



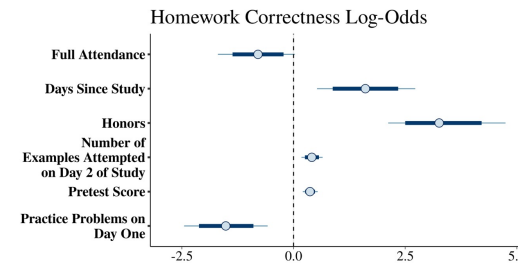
# Using video examples to improve students' understanding of hypothesis test selection

Abra Brisbin and Andrew Senapatiratne  
University of Wisconsin-Eau Claire  
*brisbia@uwec.edu*

## Background

- Reading worked examples improves learning
- But getting students to read is challenging

## Results



Video examples first  
→ Better long-term scores and persistence

## Methods

- 2 sections of introductory statistics
- Each section randomly divided into 2 groups

Group	Day 1	Day 2
A	Practice problems	Video examples
B	Video examples	Practice problems

- Difficulty ratings, short-term performance, long-term performance

## Conclusion

- Video examples on Day 1 are associated with better long-term performance
- Like written worked examples



# Using video examples to improve students' understanding of hypothesis test selection

Abra Brisbin and Andrew Senapatiratne  
University of Wisconsin-Eau Claire  
[brisbia@uwec.edu](mailto:brisbia@uwec.edu)

- Video Example Playlist: <https://bit.ly/3w97TXN>
- Explore the data: <https://bit.ly/3z92aTM>

Reading  
worked  
examples  
improves  
learning

- Slows process of forgetting
  - van Gog 2012, Brisbin 2019
- Most beneficial for “novice learners”
  - Kalyuga 2001
- Reduced cognitive load compared to practice problems
  - Atkinson 2000



# But getting students to read is challenging

- Even when they acknowledge its benefits
  - Magalhães 2014
- What about video examples?
  - Might hold current students' attention better
  - Reduced cognitive load for dyslexic students



# Study Design

- 2 sections of introductory statistics
  - Fall 2019
- I gave a 15-minute lecture on hypothesis test selection
  - 1- and 2-sample t-tests
  - 1- and 2-sample Z-tests of proportions
  - None of the above
- Each section randomly divided into 2 groups

Group	Day 1	Day 2
A	Practice problems	Video examples
B	Video examples	Practice problems



## Data collected

- Difficulty ratings (1-5)
  - Cognitive load
- Pretest, mid-test (Day 1), posttest (Day 2)
  - Short-term performance
- Score and number of attempts on homework problems involving hypothesis test selection
  - Long-term performance
  - WeBWork: Unlimited attempts

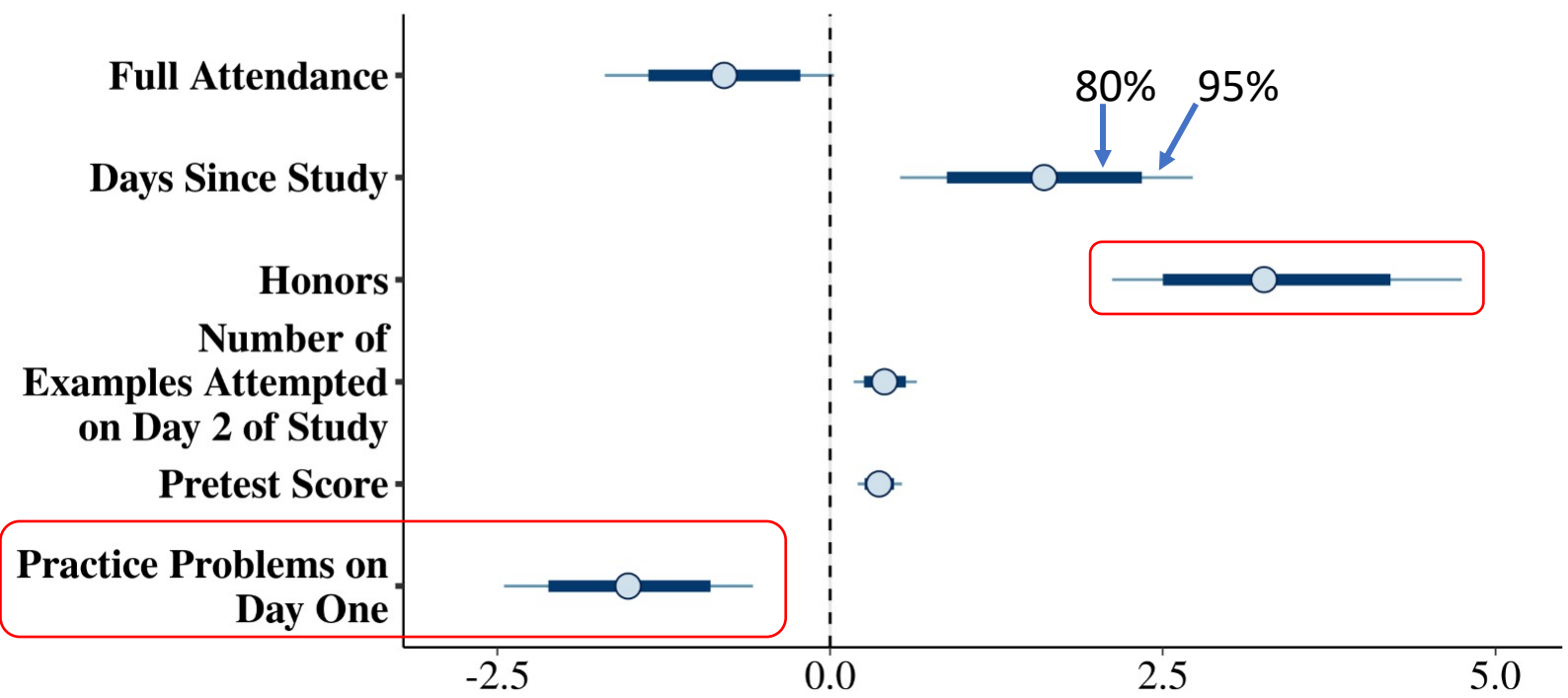


- *rstan* R package
- Treats effect of “practice problems on day 1” as a random quantity
- Simulate values that are consistent with the data
- Is 0 a likely value?

## Bayesian analysis



## Homework Correctness Log-Odds



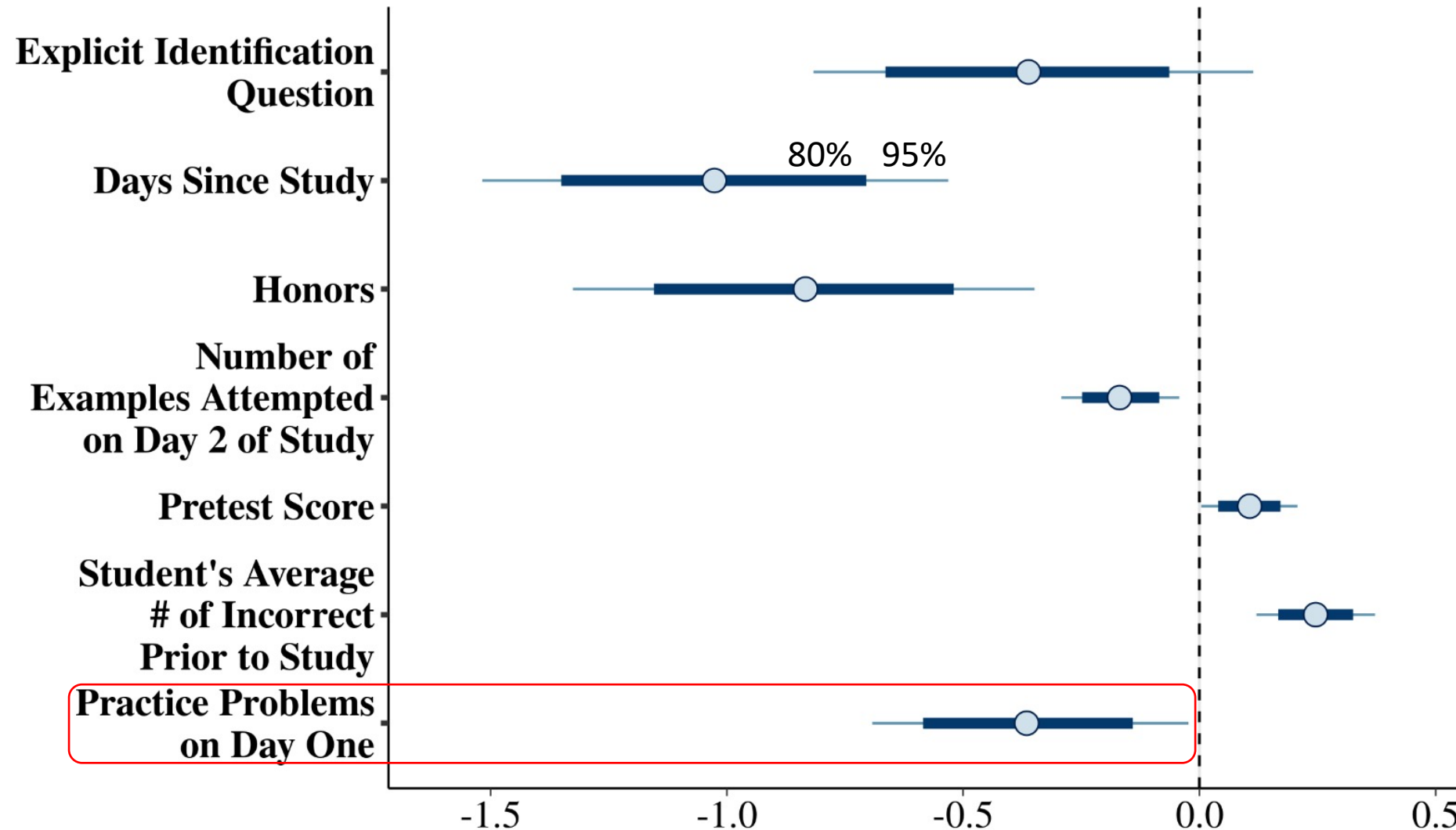
Video examples first → Better long-term scores



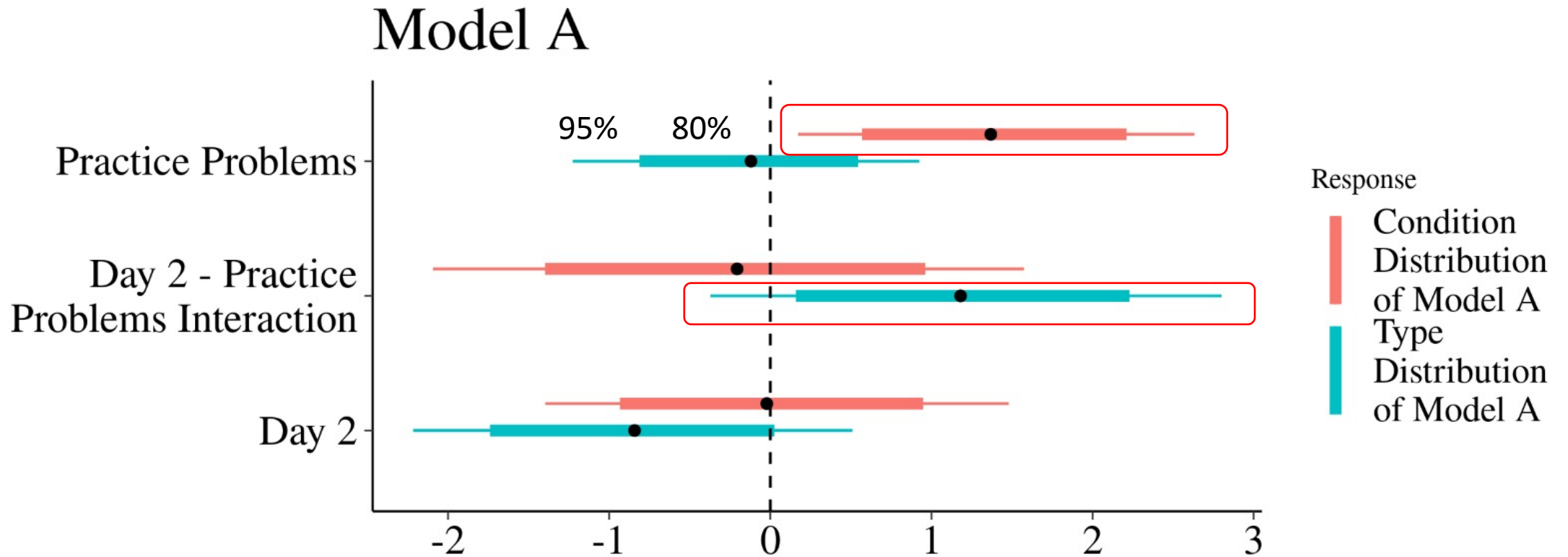


# Practice problems first → More likely to give up on homework

## Incorrect Attempts Distribution

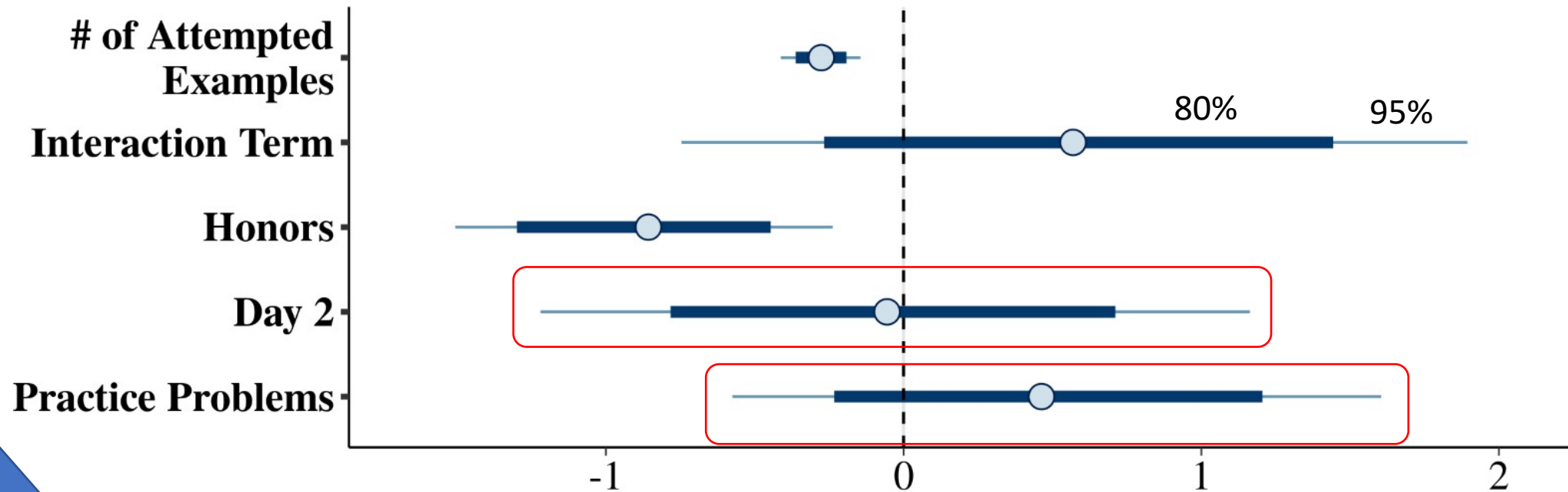


# Practice problems first → Better short-term performance



Moderate association between “practice problems first” and rating problems as hard (4 or 5)

### Multi-Level Hard-Rating Model



- Video examples on Day 1 are associated with better long-term performance
  - Like written worked examples
- Possible explanations:
  - Lower cognitive load
  - Better prepared for far transfer
- Better persistence on homework
  - Primed to focus on process, rather than correct answer?

Conclusion



## Acknowledgements

- Atkinson, R. K., Derry, S. J., Renkl, A., and Wortham, D. (2000), “Learning from Examples: Instructional Principles from the Worked Examples Research,” *Review of Educational Research*, 70, 181-214.
- Brisbin, A. and Maranhao do Nascimento, E. (2019), “Reading versus Doing: Methods of Teaching Problem-Solving in Introductory Statistics,” *Journal of Statistics Education*, DOI:10.1080/10691898.2019.1637801.
- Kalyuga, S., Chandler, P., Tuovinen, J., and Sweller, J. (2001), “When Problem Solving is Superior to Studying Worked Examples,” *Journal of Educational Psychology*, 93, 579-588.
- Nascimento Magalhães, M.A., Camargo Magalhães, M.C. (2014), “A Critical Understanding and Transformation of an Introductory Statistics Course,” *Statistics Education Research Journal*, 13(2).
- van Gog, T., and Kester, L. (2012), “A Test of the Testing Effect: Acquiring Problem-Solving Skills from Worked Examples,” *Cognitive Science*, 36, 1532-1541.
- This work was supported by the UWEC Office of Research and Sponsored Programs.

