

# Breaking the IOED: Effects of Generating Explanations on Metacognitive Monitoring and Control

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## Background

- **Illusion of explanatory depth:** belief that one understands complex phenomena with greater depth than one does (Rozenblit & Keil, 2002).
- Generating an explanation may benefit learning of complex materials through metacognitive means.
- How does generating an explanation affect both the accuracy of metacognitive monitoring and how learners choose to control further study?

## Method

10 common devices + expert explanations

### Ratings of Understanding

*Rate how well you understand how these devices work from 0 (I have no idea how this works) to 100 (I know exactly how this works).*

**Exp 1** (N = 148): sliders

**Exp 2** (N = 189): numeric input

Rating 1

Generate explanations

OR

Read expert explanations

Rating 2

Study plan:  
order of study &  
allocation of 20 min

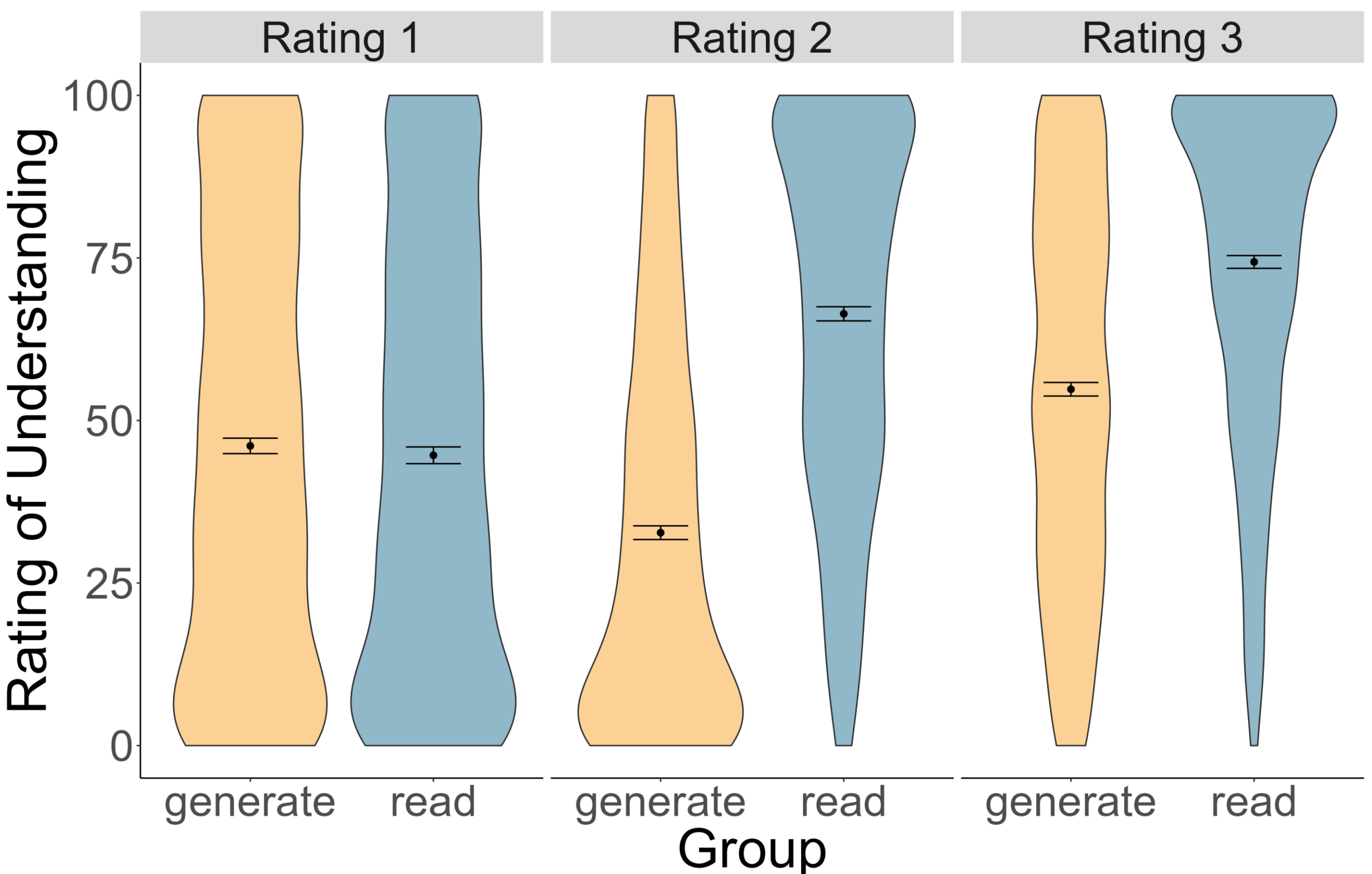
Study: 2 min per device in  
random order

Rating 3

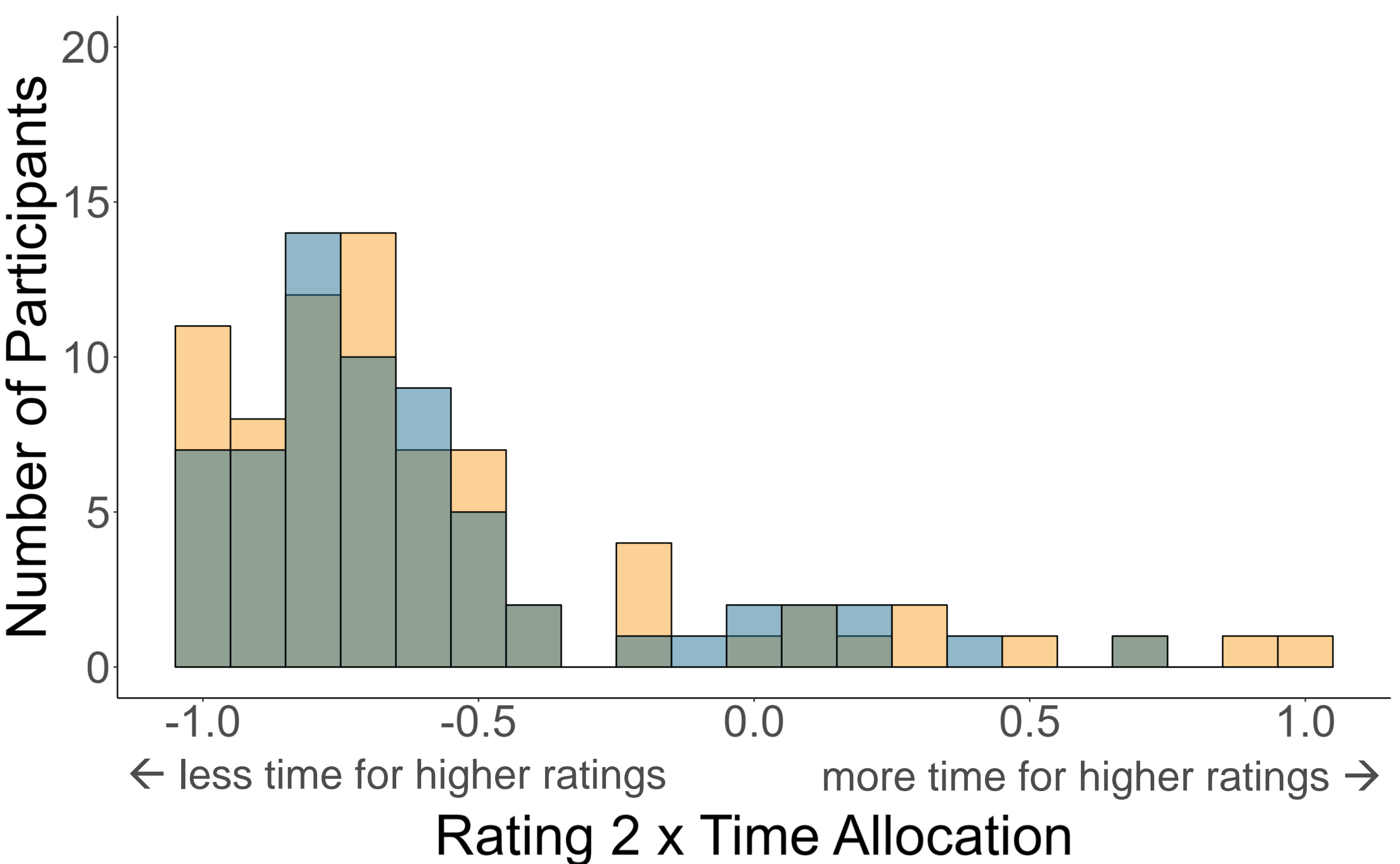
Final short-answer test

## Experiment 1 Results

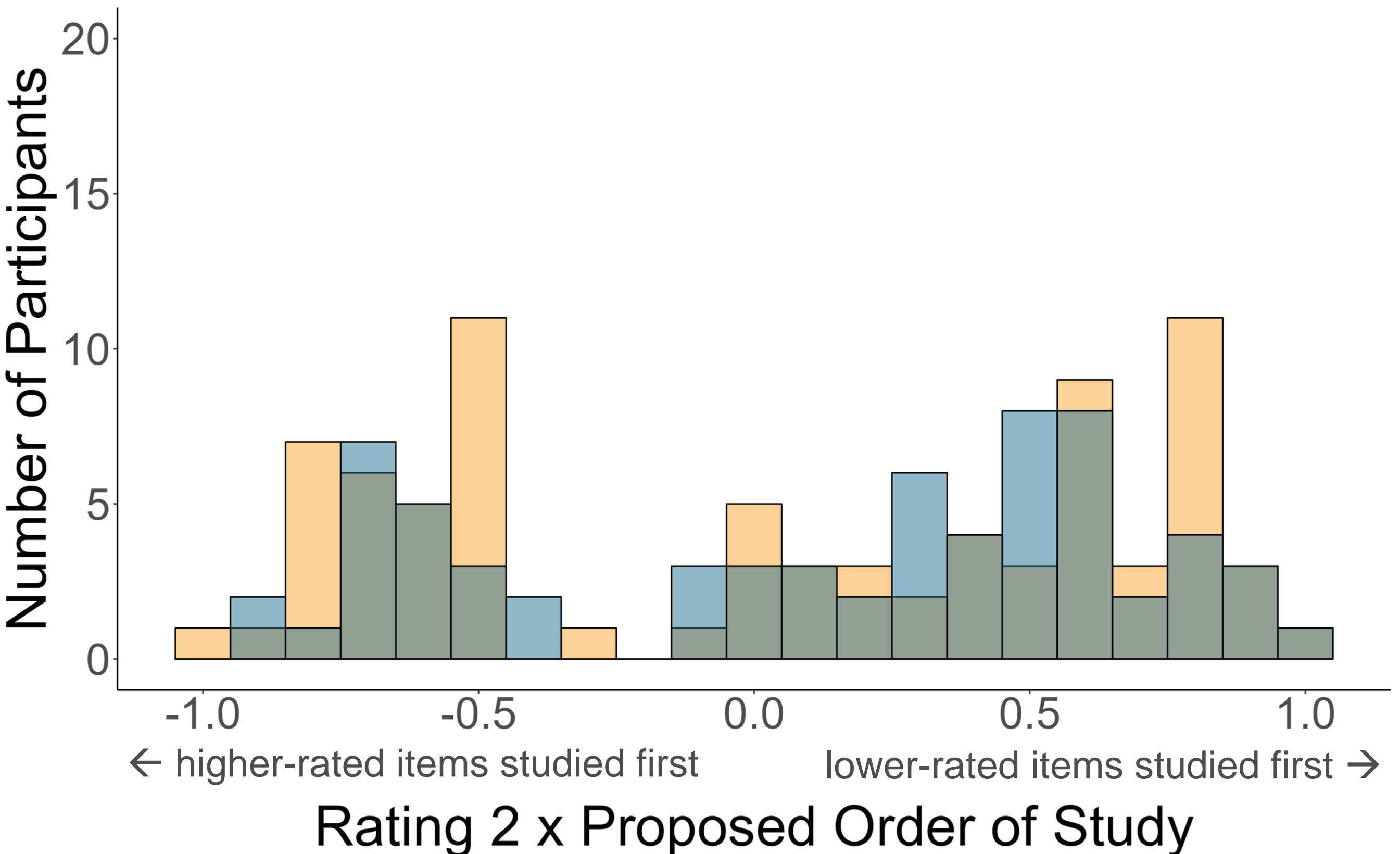
Average Ratings of Understanding



Rating 2 Correlated with Study Time Allocation

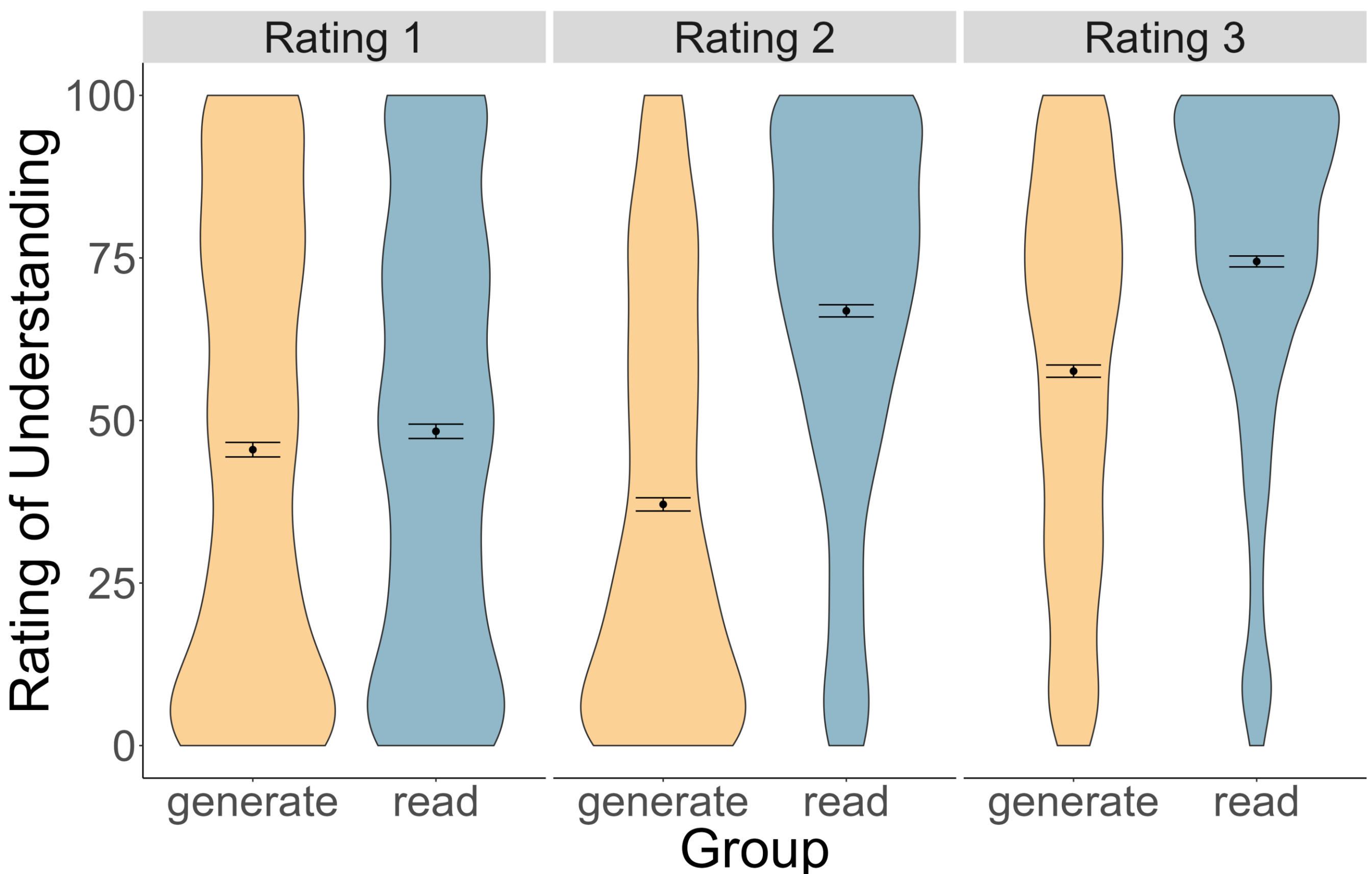


Rating 2 Correlated with Proposed Study Order

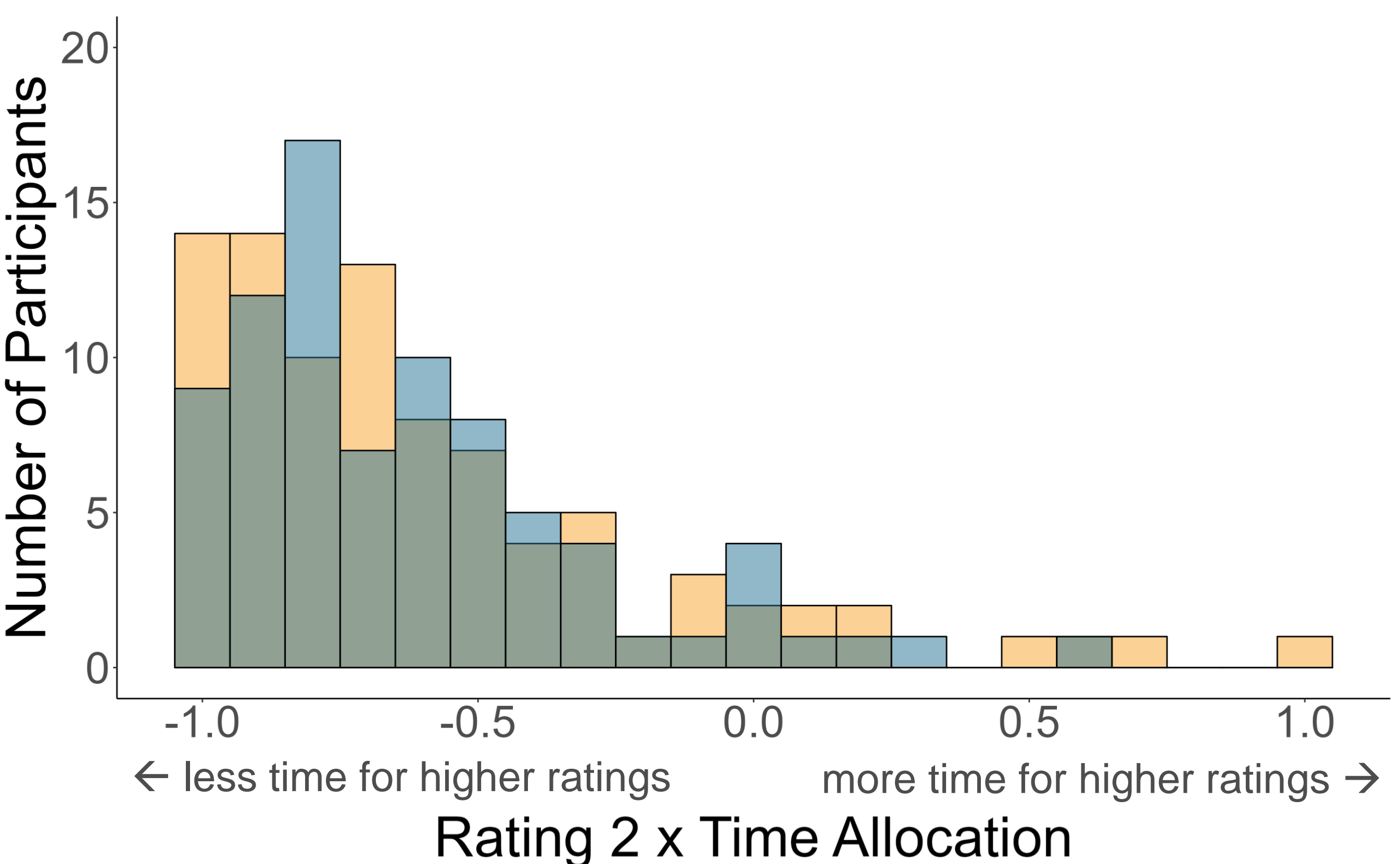


## Experiment 2 Results

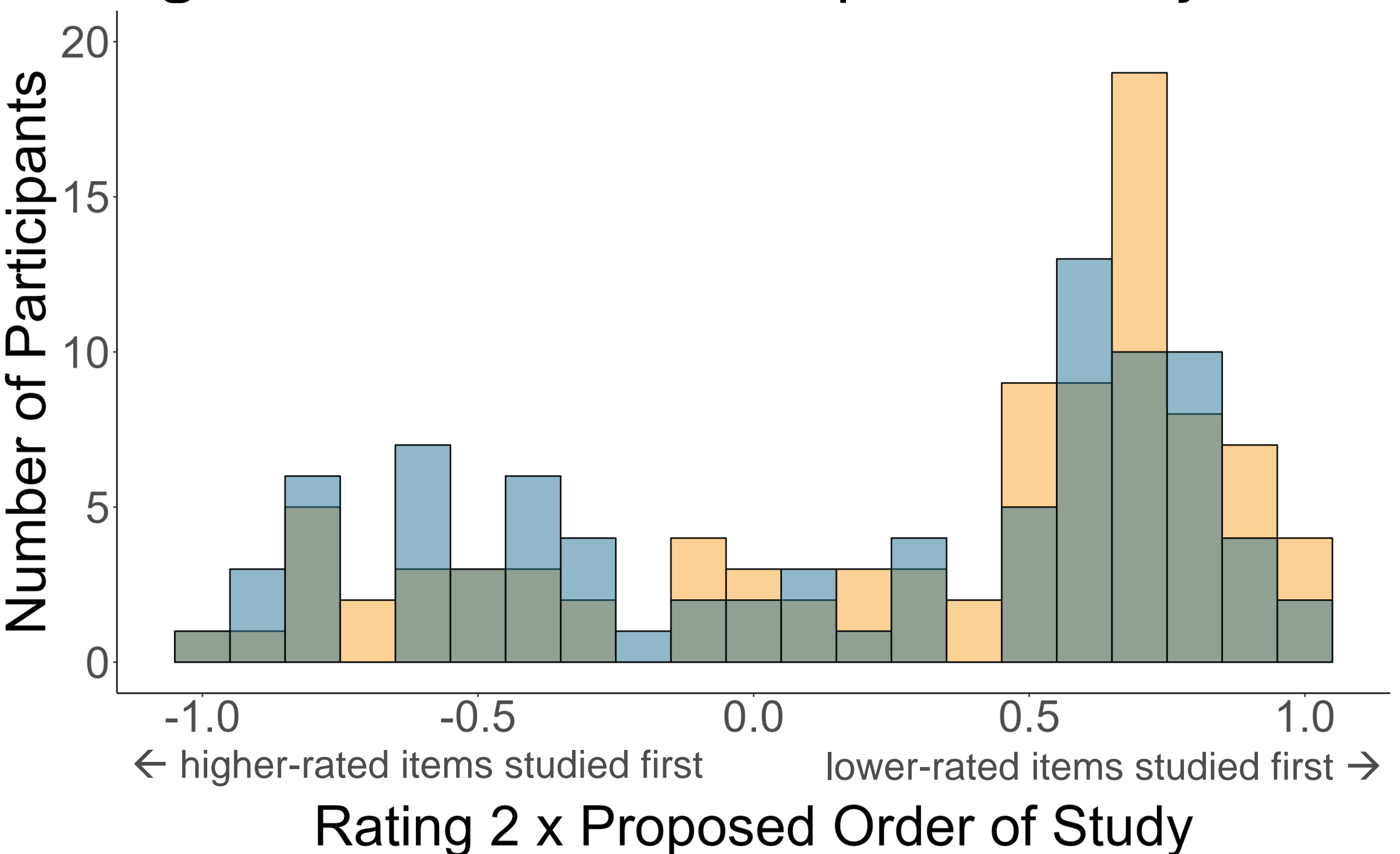
Average Ratings of Understanding



Rating 2 Correlated with Study Time Allocation

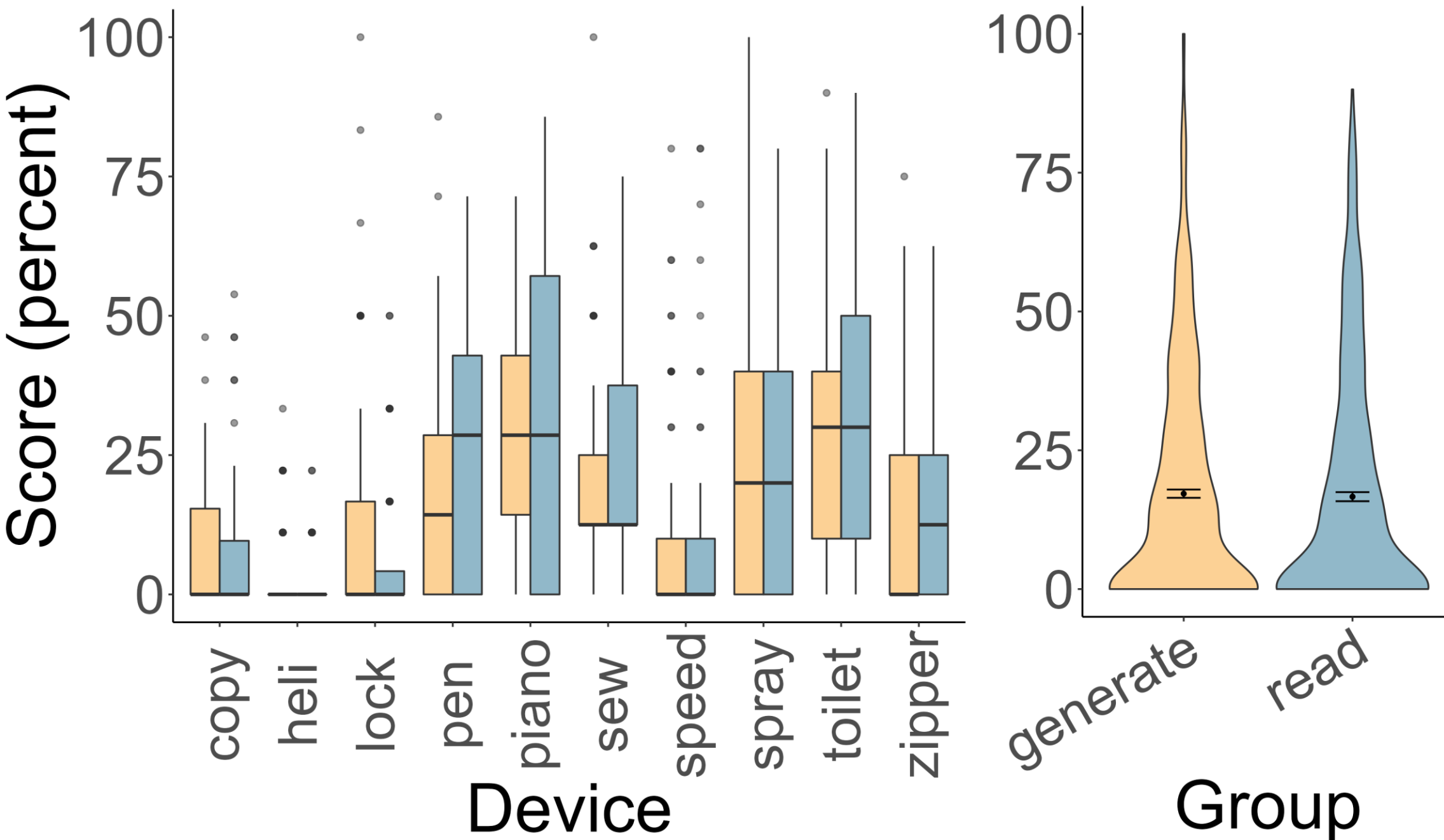


Rating 2 Correlated with Proposed Study Order

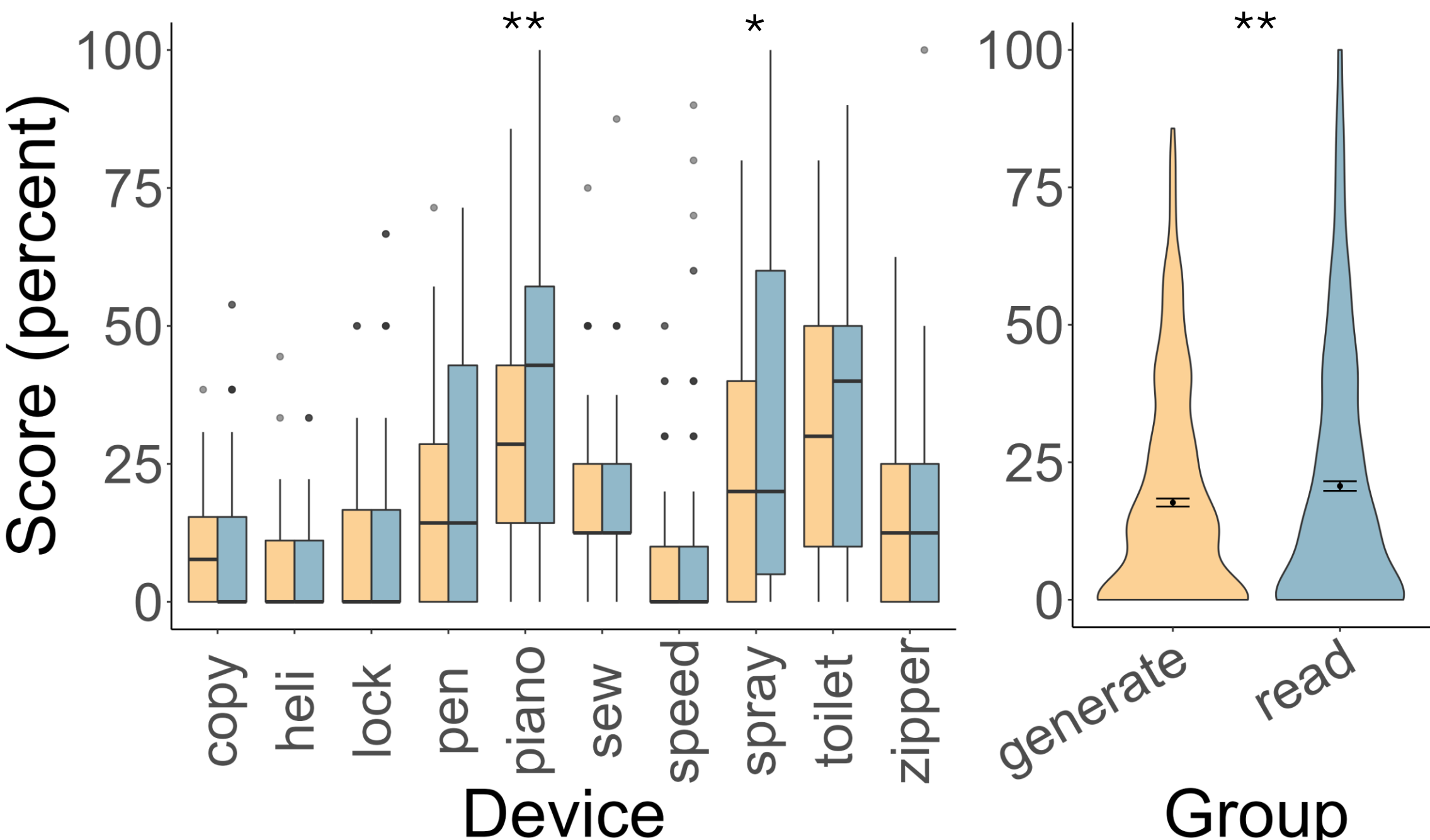


## Final Test Results

Experiment 1



Experiment 2



## Conclusions

- Generating led to a significant drop in ratings of understanding (compared to Rating 1 and to reading). All ratings rose after study, but the Read group's remained higher.
- Participants generally allocated more time to devices they understood less.
- Two broad strategies emerged: studying highly rated (well-understood) devices early or late.
- Final test scores did not differ in Exp 1, but the Read group performed better in Exp 2 – an effect that seems to be driven by select devices (piano, spray bottle).

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