



Bayesian analysis for
speech scientists

INSTRUCTORS

Joseph Casillas

 @jvcasill

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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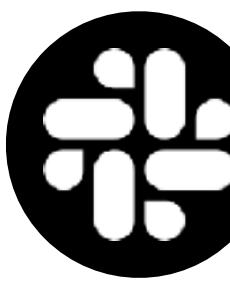
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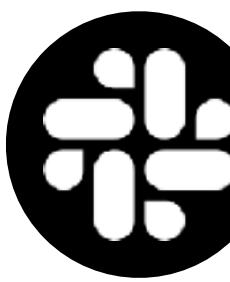
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Zoom chat



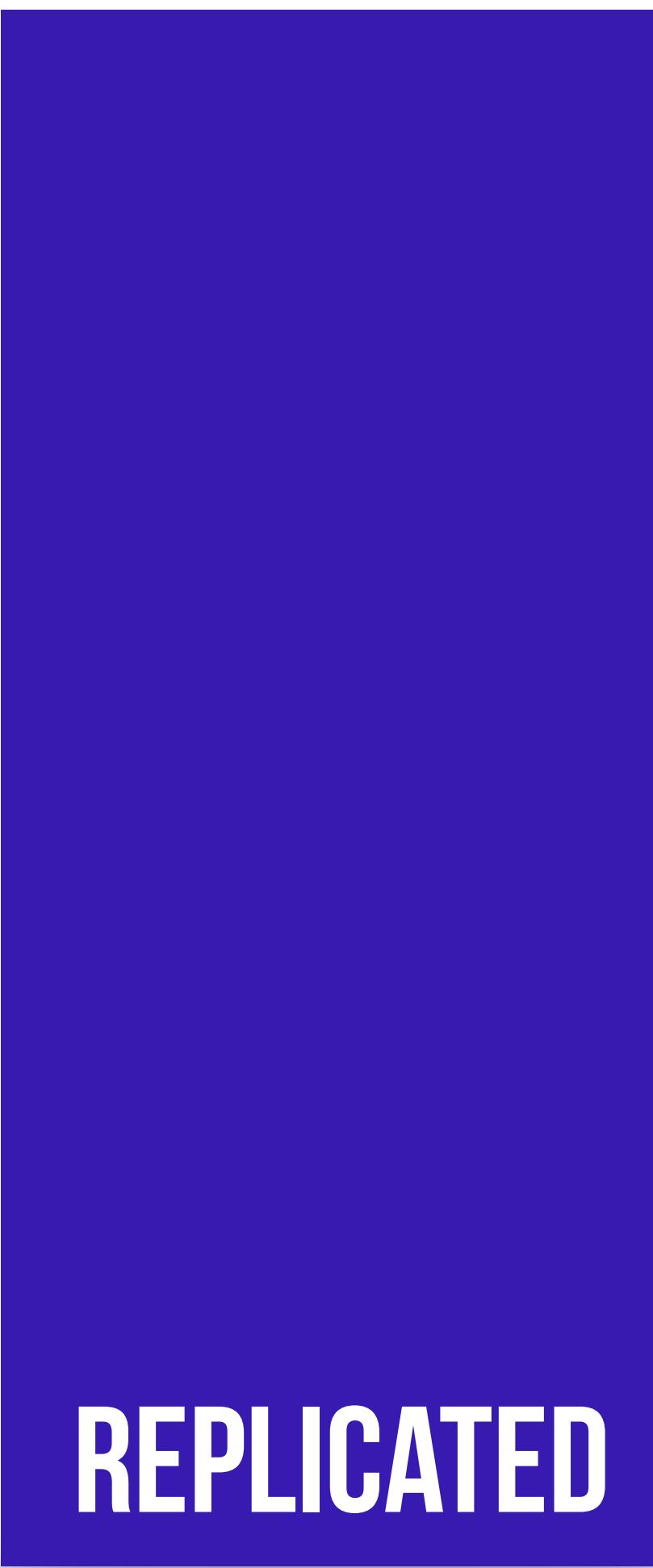
Google Slides



Slack chat

**WHY ARE WE
HERE TODAY?**

100%



0%

CRISIS IN CONFIDENCE

Open Science Collaboration (2015)

47%



REPLICATED

53%



NOT
REPLICATED

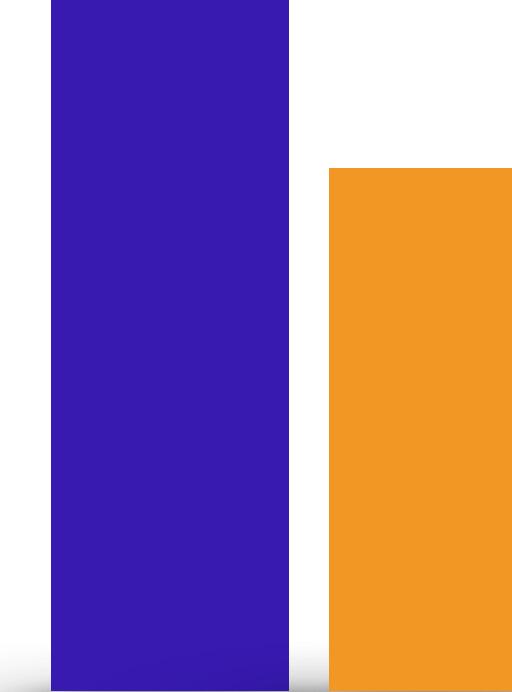
CRISIS IN CONFIDENCE

Open Science Collaboration (2015)

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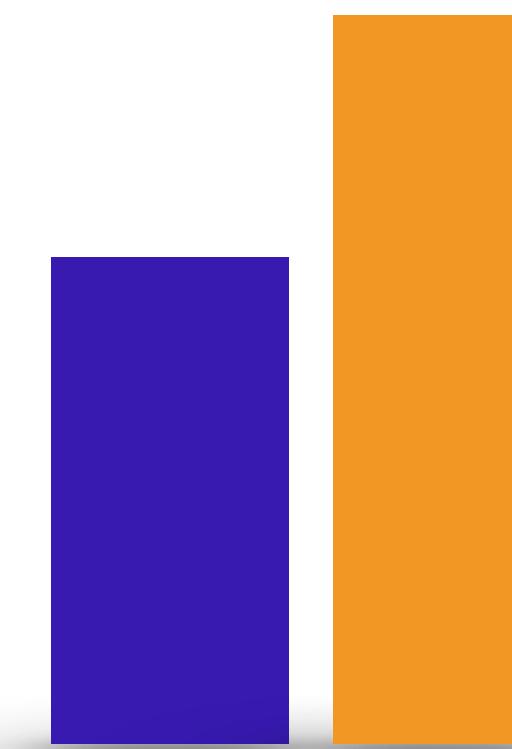
53%



39%

Economy

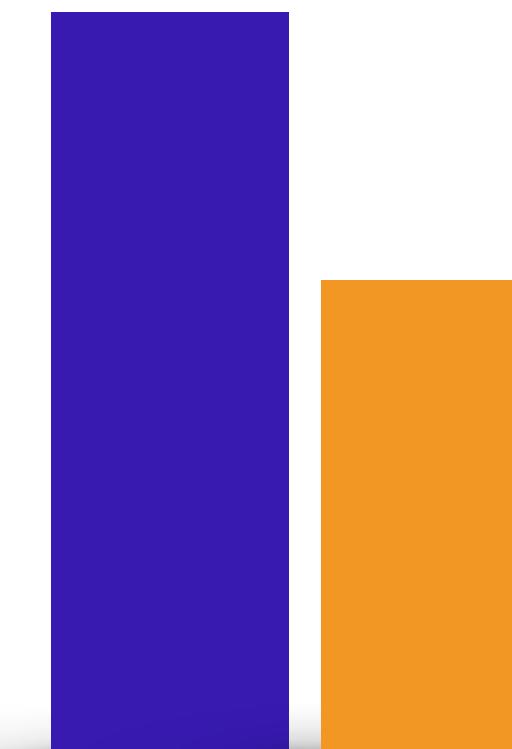
Camerer et al. (2016)



60%

Cancer Research

Nosek & Errington (2017)



43%

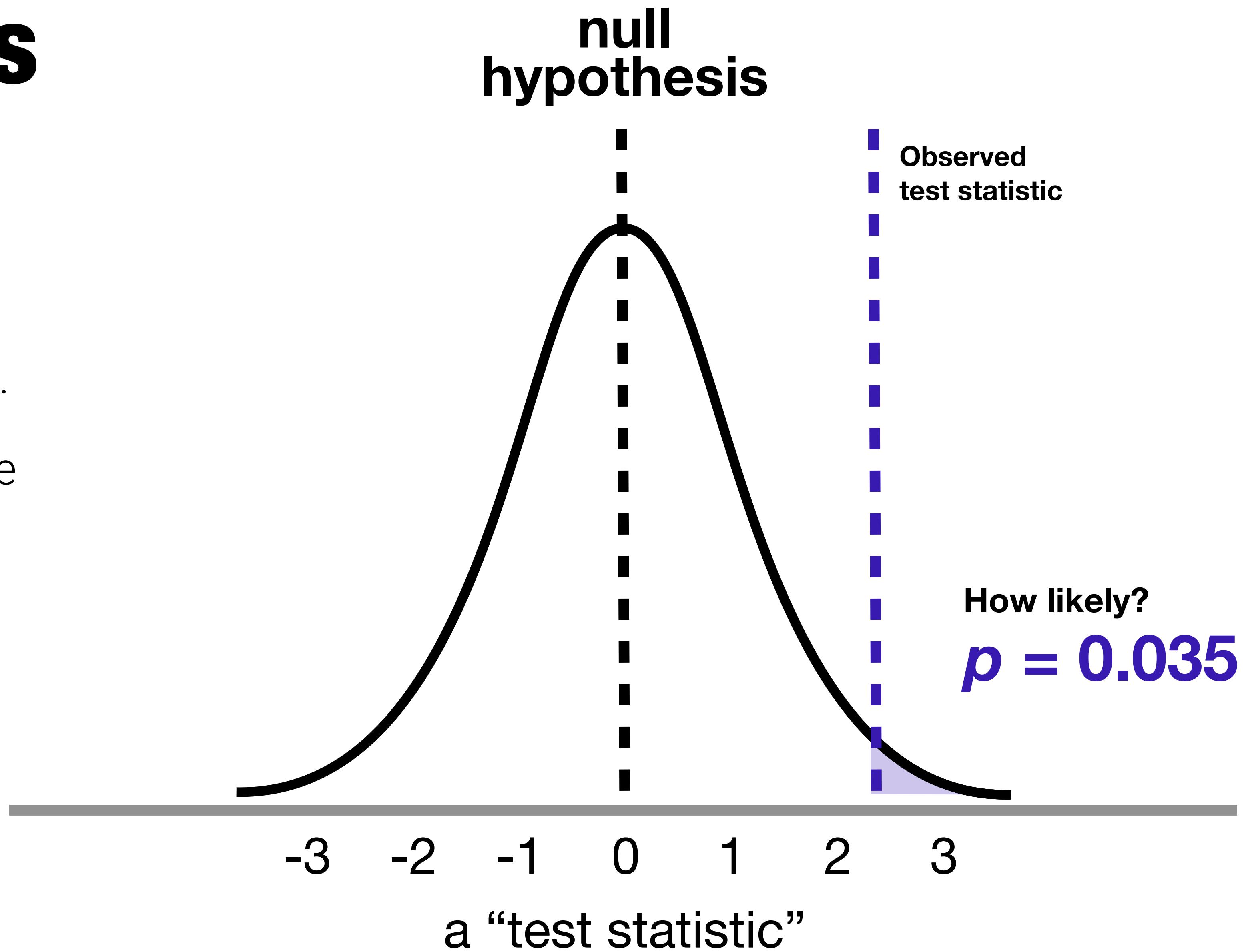
Social Sciences

Camerer et al. (2018)



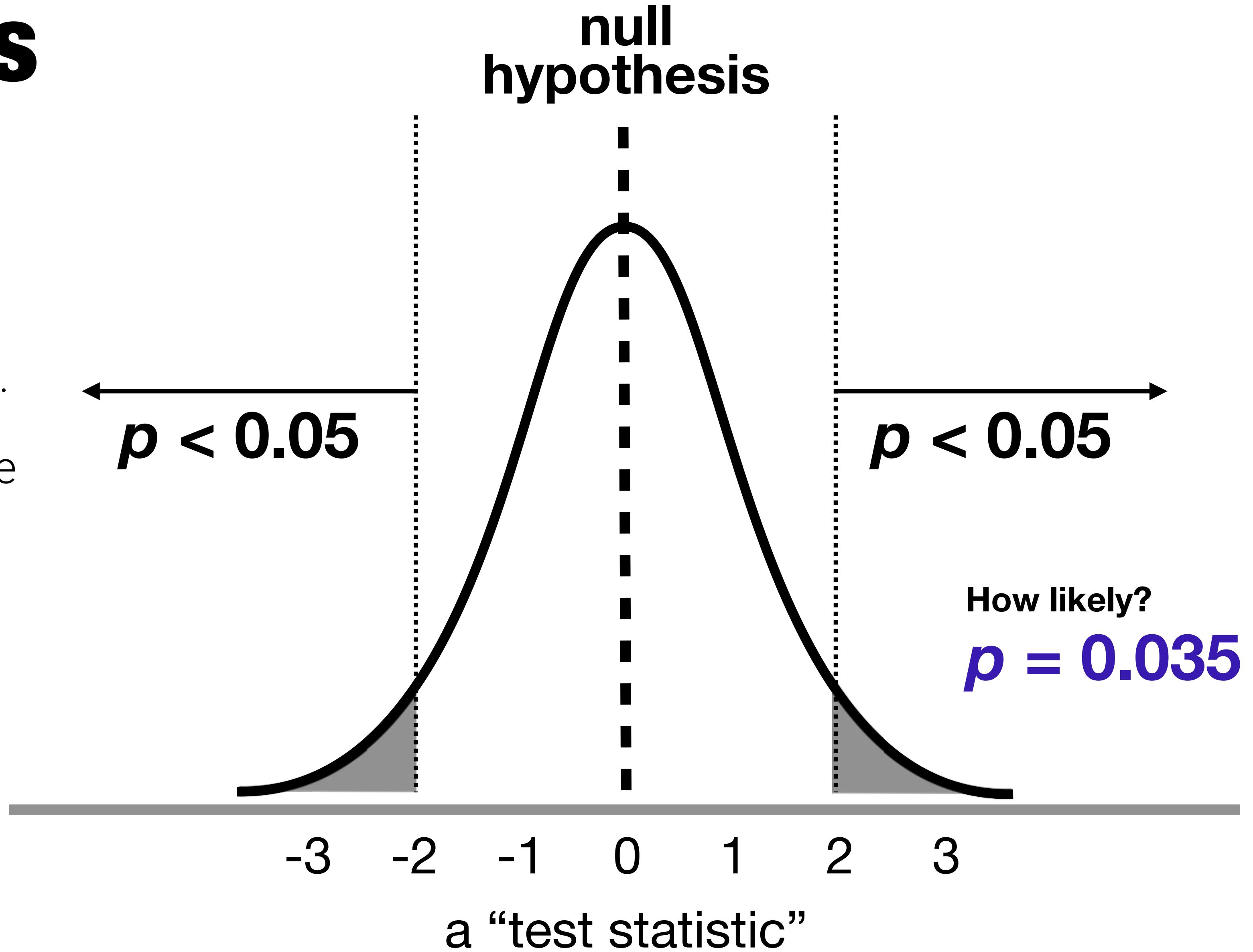
Null hypothesis significance testing

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|grad| = 0.0139723 (tol = 0.002, component 1)
```

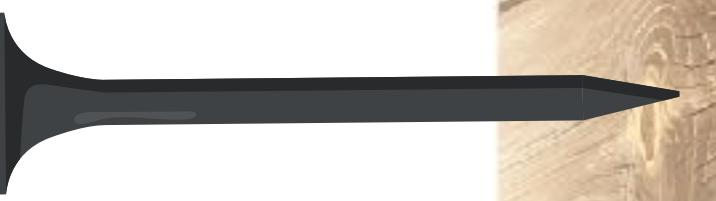
Null hypothesis significance testing

- ✖ 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

- ➊ robust inference
- ➋ intuitive
- ➌ 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

