



Bayesian analysis for
speech scientists

INSTRUCTORS

Joseph Casillas

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Stefano Coretta

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Timo Roettger

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#LearnB4SS



Join the
SLACK
channel



To our **materials**

<https://learnb4ss.github.io/learnB4SS/>



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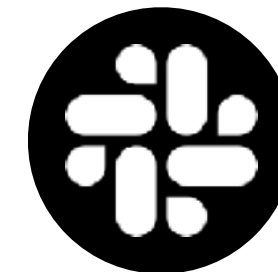
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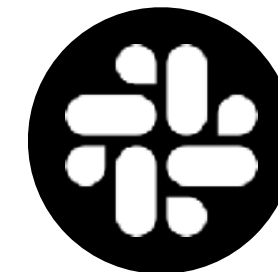
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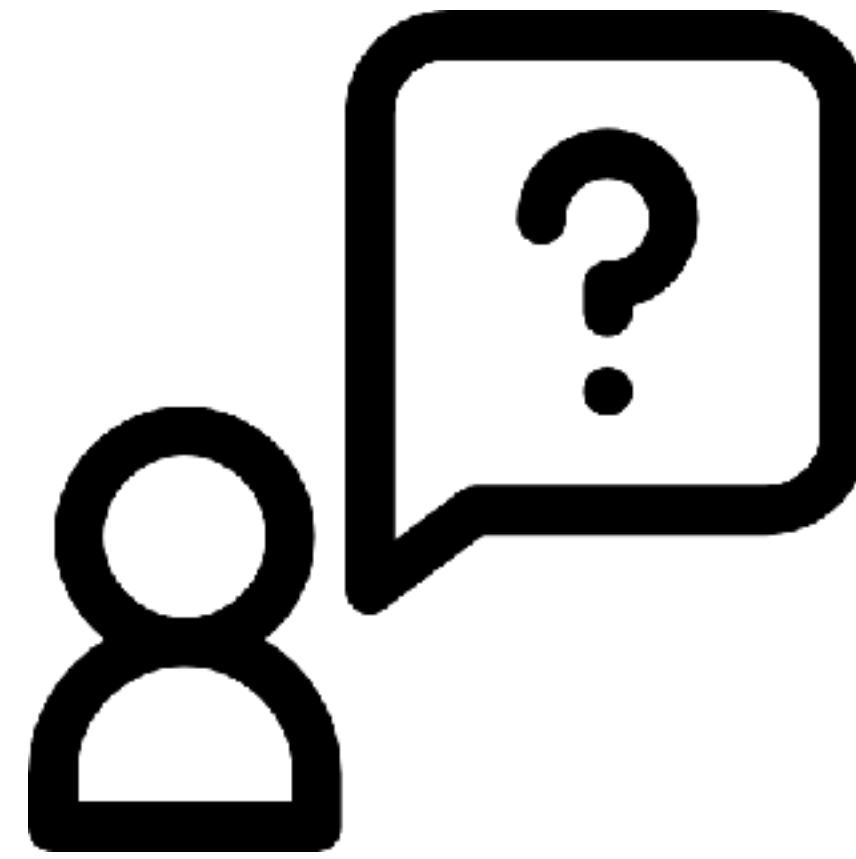


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Zoom chat



Google Slides



Slack chat

**WHY ARE WE
HERE TODAY?**

100%



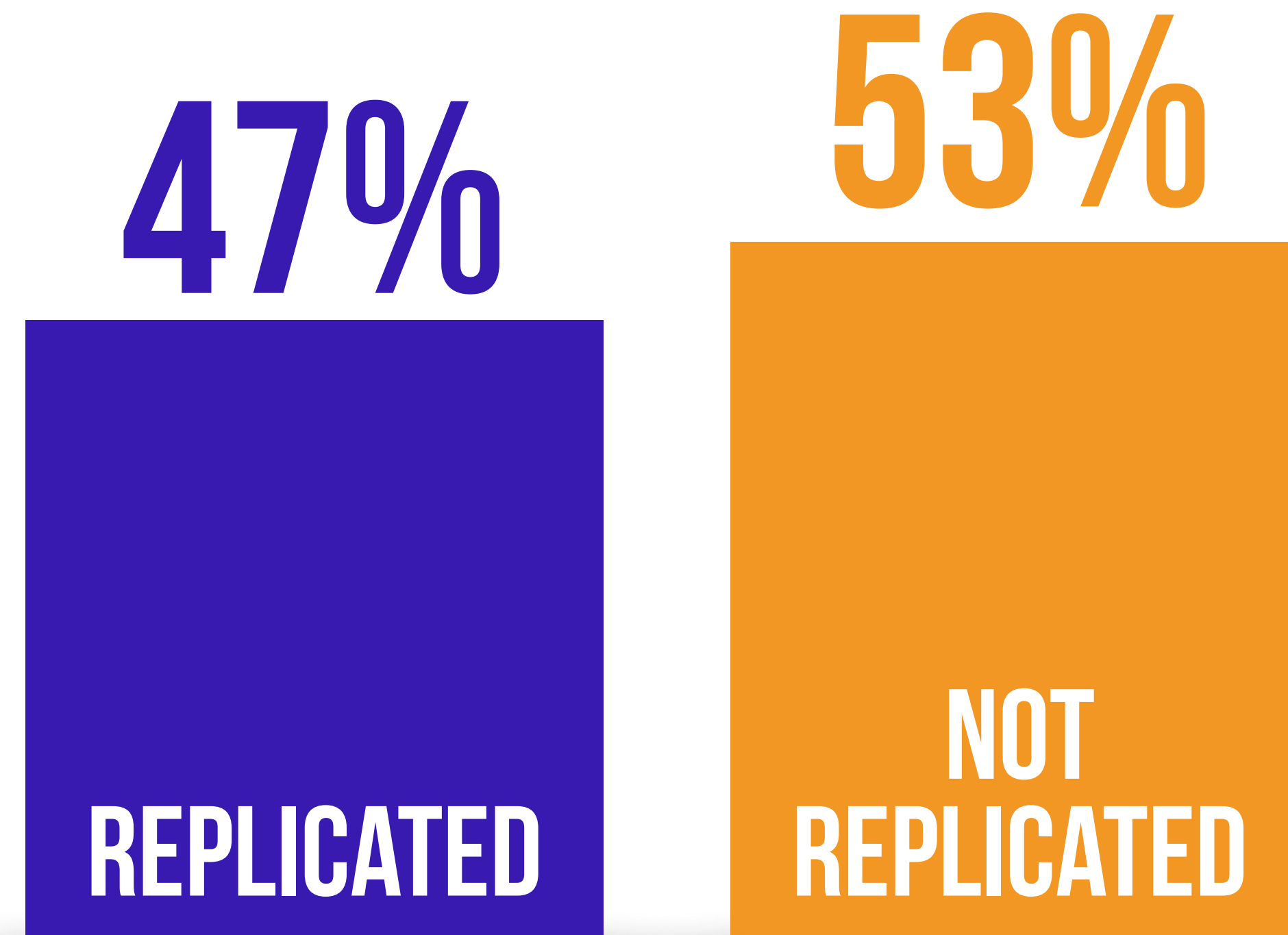
REPLICATED

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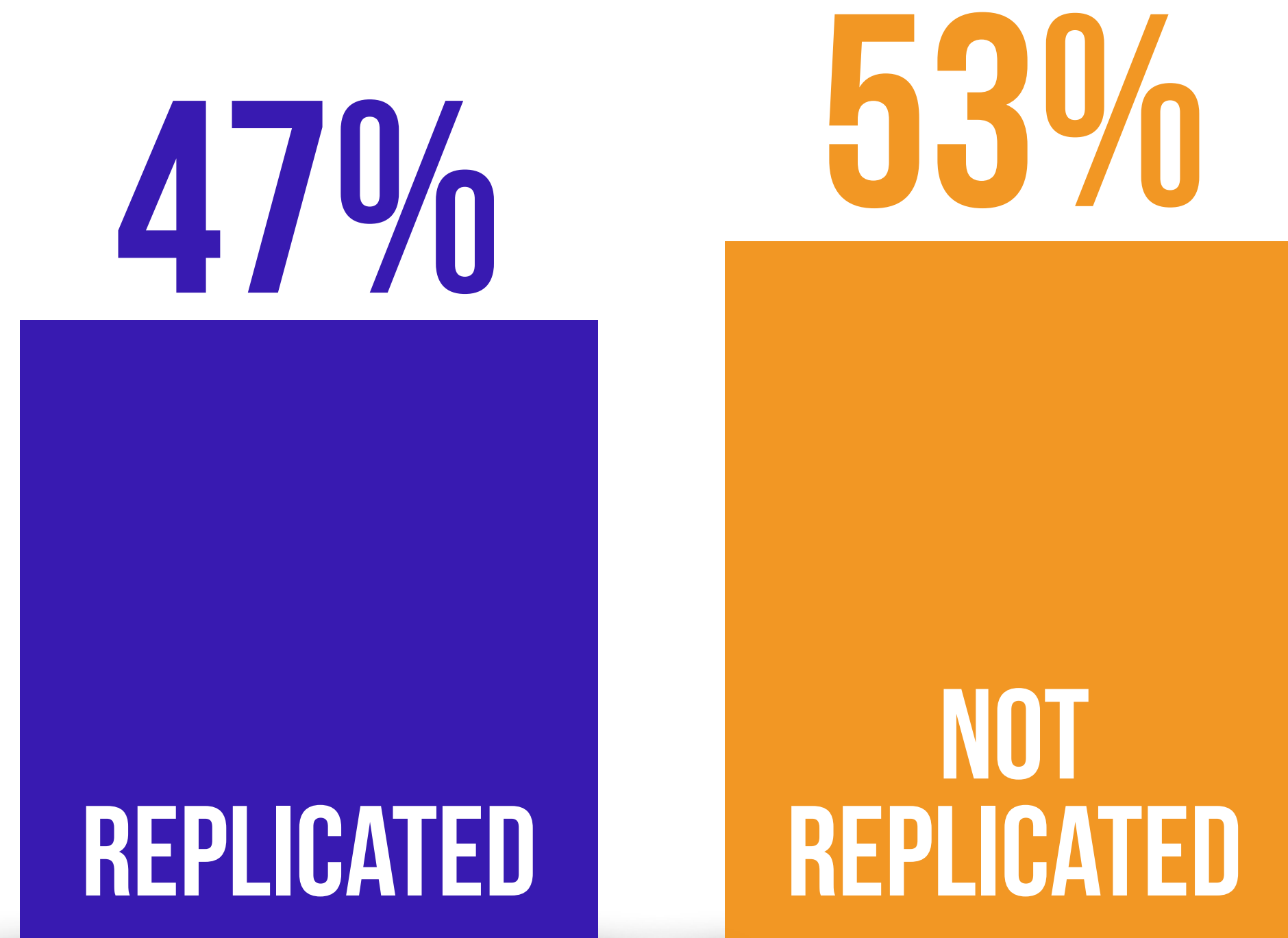
CRISIS IN CONFIDENCE

Open Science Collaboration (2015)

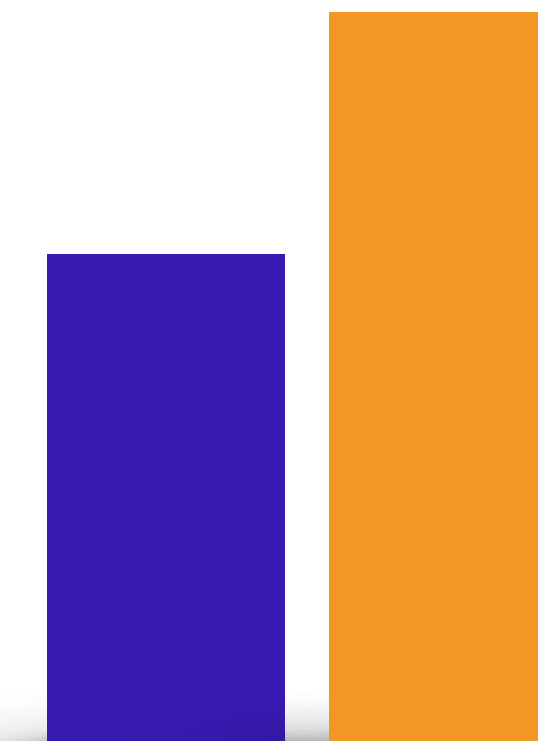


CRISIS IN CONFIDENCE

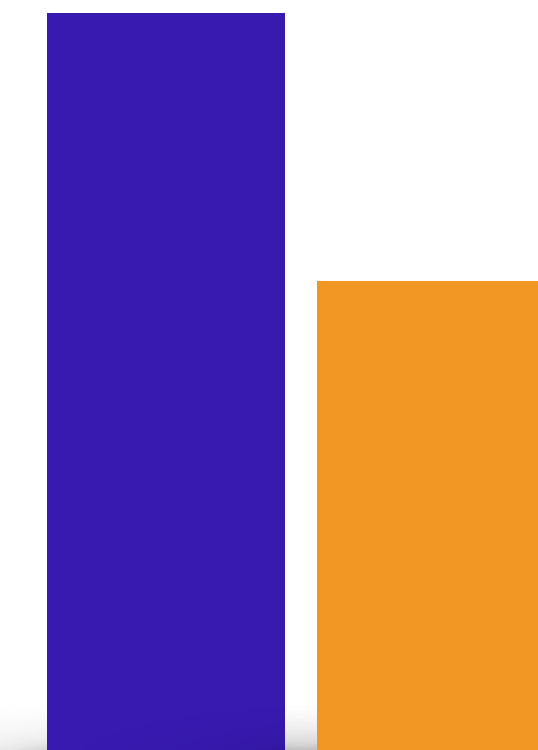
Open Science Collaboration (2015)



39%
Economy
Camerer et al. (2016)



60%
Cancer Research
Nosek & Errington (2017)

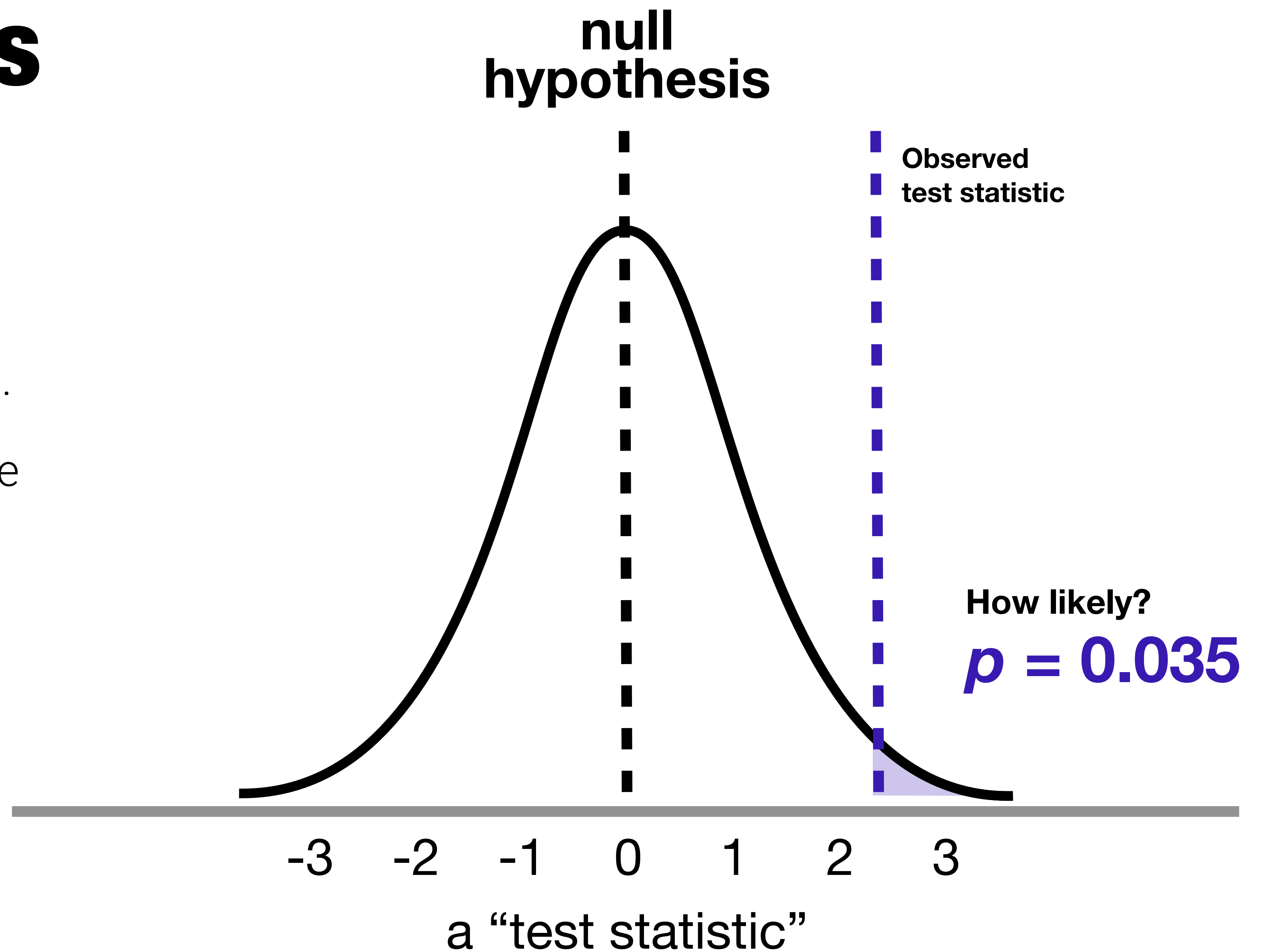


43%
Social Sciences
Camerer et al. (2018)



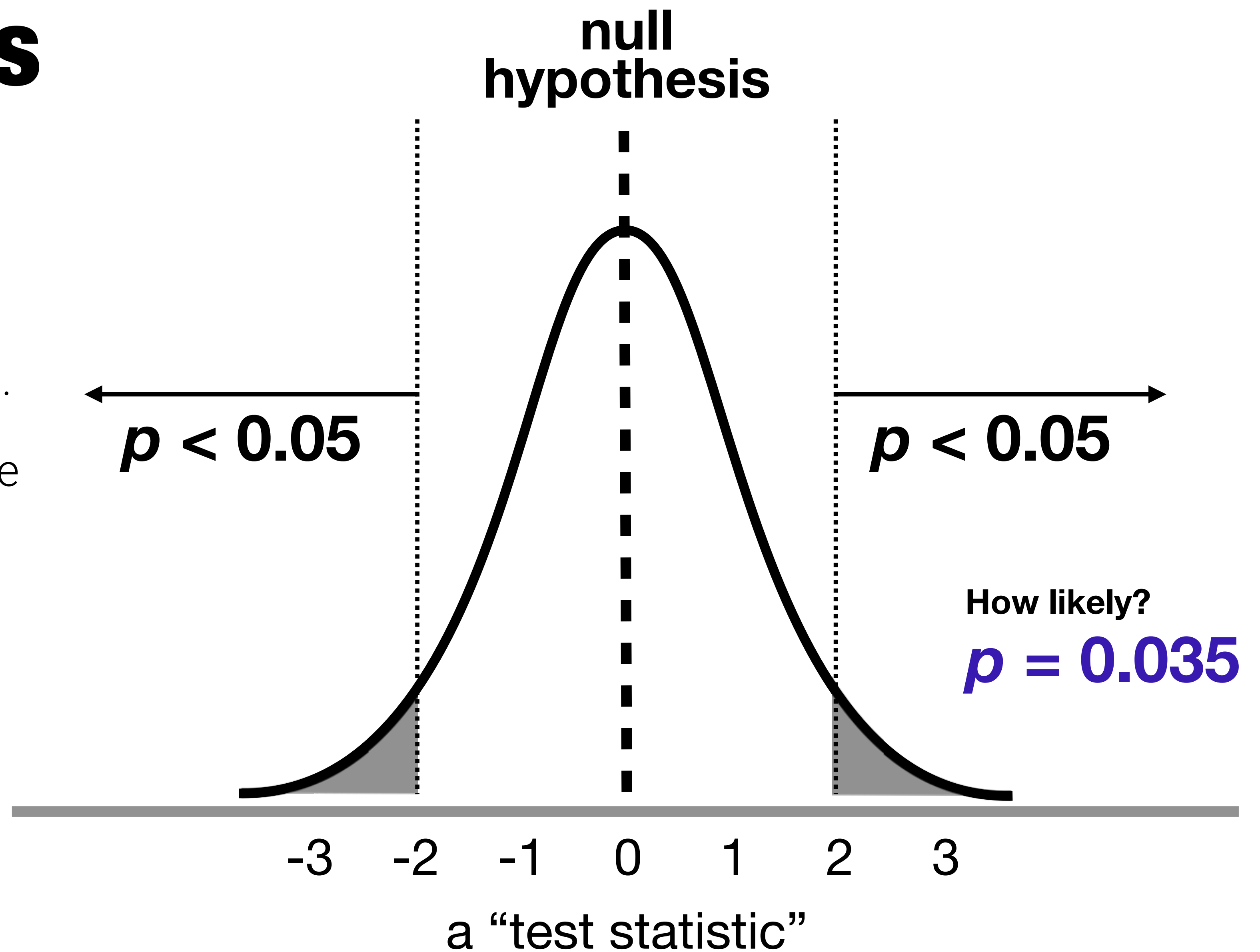
Null hypothesis significance testing

1. Set up a Null-Hypothesis (H_0).
2. Calculate the probability of the results under H_0 (p value).



Null hypothesis significance testing

1. Set up a Null-Hypothesis (H_0).
2. Calculate the probability of the results under H_0 (p value).
3. Reject H_0 when $p < 0.05$, else don't reject.



Null hypothesis significance testing

- ⊗ often does **not** allow **appropriate** use,



```
Warning message:  
In checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv, :  
  Model failed to converge with max|gradl = 0.0139723 (tol = 0.002, component 1)
```


Null hypothesis significance testing

- ⊗ often does **not** allow **appropriate** use,
- ⊗ is **not intuitive**,



89%

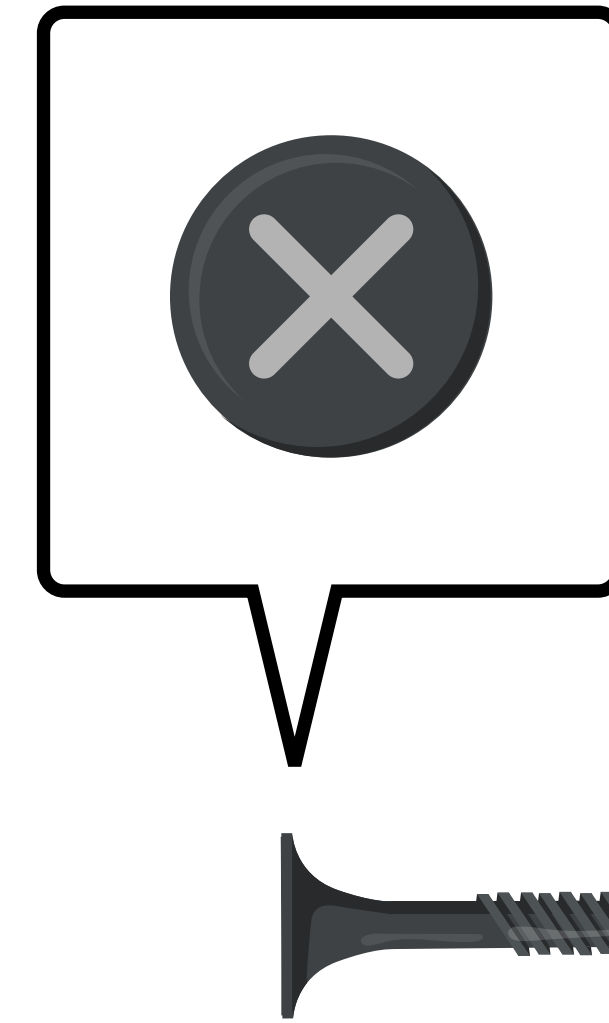
of books that covered
statistical significance
defined or explained it
incorrectly

Cassidy et al. (2019)



Null hypothesis significance testing

- ✘ often does **not** allow **appropriate** use,
- ✘ is **not intuitive**,
- ✘ and **cannot** provide an **answer** to the **questions** we are interested in.



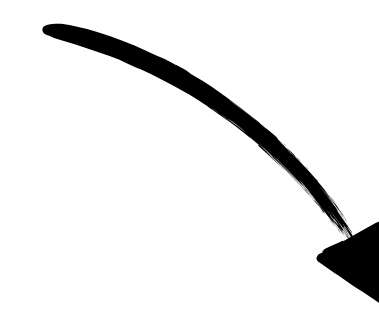


Bayesian Inference

- ⊗ robust inference
- ⊗ intuitive
- ⊗ flexible

Bürkner, P. C. (2017). brms: An R package for Bayesian multilevel models using Stan. *Journal of statistical software*, 80(1), 1-28.

brms



EXPECTATIONS

What we will cover and what we won't cover

EXPECTATIONS

What we will cover



The conceptual framework of Bayesian inference



How to run (generalized) linear models using brms



How to specify priors and interpret results

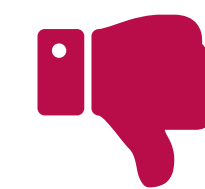


How to draw probabilistic inferences from results

what we won't cover



Introduction to R / data carpentry in R



Introduction to (generalized) linear models

GET THE MOST OUT OF IT



Use the Slack channel



Have your machine
prepared for brms



Relax! All materials
(videos + Rmarkdowns)
will be available

Don't panic!

ROADMAP

DAY 1

1st Bayesian Model

Run your first Bayesian Model

Bayes Theorem

What does it mean to think like a Bayesian?

Priors - Part 1

What are priors?

Priors - Part 2

How do I specify priors?

NHST vs. Bayes

Why are we doing this again?

DAY 2

Review

Day 1 in a nutshell

Inference

How do I answer my research question without a p-value?

More on priors

Why is it a good idea to specify priors?

Mixed Models

Run linear mixed effects models with brms

Sampling

What happens under the hood?

DAY 3

1:1 sessions



1:1 sessions



1:1 sessions

