



Evaluating the Benefits of Equivalence-Based Instruction: Efficiency and Transfer of Function

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Introduction

In Equivalence-Based Instruction (EBI), strategically selecting and teaching a small number of relations between stimuli can generate a number of additional relations that have never been directly taught. Because of this, EBI is often said to be an efficient form of instruction.

Three previous studies have compared the efficiency of a particular EBI arrangement to complete instruction control conditions in which all possible relations are taught (Fienup & Critchfield, 2011; Petursdottir & Oliveira, accepted pending revisions; Zinn et al., 2015) with results mostly in favor of EBI.

The purpose of the present study was to add to this literature by

- Comparing the efficiency of two different EBI training structures, Linear-Series (LS) and One-to-many (OTM) to Complete Instruction (CI)
- Explore other potential benefits of EBI with the inclusion of a function transfer test. If EBI is less likely to produce rote learning than CI, greater transfer of function might be expected.

Method

Participants

Sixty undergraduate students (73% female; mean age 19.48 years; range: 18 – 22 years) were recruited from a psychology department's subjects pool.

Participants were assigned to either OTM, LS or CI groups.

Apparatus and Stimuli

HP EliteBook 840 laptop computer, software package SuperLab® 5, two pedals and a colored keyboard.

Figure 1. Apparatus used on the Experiment

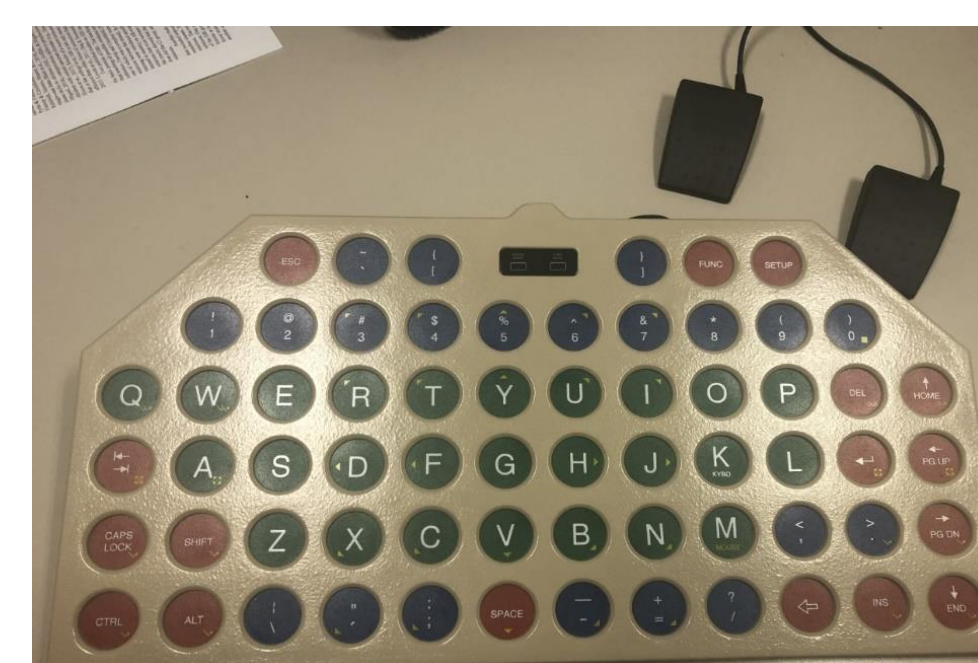
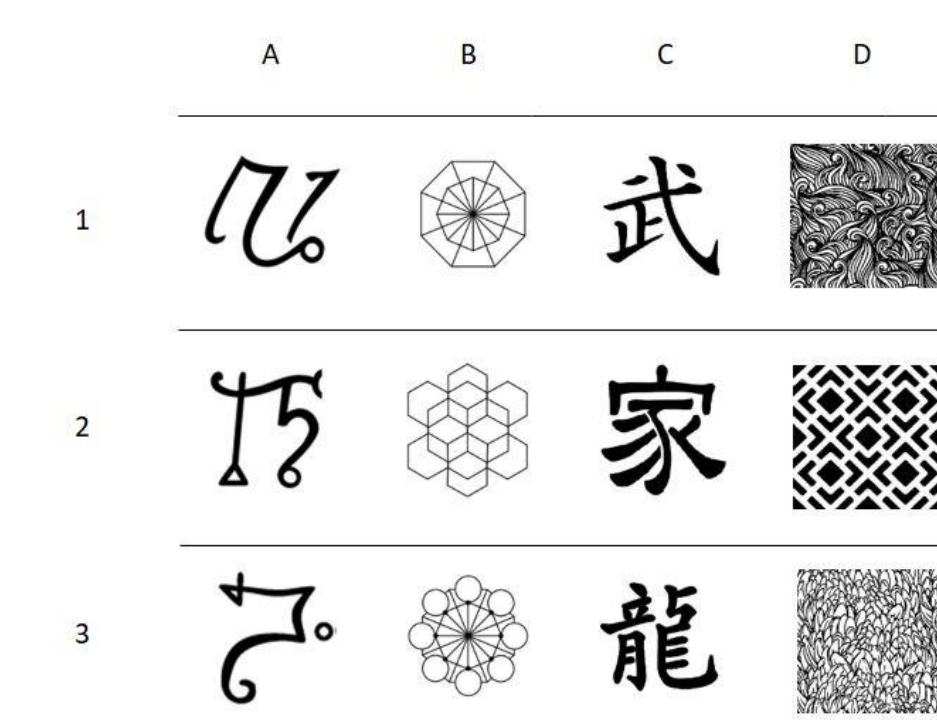


Figure 2. Visual stimuli used on the Experiment



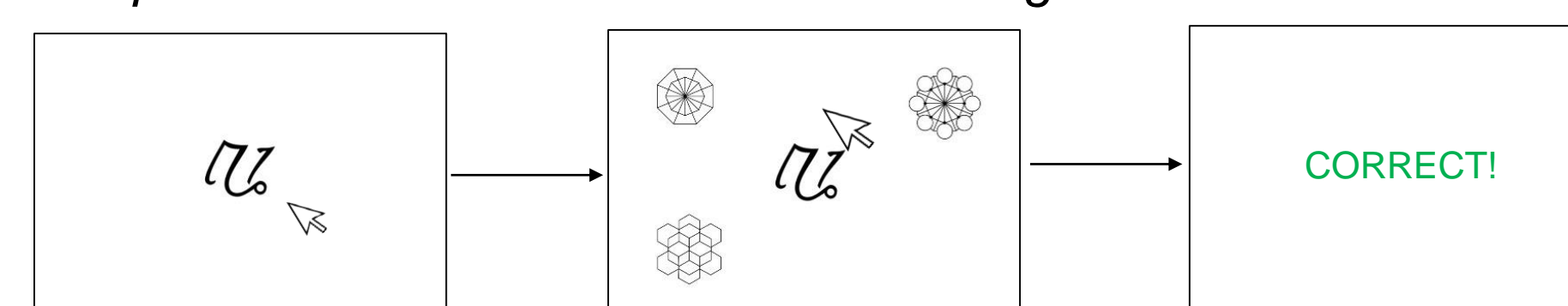
Data Collection and Dependent Variables

The software recorded data on correct and incorrect responses, reaction times, and number of trials conducted throughout the experiment. Dependent measures included (a) trials to criterion, (b) percent correct in the ABCD test, and (c) percent correct in the transfer of function test.

Procedure

- ABCD Training: 36-trial blocks for EBI groups; 36 trial types for CI. The training continued until the participant achieved correct responding of 32 correct trials out of the 36 trials in a block.

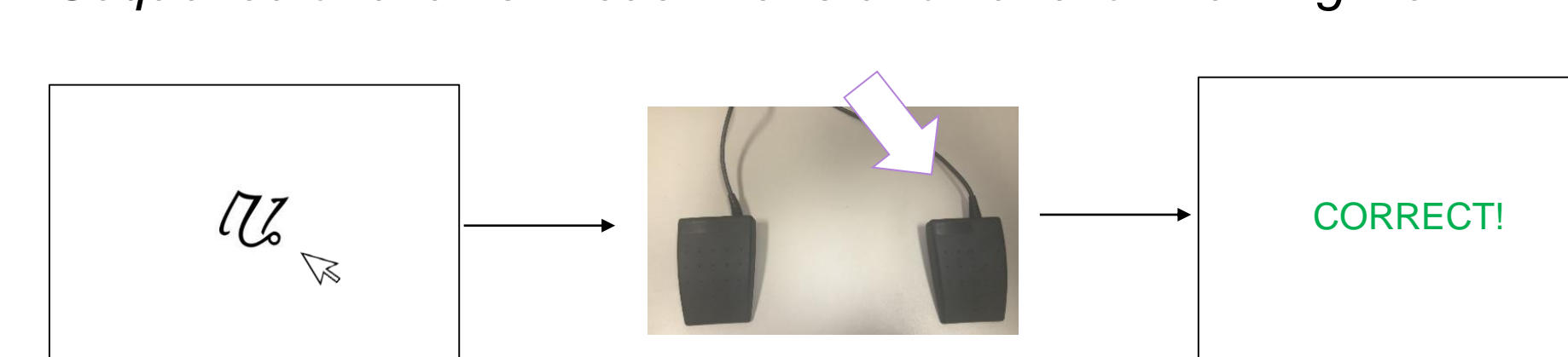
Figure 3. Sequence of events in each ABCD training trial



- ABCD Test: 36-trial blocks (total 72 trials) without feedback, and identical for the three groups.

- Transfer of Function training: Establish stimuli A1, A2, and A3 as discriminative stimuli for distinct responses
 - A1: right pedal
 - A2: left pedal
 - A3: X on the colored keyboard

Figure 4. Sequence of events in each transfer of function training trial



- Transfer of Function Test: 3 trials for each of the 12 stimuli (total 36 trials) were presented within blocks of 12 trials. Each stimulus was shown and the participant executed a motor response.

Results and Discussion

Figure 5. Trials to mastery criterion during ABCD training

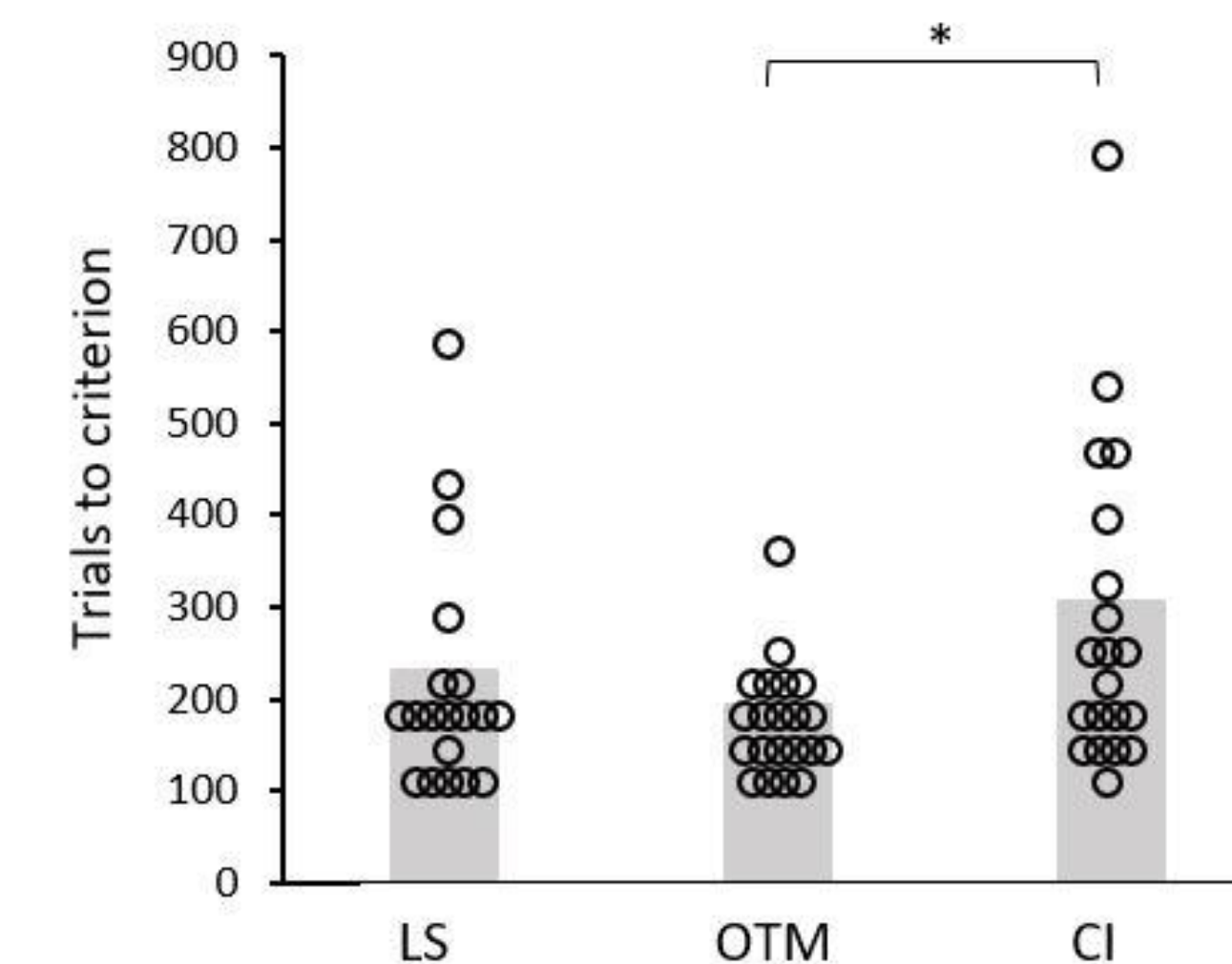


Figure 6. Accuracy on ABCD test for LS, OTM and CI groups.

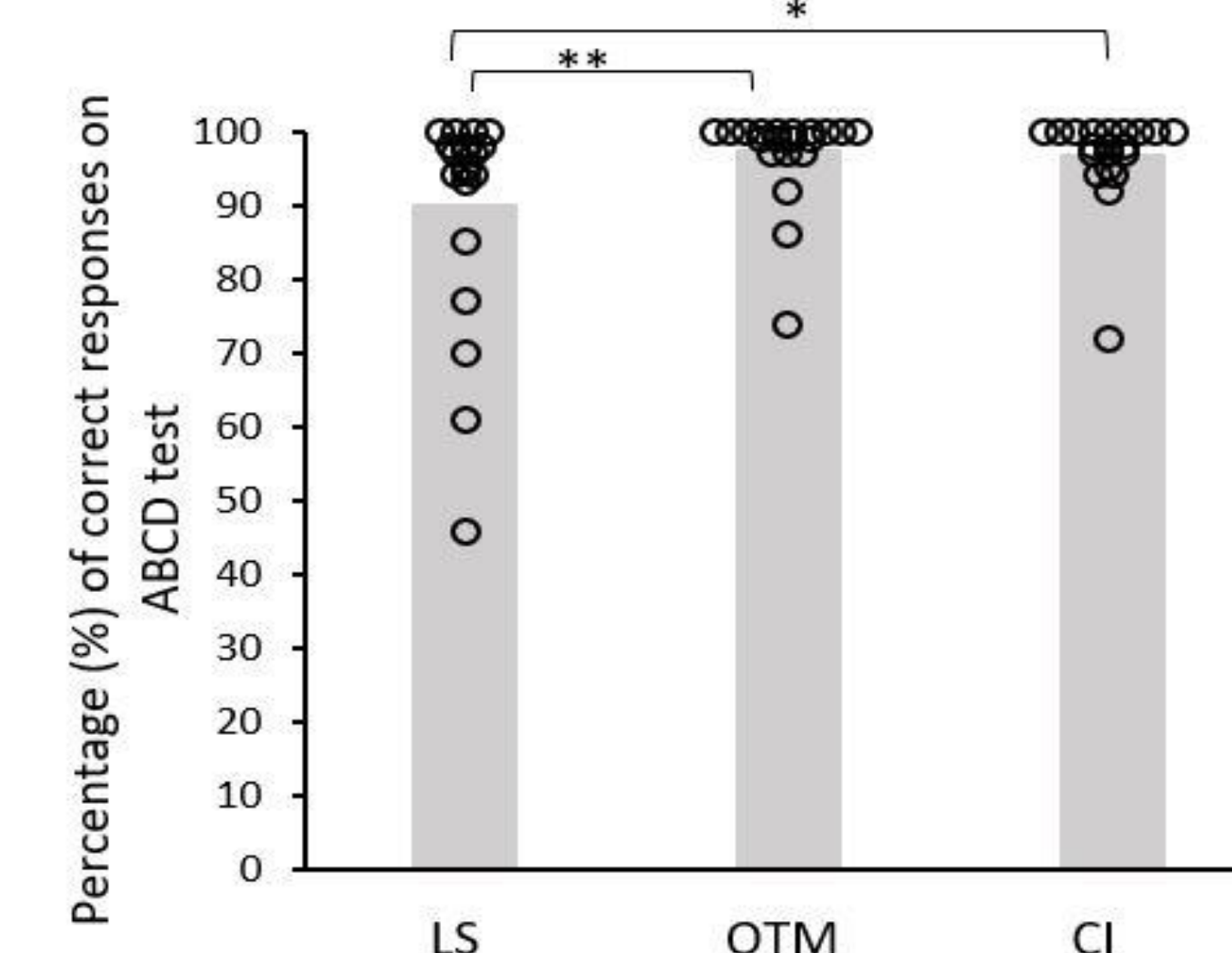


Figure 7. Reaction time on ABCD test

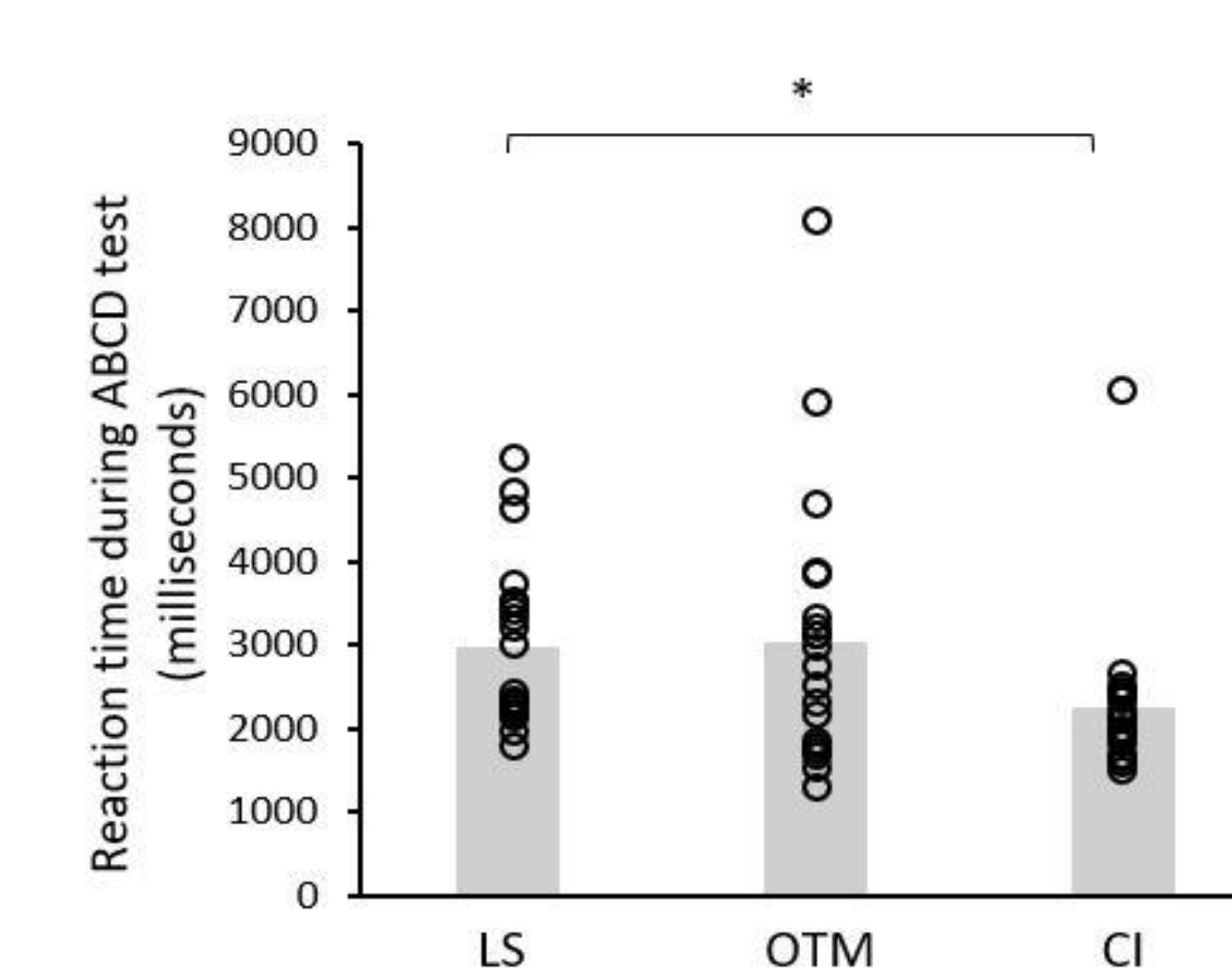


Figure 8. Trials to passing the ABCD test for LS, OTM and CI groups.

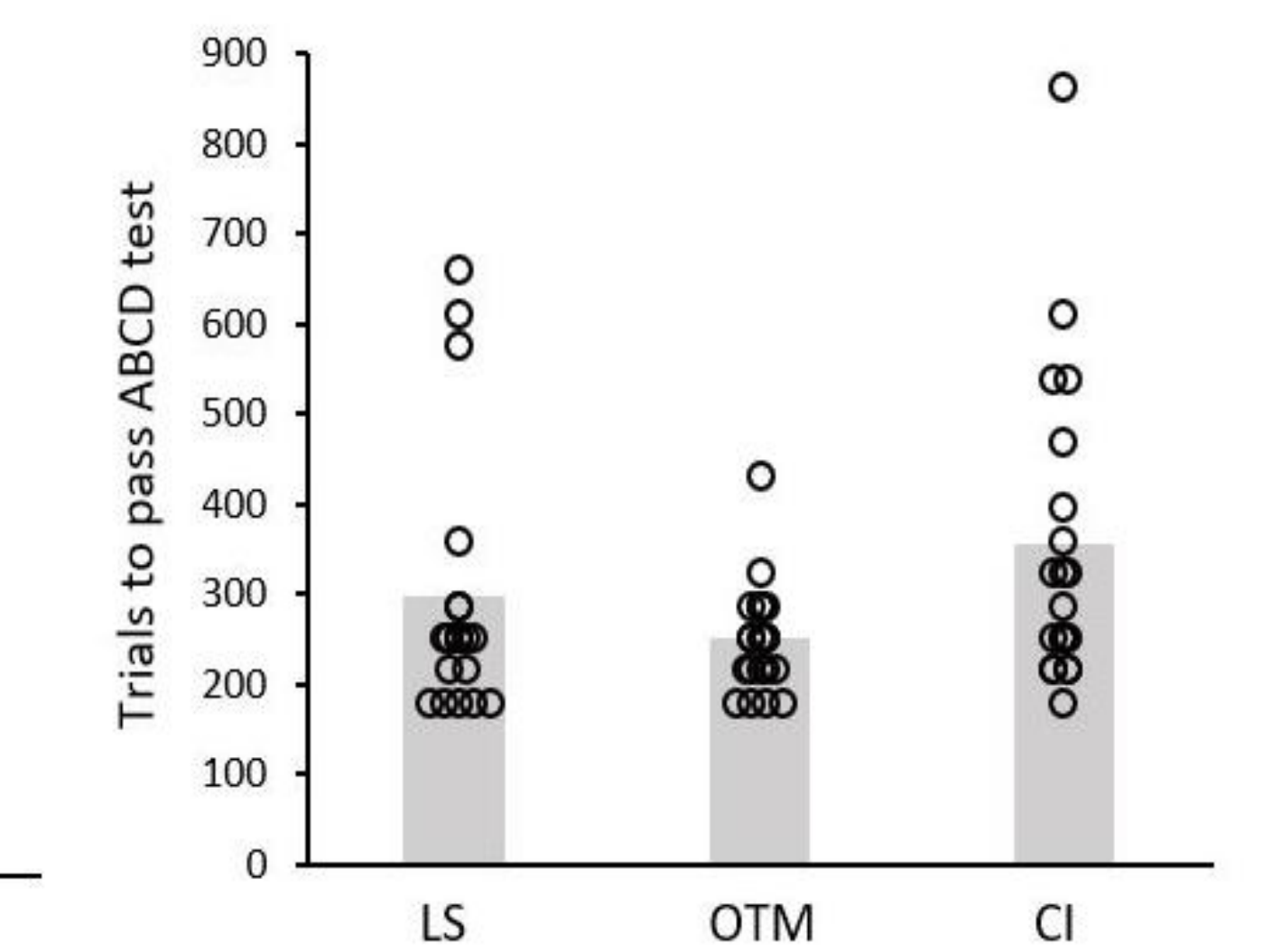


Figure 9. Trials to mastery criterion during Transfer of Function training

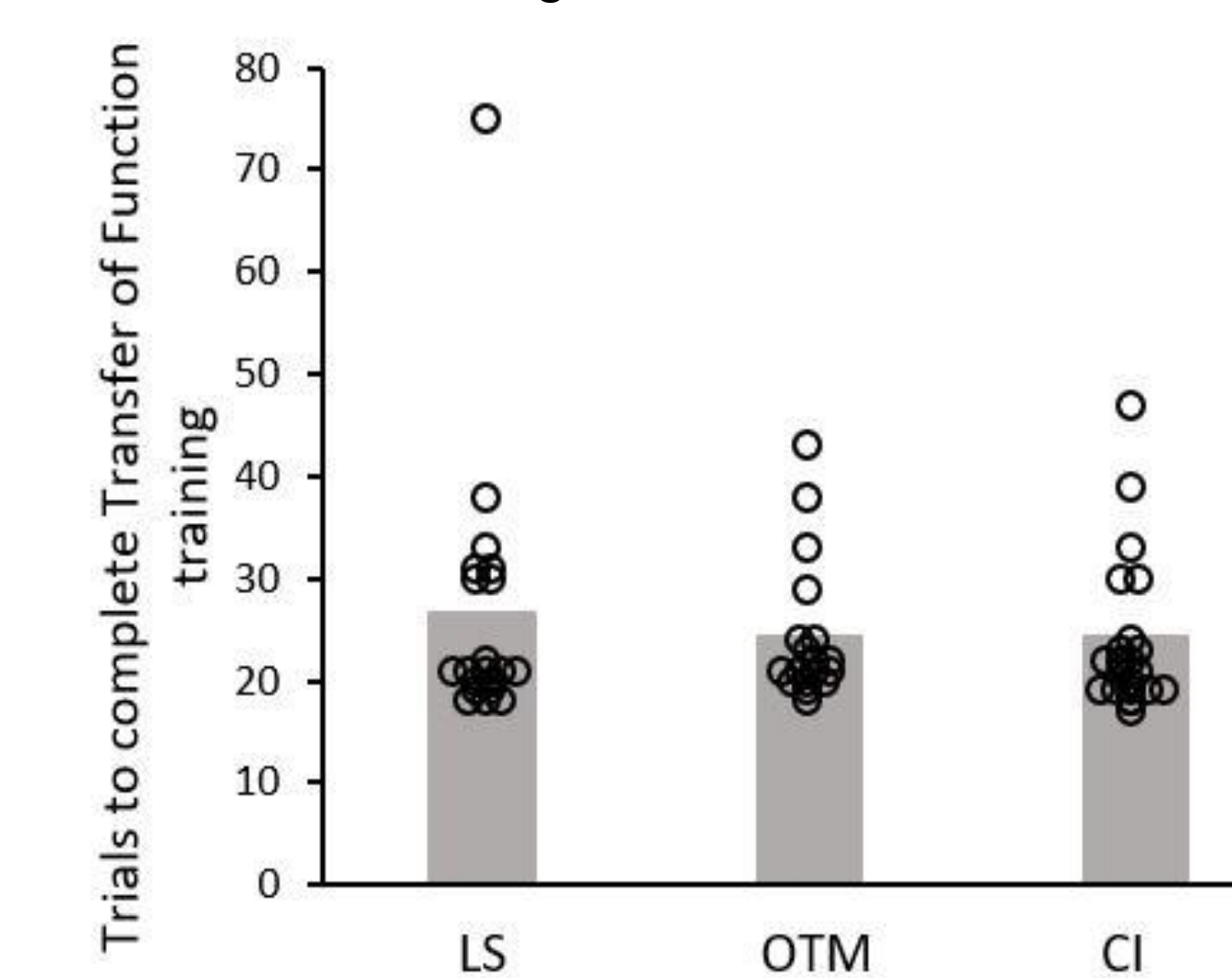


Figure 10. Accuracy on Transfer of Function test

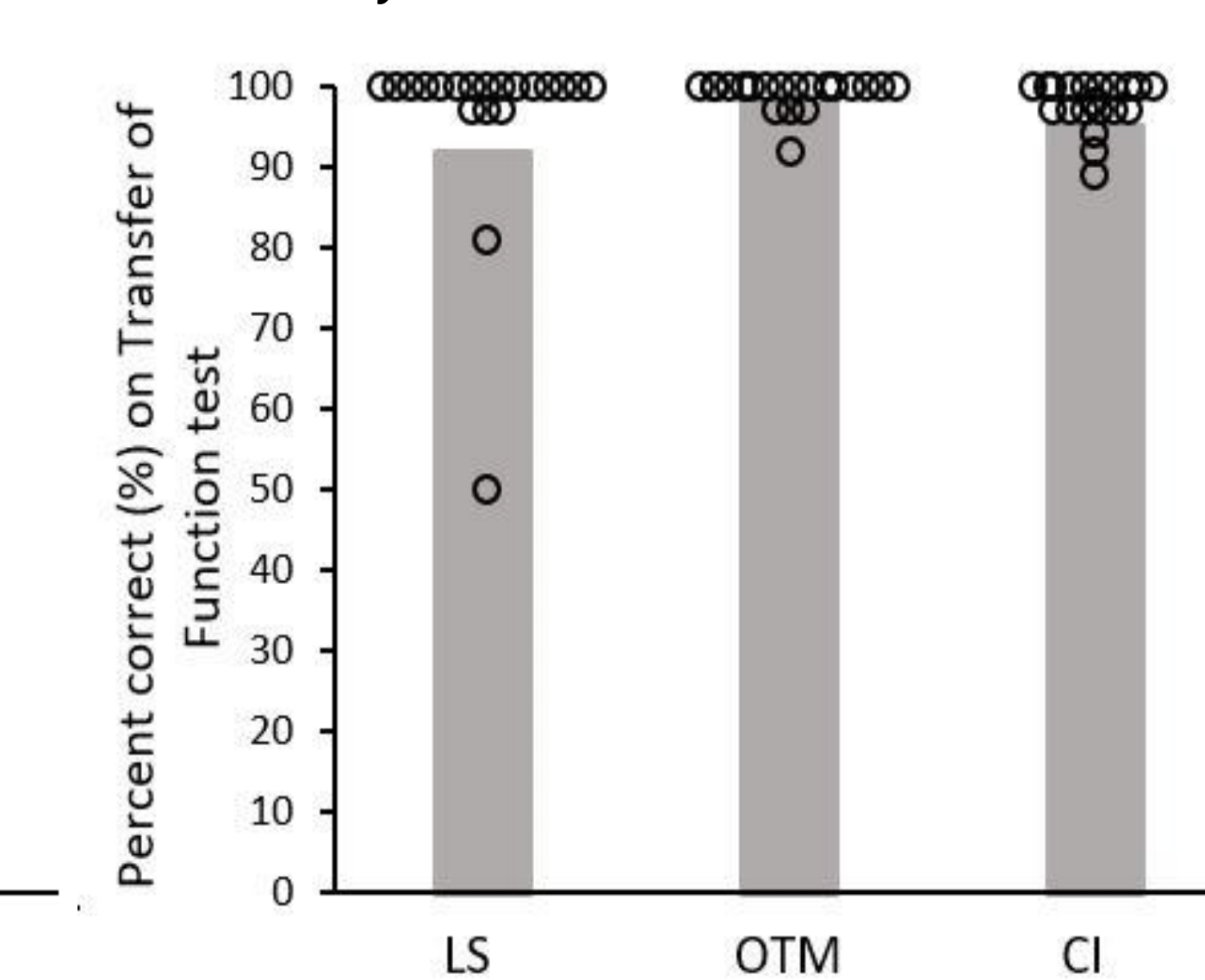


Figure 11. Reaction time on Transfer of Function test

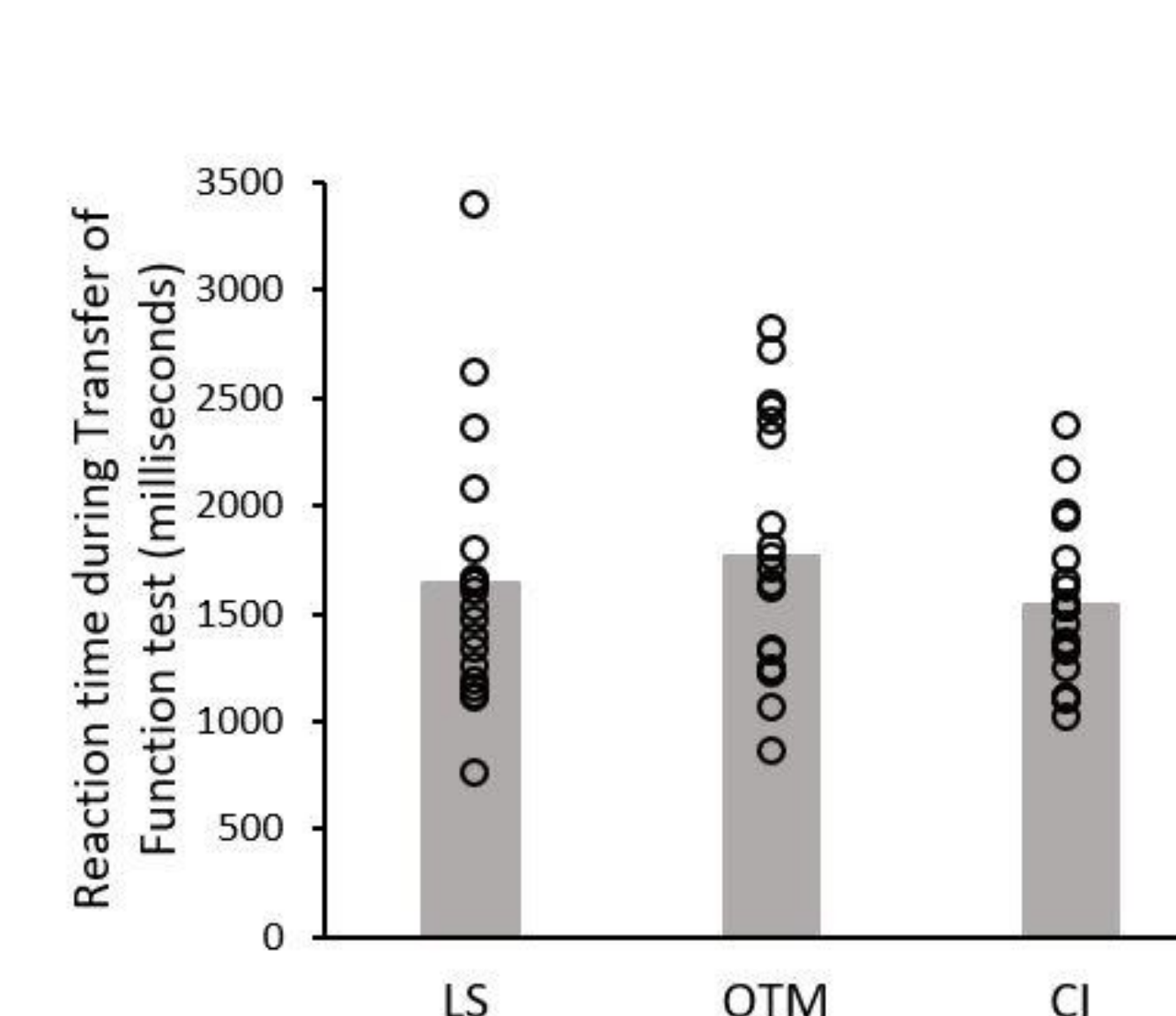
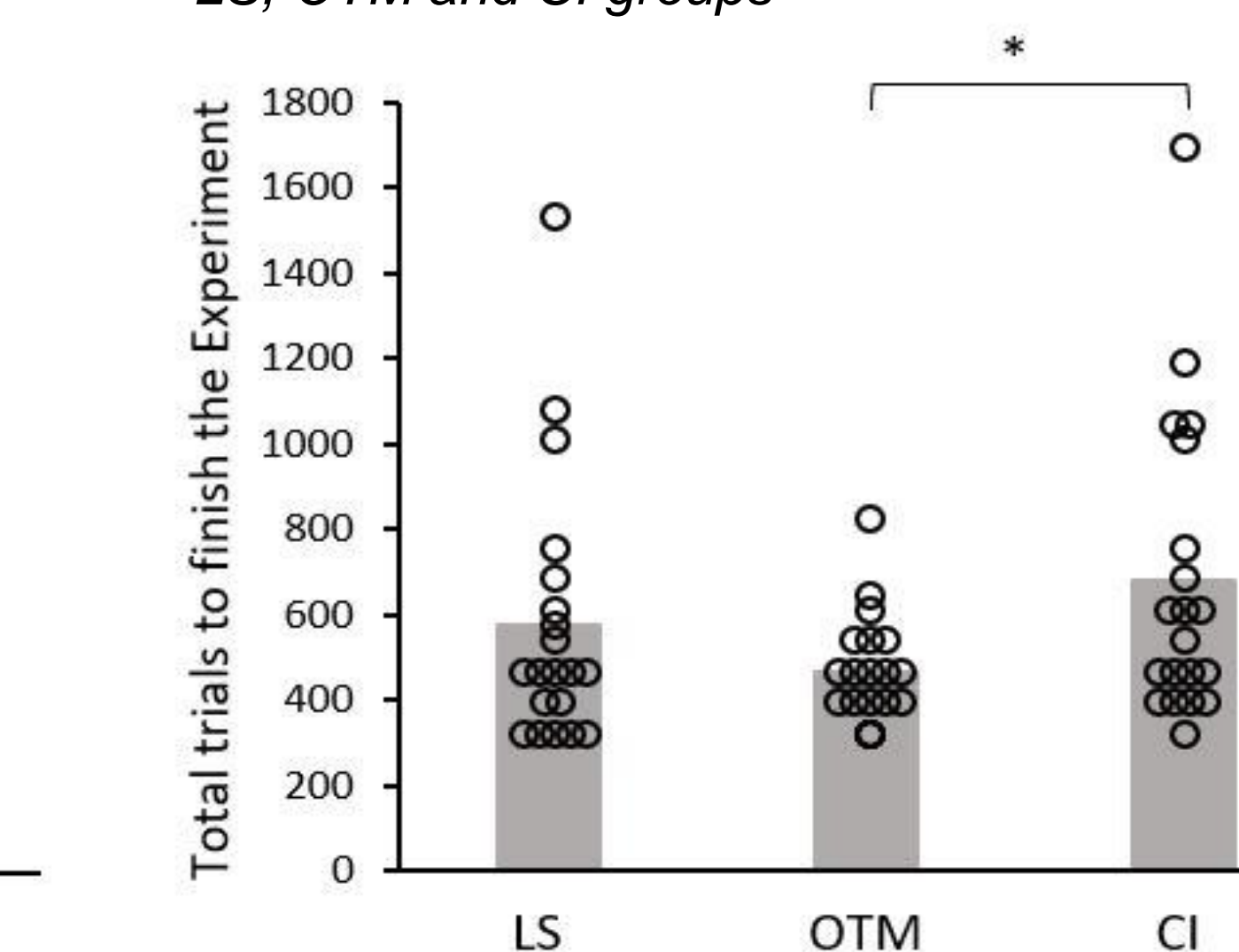


Figure 12. Total trials to complete the experiment for LS, OTM and CI groups



Class Establishment

- The OTM group required significantly fewer trials to mastery than the CI group and yet performed with equal accuracy in the ABCD test. After re-training participants who did not pass the ABCD test, the effect on trials to passing was marginally significant ($p = .08$).
- The LS group performed with significantly lower accuracy on the ABCD test than the OTM group (replicating previous findings) and the CI group.
- EBI-trained groups had longer reaction times than the CI group on the ABCD test

Transfer of Function

- No differences between groups; possibly due to ceiling effect

Conclusion

- The data tentatively support the efficiency of EBI arranged according to an OTM training structure.

References

Fienup, D.M., & Critchfield, T. S. (2011). Transportability of equivalence-based programmed instruction: Efficacy and efficiency in a college classroom. *Journal of Applied Behavior Analysis, 44*, 435-450.

Petursdottir, A. I., Oliveira, J. S. C. D. (2020). Efficiency of Equivalence-Based Instruction: A Laboratory Evaluation. *Journal of experimental behavior analysis*. Accepted pending revisions.

Zinn, T. E., Newland, M. C., & Ritchie, K. E. (2015). The efficiency and efficacy of equivalence-based learning: A randomized controlled trial. *Journal of Applied Behavior Analysis, 48*, 865-882.