

Evaluating the effects of game elements on learning: a shift in priorities?



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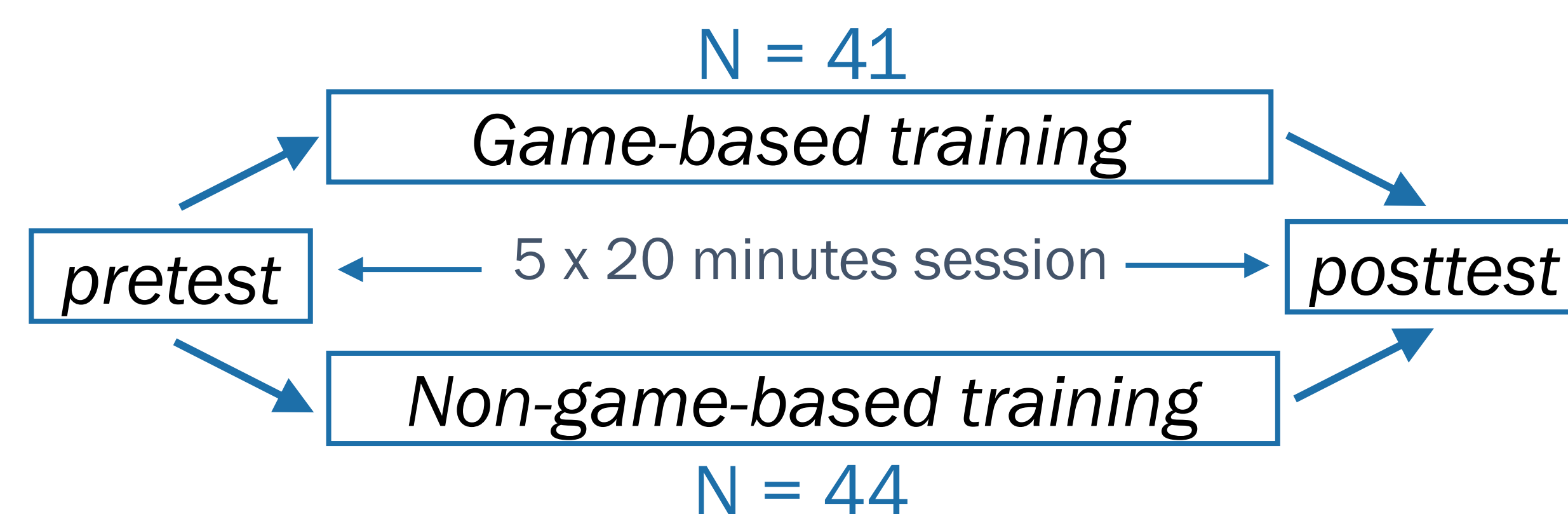
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Introduction

- The use of game elements in learning materials is debated controversially:
 - game elements increase motivation and engagement [1,2]
 - game elements distract learners and decrease performance and learning outcomes [3,4]
- Current research objectives:
 - Learning effects (Pre vs Post)
 - Performance in training (Speed & Accuracy)

Methods



Participants: 85 adult students randomly assigned

Training task: Fraction Number Line estimation (NLE)

Pre/posttest: paper pencil NLE with 96 fractions

DVs: Percentage absolute estimation error (PAE) & Duration

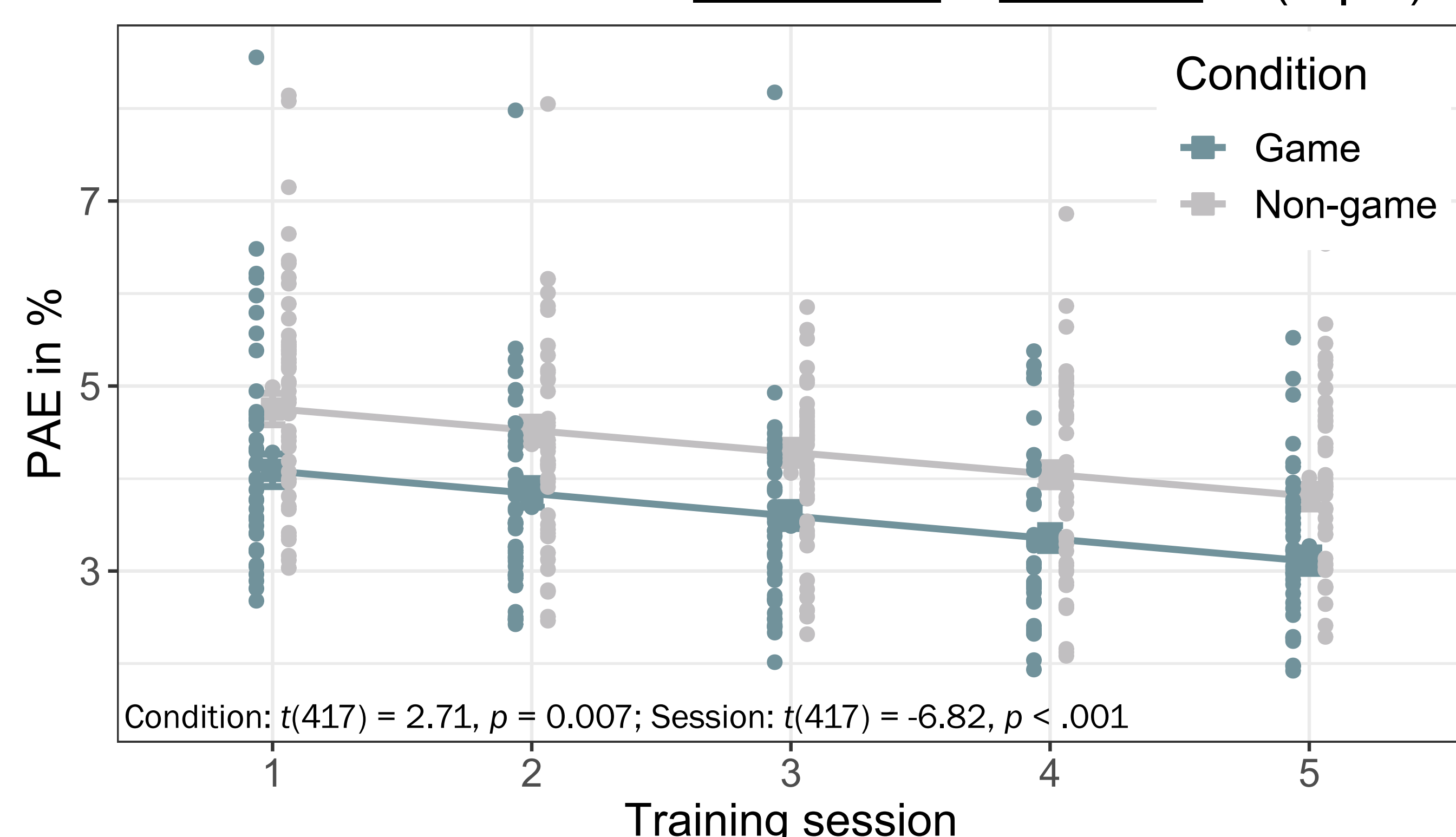
Results

no sign. differences at pretest $t(74.84) = -1.15, p = 0.255$

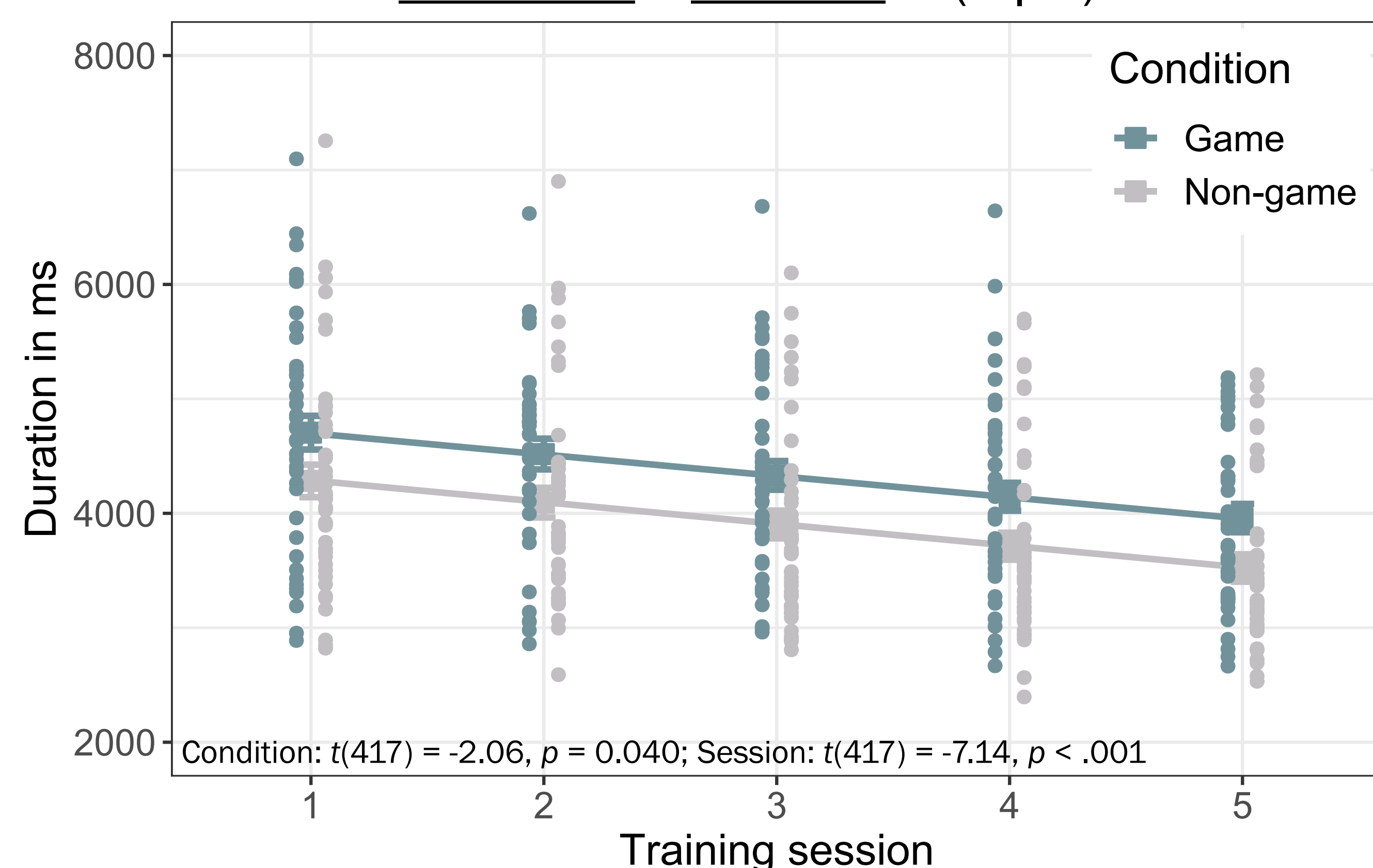
Learning: LMM $PAE \sim \text{condition} \times \text{prepost} + (1 | \text{id})$

Only prepost diff sign. $t(164) = -2.81, p = 0.005$

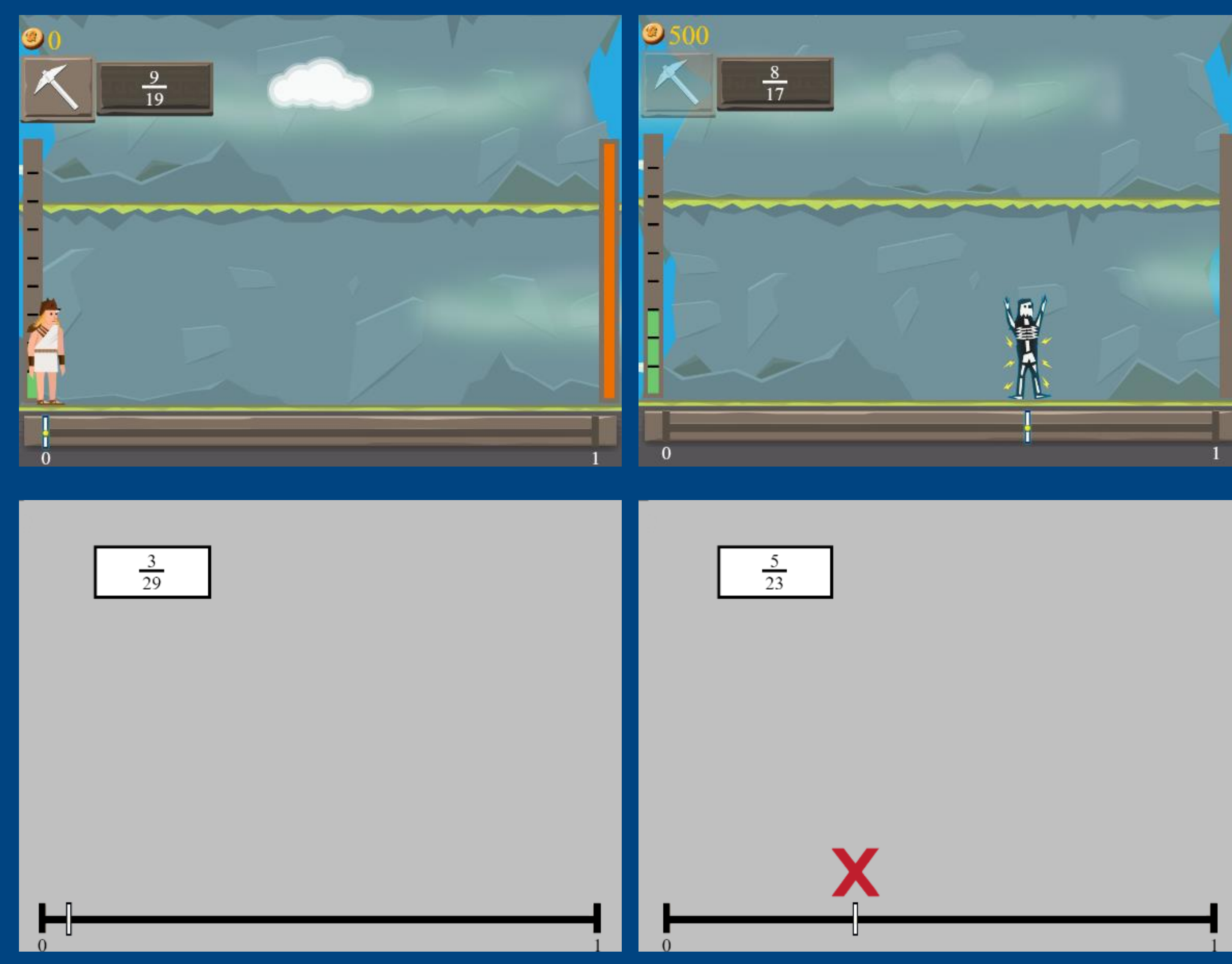
Performance: LMM: $PAE \sim \text{condition} \times \text{session} + (1 | \text{id})$



LMM: $\text{Duration} \sim \text{condition} \times \text{session} + (1 | \text{id})$



Game vs No-Game Condition



Conclusion

- Game-based and non-game-based training improved fraction magnitude understanding in adults
- Learning outcomes comparable between groups
- Performance in task differed between groups:
 - Game-based → more accurate but slower
 - Non-game-based → less accurate but faster
- Higher cognitive engagement with game elements
- Different priorities and/or strategies?
- Feedback more valued in game-based version?

