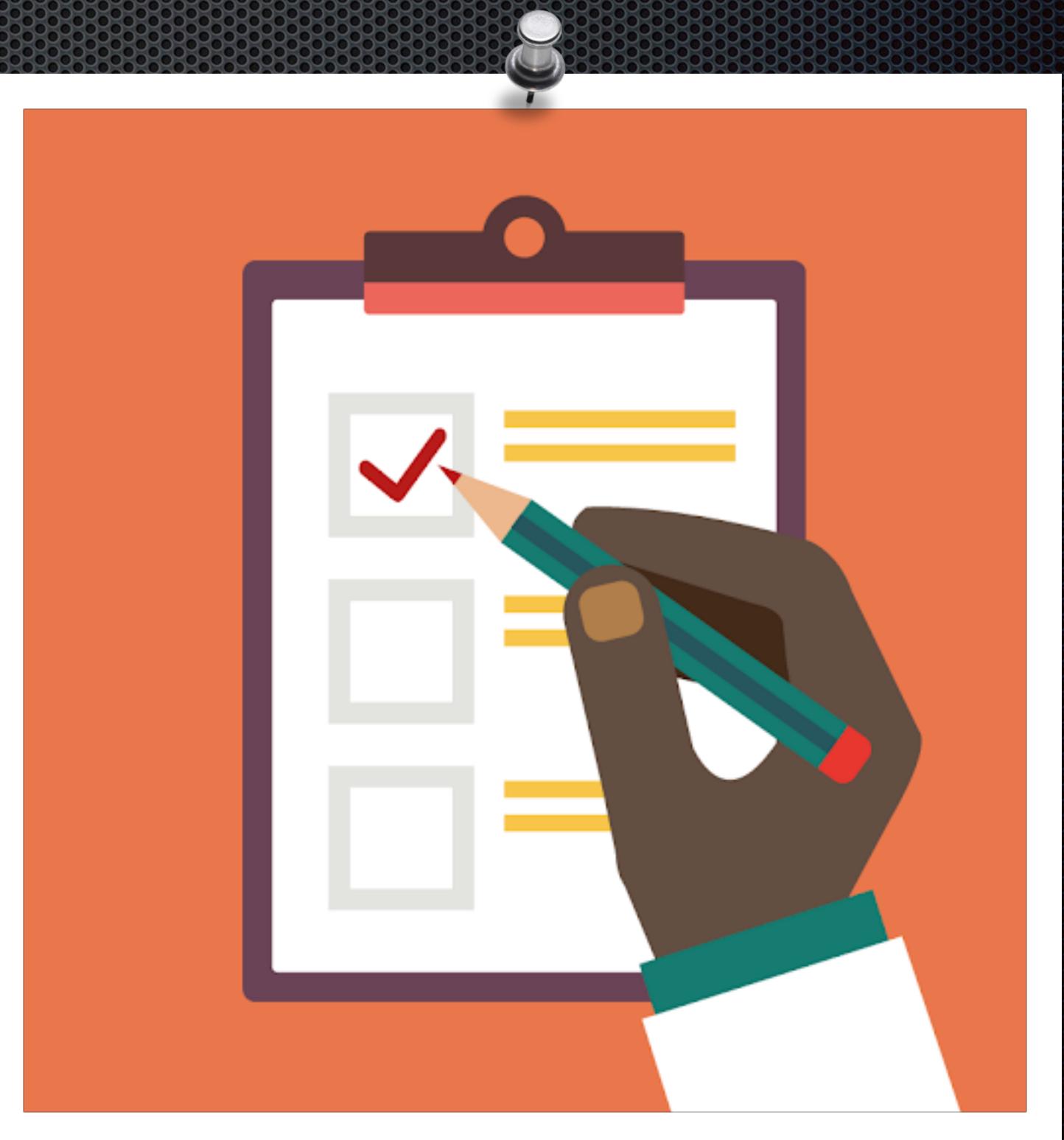
Open data  
Open analyses

Publication

Preprint services

# Agenda

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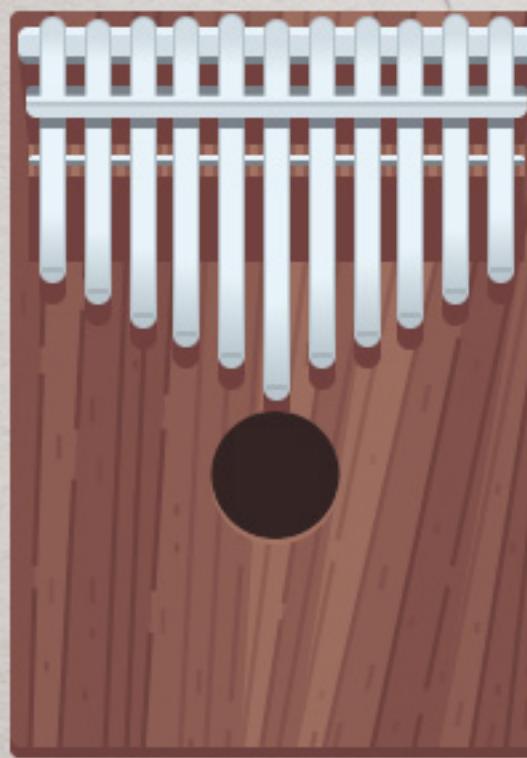


# Preregistration

See folder preregistration/primaryData

# Step number 1

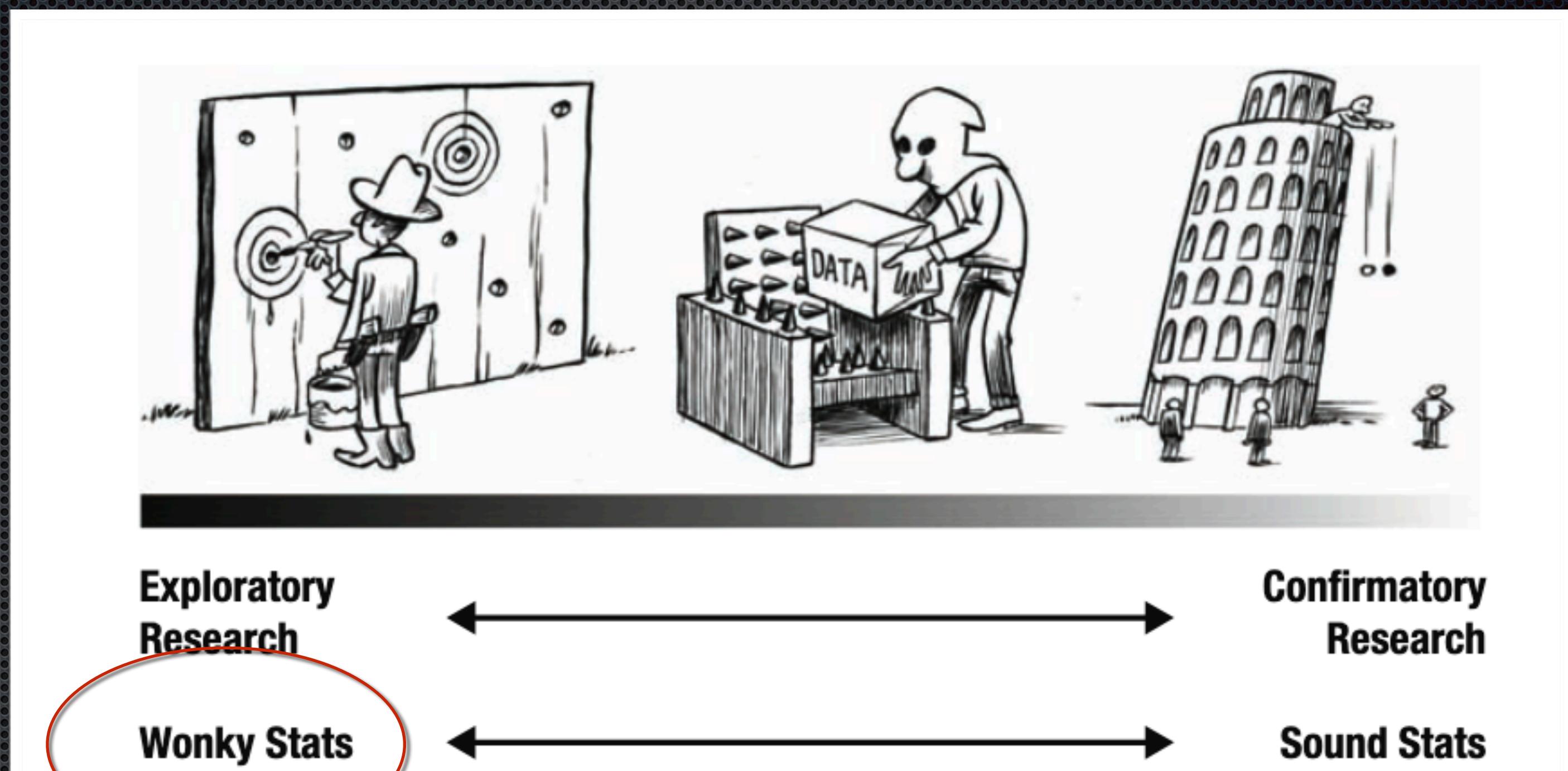
- Research idea
- Open science practices on their own do not make your idea valid



The Most  
Important  
Thing

# Step number 2

- Type of study
  - Confirmatory
  - Exploratory



Not correct anymore

De Groot, 2014  
Wagenmakers et al., 2012

# Step number 3

- What data should I use?
  - Primary (original data)
  - Preexisting (yours or others)
- The type of data you use partially define the options you have



# Step number 3 (Original data)

- In case of original data
  - When are you gonna stop collecting data?
    - (e.g. Power analysis, optimal stopping)

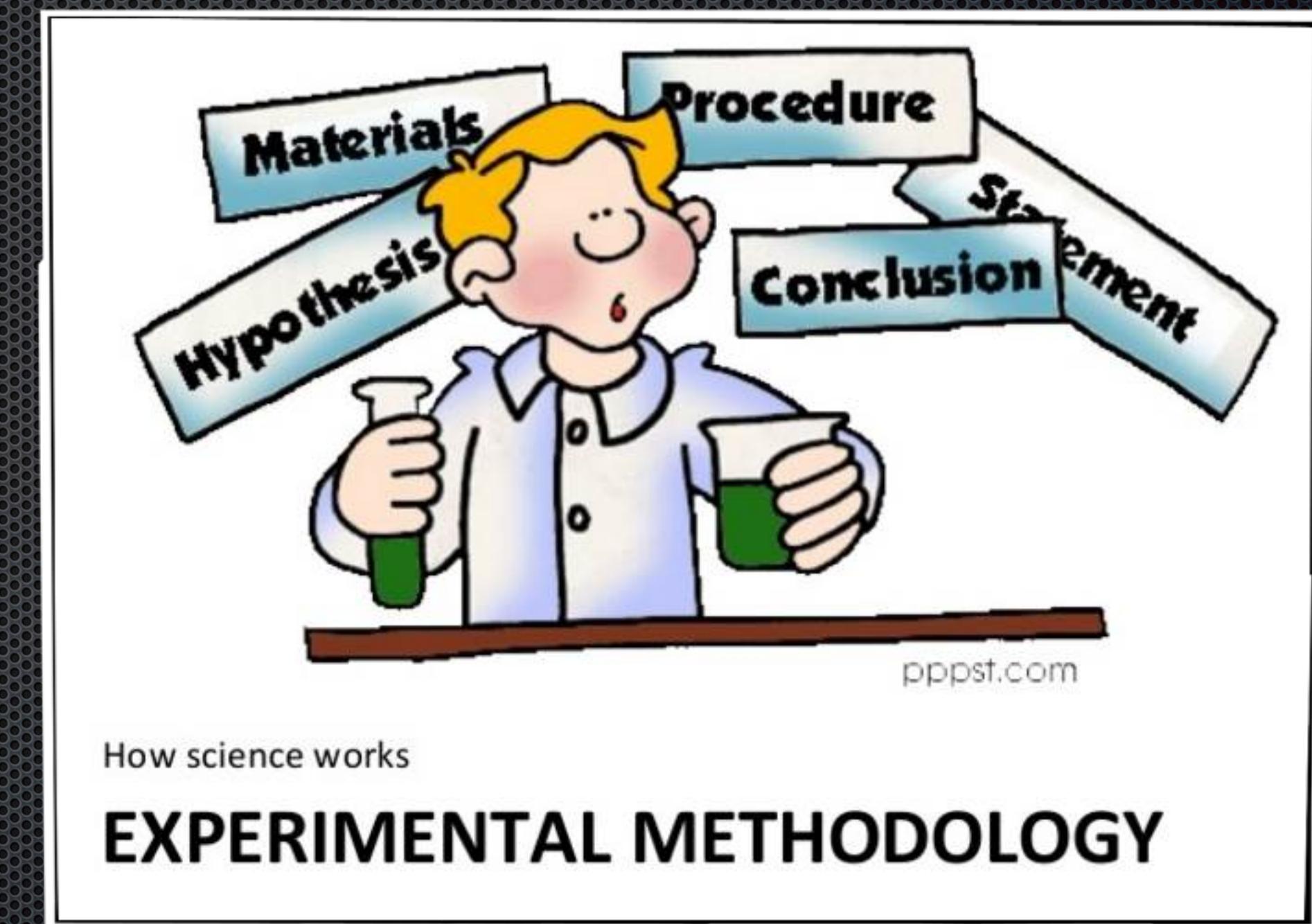


# Step number 3 (Preexisting data)

See folder preregistration/preexistingData

# Steps number 4-5

- Method and analyses
  - Define everything (confirmatory)
  - Or not... (exploratory)



# Benefits/shortcomings of preregistration

- Benefits
  - Think in advance about hypotheses/analyses
  - Take credit about your predictions
  - In some cases you are required to preregister (e.g., RCTs)
  - Just write up the discussion in the end and you are done!

# Where to preregister?

- Open Science Framework ([osf.io](https://osf.io))
- As Predicted ([aspredicted.org](https://aspredicted.org))
- Clinical trials ([ClinicalTrials.gov](https://ClinicalTrials.gov))

This is the point where I show you how  
to perform the preregistration at OSF.IO

# Exercise 1

- Lets fill in the osf template (<https://help.osf.io/hc/en-us/articles/360019738834-Create-a-Preregistration>).
- Alternative preregistration templates can be found here: <https://osf.io/e6auq/>
- DO NOT SUBMIT THE PREREGISTRATION!

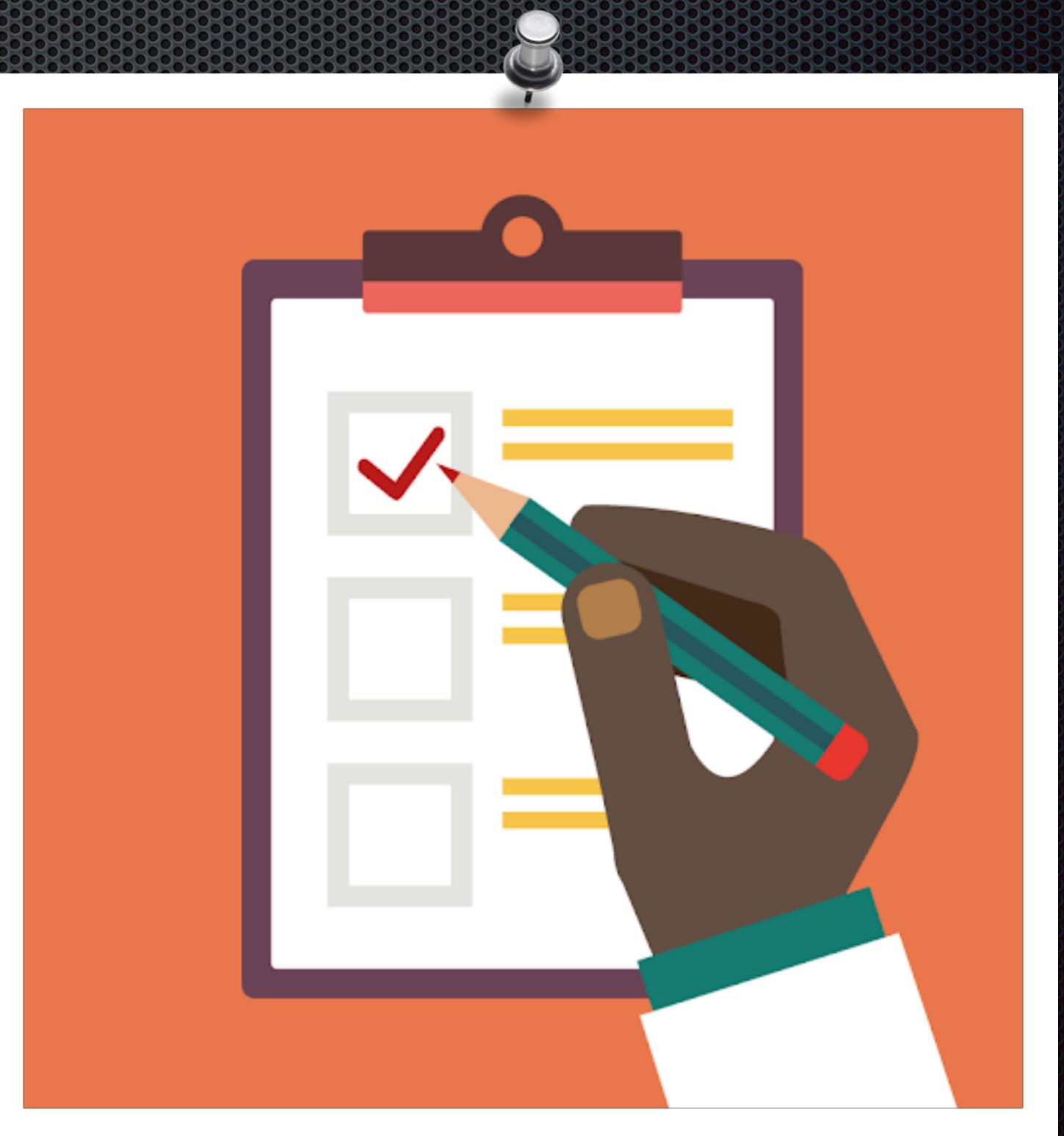
# One last thing...



- Register reports — the best thing to happen against publication bias
- <https://www.cos.io/initiatives/registered-reports>

# Agenda

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# Open data



- Sharing of all data that will, at least, reproduce the results of the main paper
- Enables: reproducibility
- Possible concerns: privacy (the General Data Protection Regulation; GDPR)

Your data should be:



Findable (read by humans and machines)

Accessible (USB vs. The cloud vs. OSF)

Interoperable (can be read in the future)

Reusable (a script could reproduce the results)

# What data should I share?

- Data that will reproduce your results
- No identifiable data (e.g., names, date of birth)
- For multiple waves, use code where you will have the key - no openly available

# What data should I share?

- Data could be shared: restricted number of individuals, individuals who request access, everyone
- Whether you can do anything from that, need to be consulted with the relevant departments at your institution
- Open science: unrestricted access usually by storing the data in the cloud

# Data anonymization

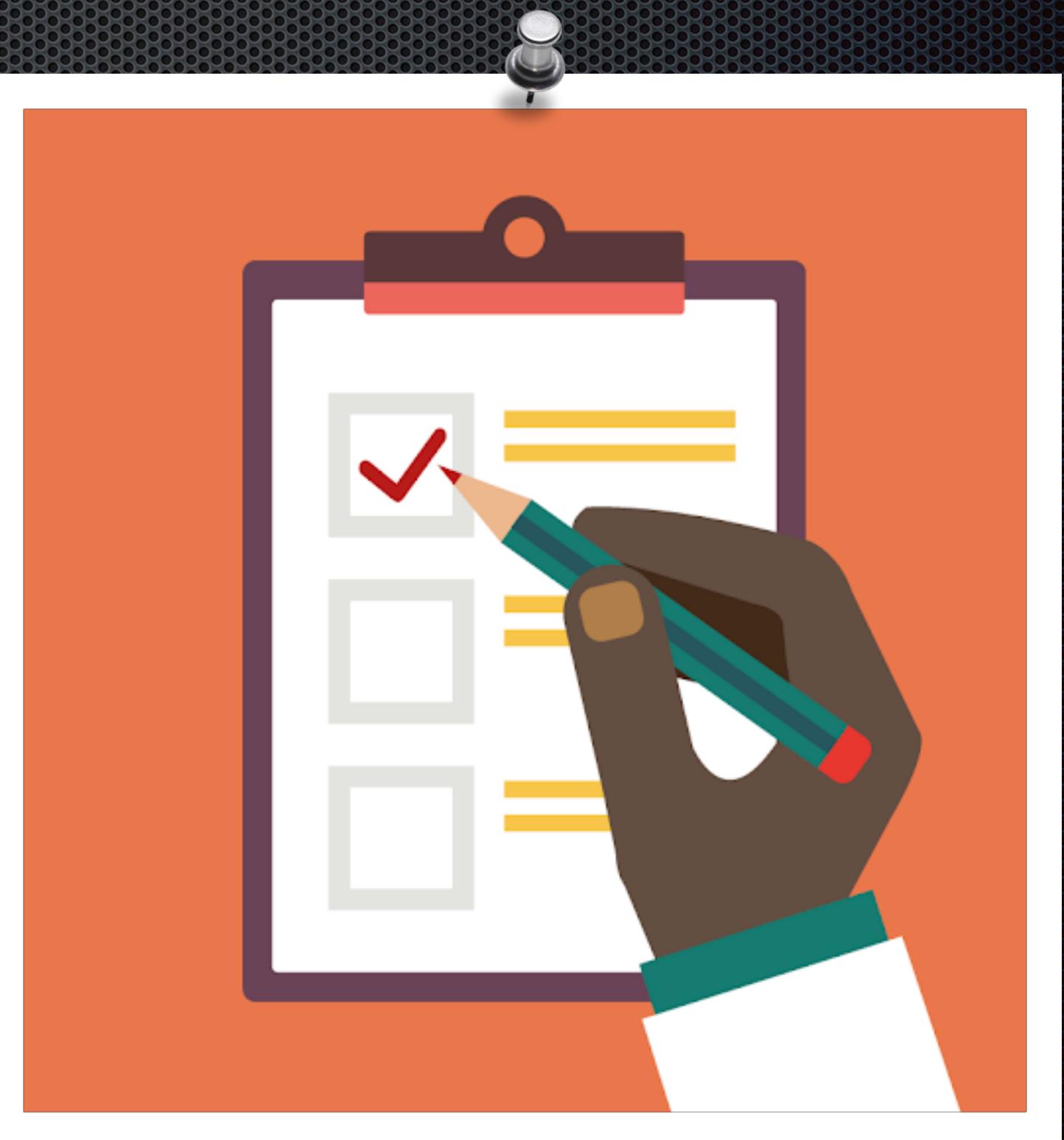
- Remove non-relevant variables
- Remove personal identification (e.g., names)
- Bin variables (see k-anonymity)
- You can also simulate data (e.g., see synth pop R package)
- Also: <https://osf.io/26y8j/>



	A	B	C	D	E	F	G
1	participant name	Performance	Sex	Political opinions	Date of birth		
2	John Doe	bad	Female	Right	01/08/2000		
3	John Lennon	bad	Make	Left	01/08/2000		
4							
5							
6							

# Agenda

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# Open analysis/code

- Replicability vs. Reproducibility
- A scripting language is best
- However, point and click programmes are also OK (e.g., JASP, JAMOVI)

# README

- Explain clearly what each column is
- Explain clearly what each row is
- Explain how some columns were created (e.g., sums of two columns)

# JASP

- Advantages
  - Reproducible analyses
  - Really easy to use
- Disadvantages
  - No code available (at least for now)
  - Not so easy with data reduction

JASP Example (follow along)

# R/Rstudio



- Programming language
- It allows to easily conduct your analyses and share your code
- Everything should be done with a button press

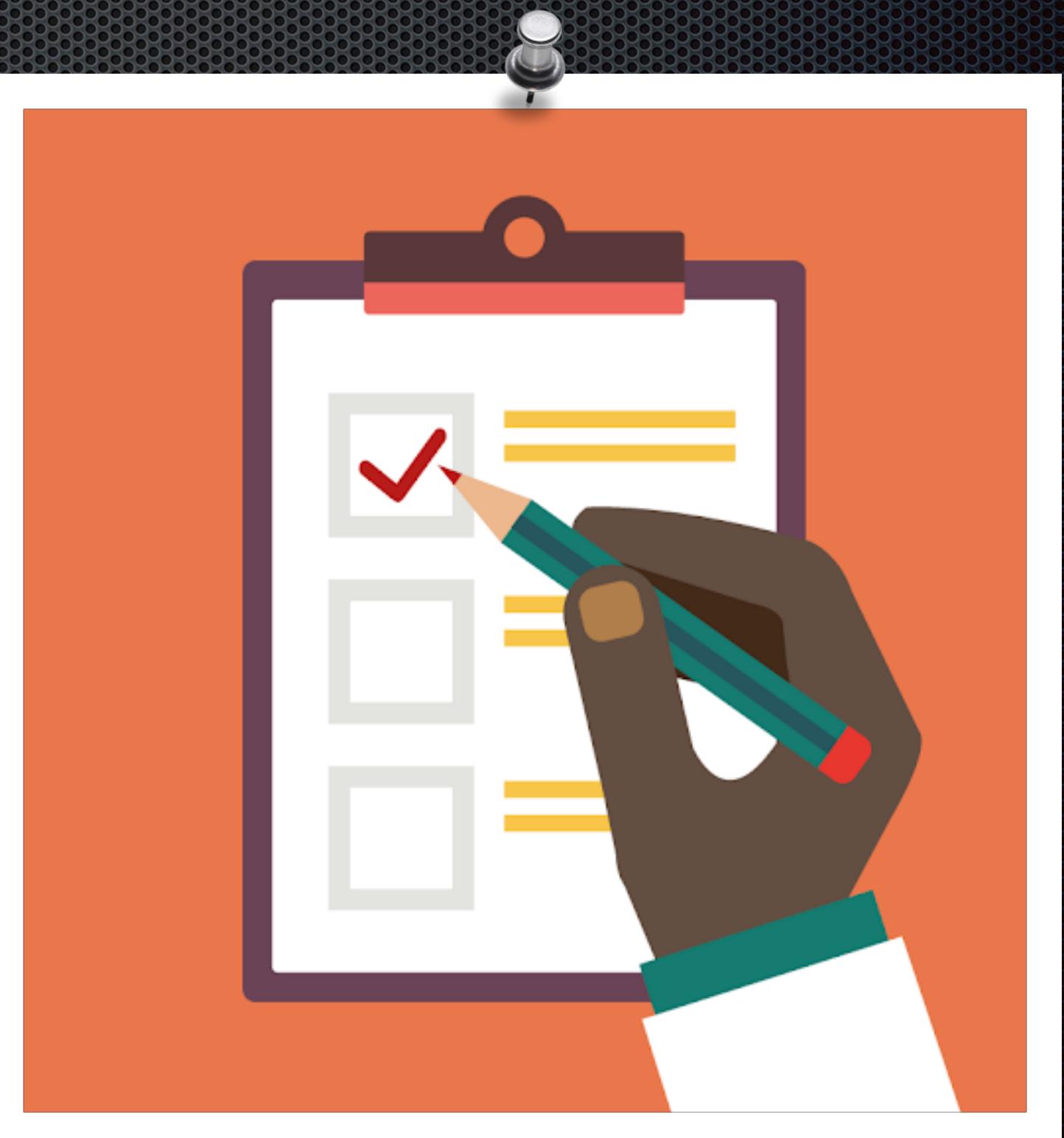
# Git

- Version control system
- You can commit changes and comment on these changes
- It works regarding code, if you do not code, it does not do much

R/git Example (follow along)

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# Pre-print/post-print

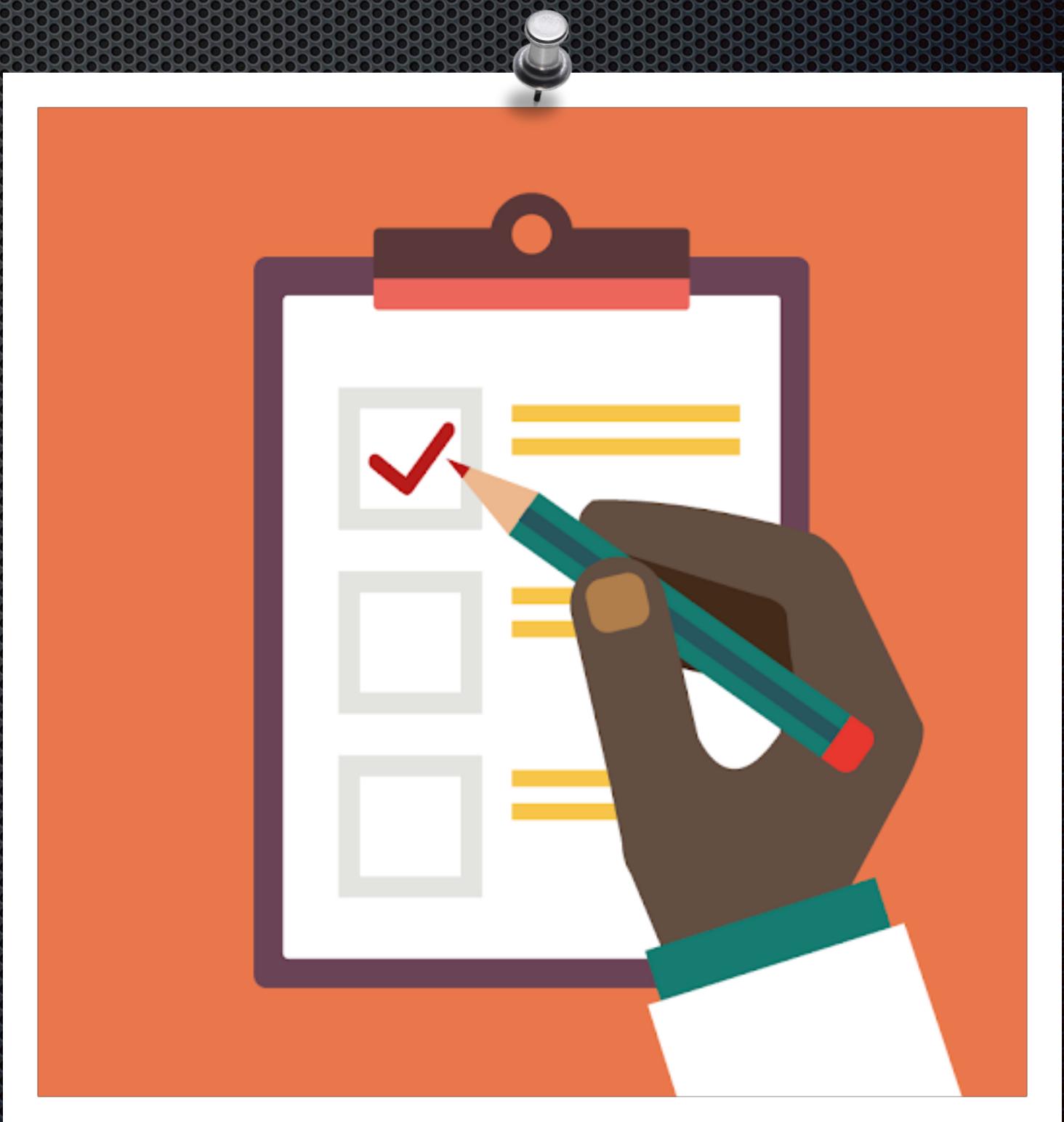
- Share your work prior to publication to a journal
- Receive comments and critique (+ maybe citations)
- (Maybe never publish it)
- Popular archives
  - arXiv
  - <https://psyarxiv.com>

# Exercise (again...)

- Let's see how we can submit a fake paper
- But we will not actually submit it!

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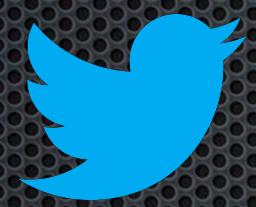
# What did we learn?

- Open science can help you, science, society
- It may seem hard the first time – like almost everything
- In the end you save time, rather than waste time
- Open science should be just science

Don't fool yourself  
— and you are the easiest person to  
fool

It's a wrap

[akrypotos.com](http://akrypotos.com)



@AngelosVanKr