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Environmental enrichment provided to adult Zebra Finches (*Taeniopygia guttata*) differentially influences sexes on a spatial learning task

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Introduction

- Poor animal welfare & low experimental validity is stress-related
- Environmental enrichment may reduce stress
- Evidence for enrichment improving stress-linked behaviors:
 - Reduced anxiety, abnormal repetitive behaviors, and corticosterone (CORT) stress hormone levels
 - Improve hippocampal dependent spatial cognition
- Effectiveness of enrichment varies by:
 - Species' specific relevance
 - Age related neuroplasticity
 - Sex specific responses to stress
- Enrichment research rich in rodents, little in zebra finch
- Zebra finch juveniles more neuroplasticity than adults
- Zebra finch males more susceptible to CORT and more active

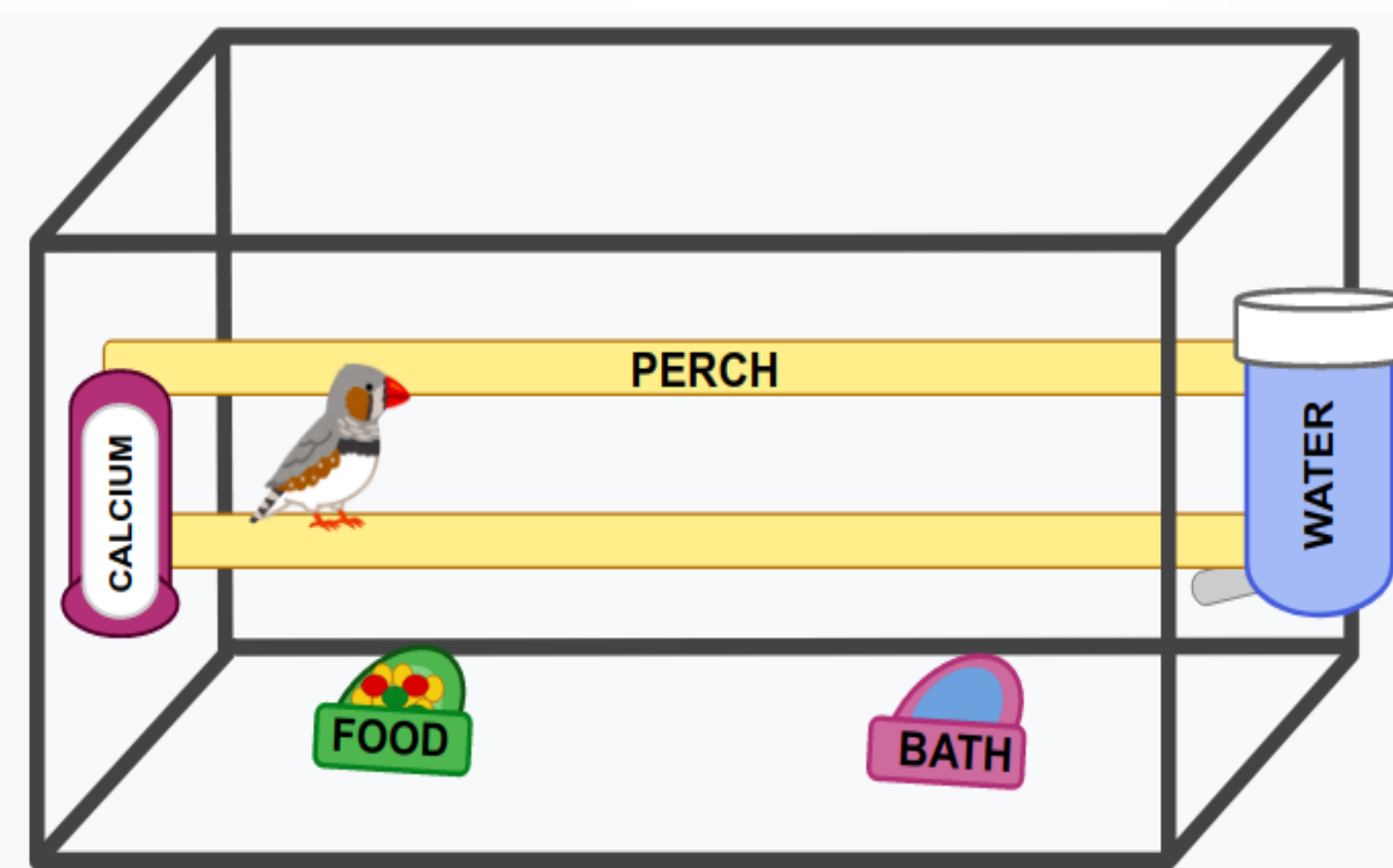
Predictions

Environmental enrichment will:

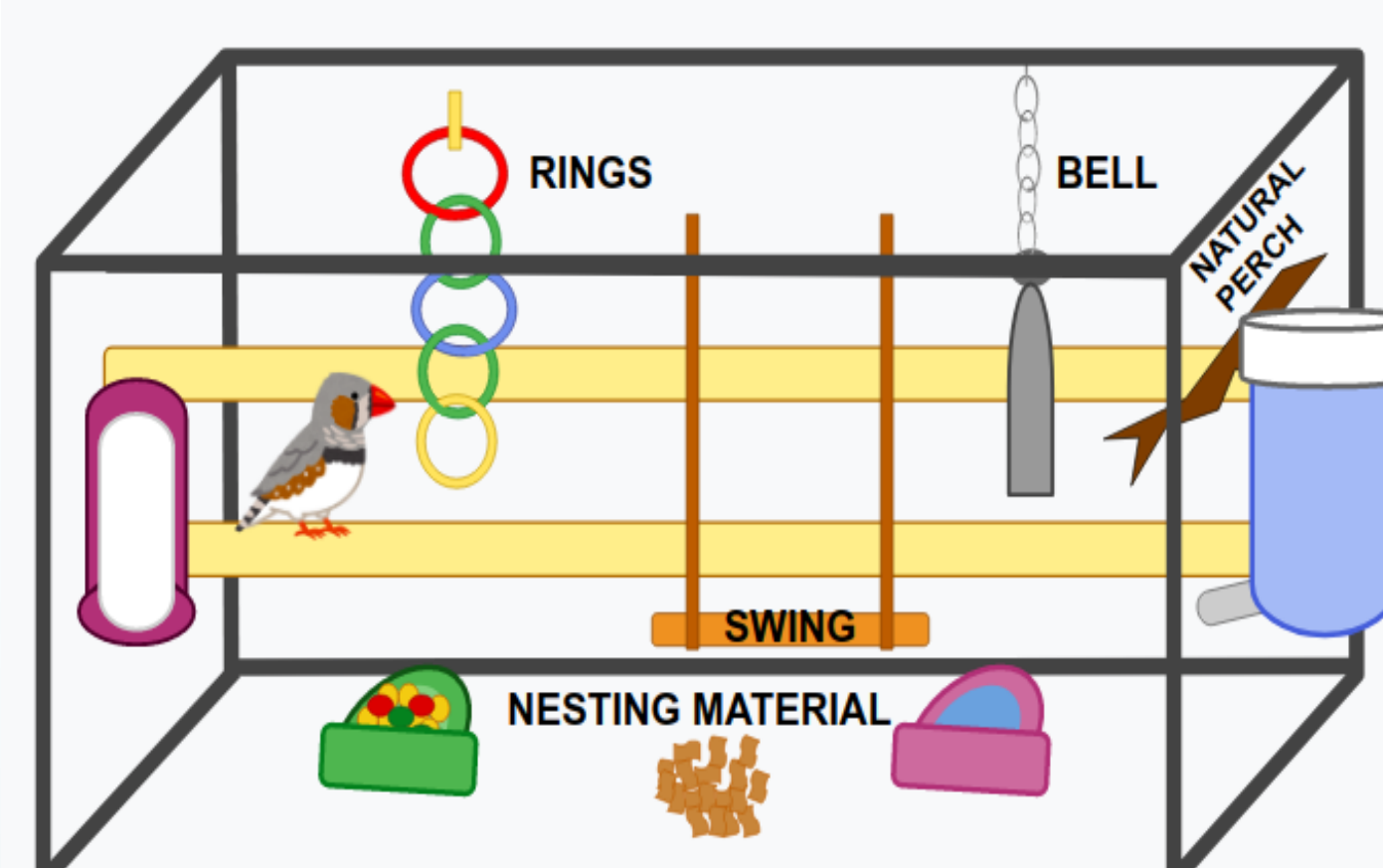
- Reduce abnormal repetitive behaviors (ARBs)
- Reduce time to approach food (hyponeophagia) and novel objects (neophobia)
- Reduce baseline and reactive CORT
- Increase spatial cognition
- Be more effective in juveniles than adults
- Result in greater responses in males than females

Methods: Housing

Basic Housing

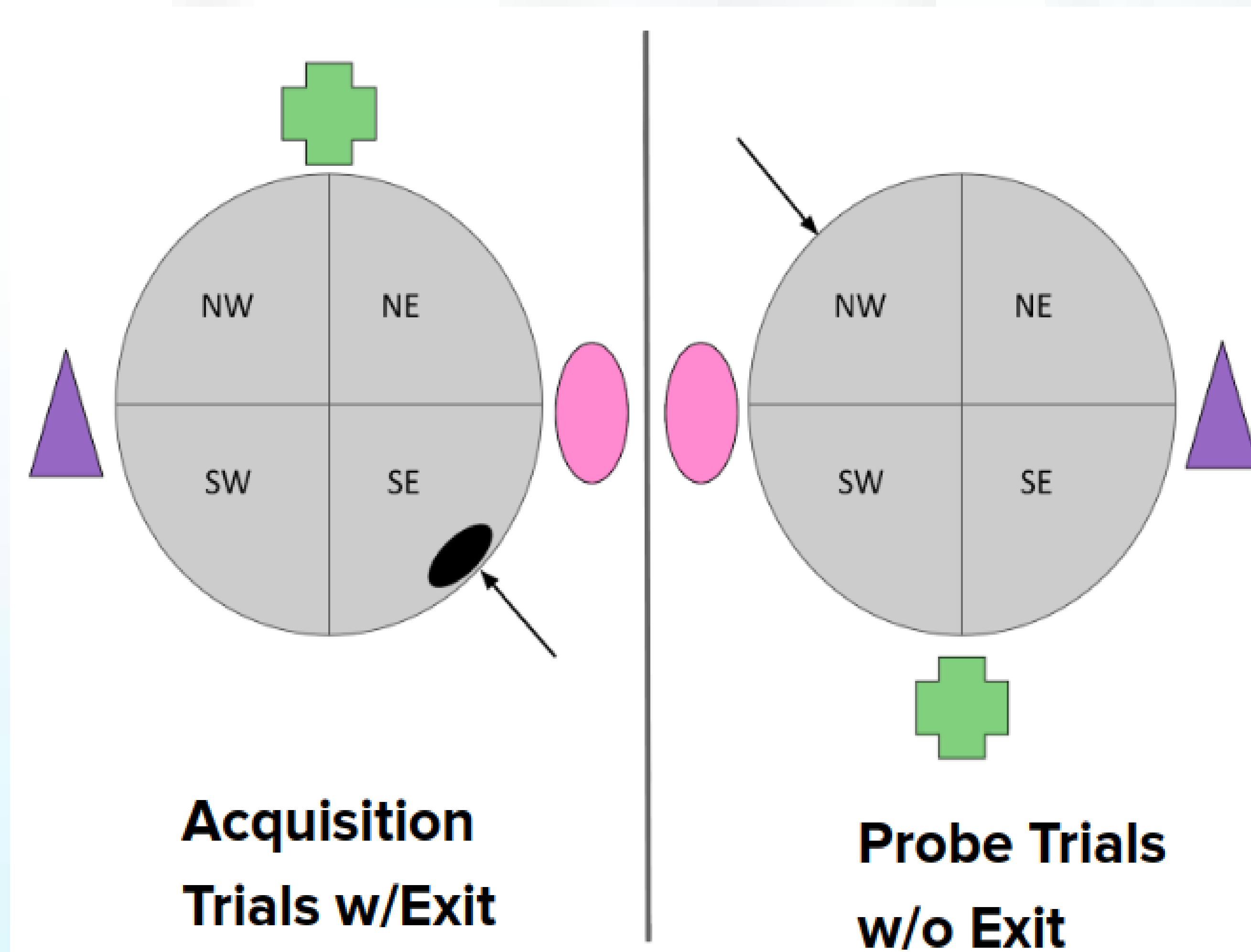
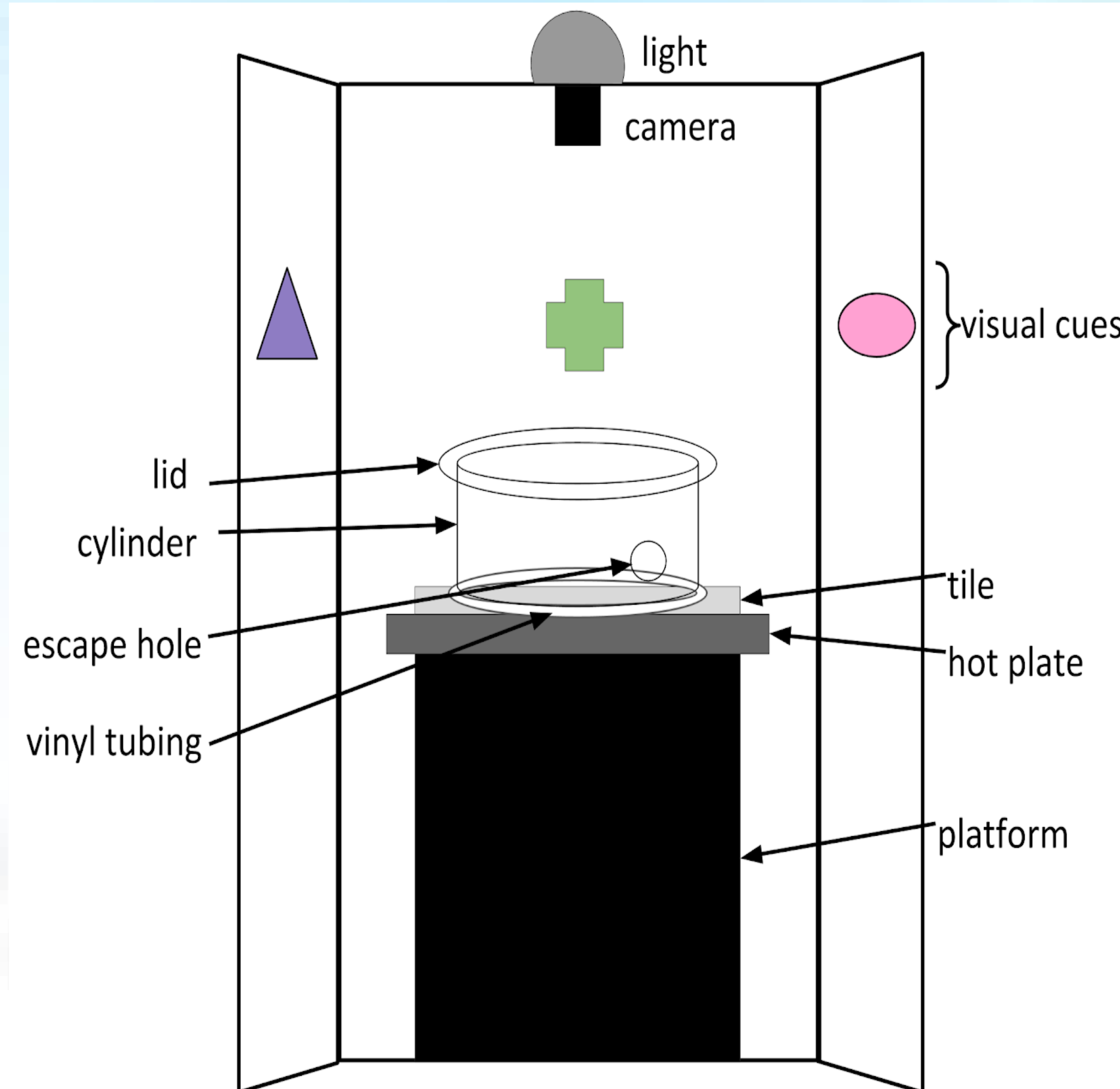


Enriched Housing



Enriched birds have hanging rings, nesting material, a swing, bell, and natural perch. Both enriched and basic housing have two wooden dowels for perching, cuttlebone, drinking water, food, and bath water. n=8 per single-sex cage, with n=16 F and n=16 M per treatment in adult and juvenile experiments.

Methods: Escape Maze



Results

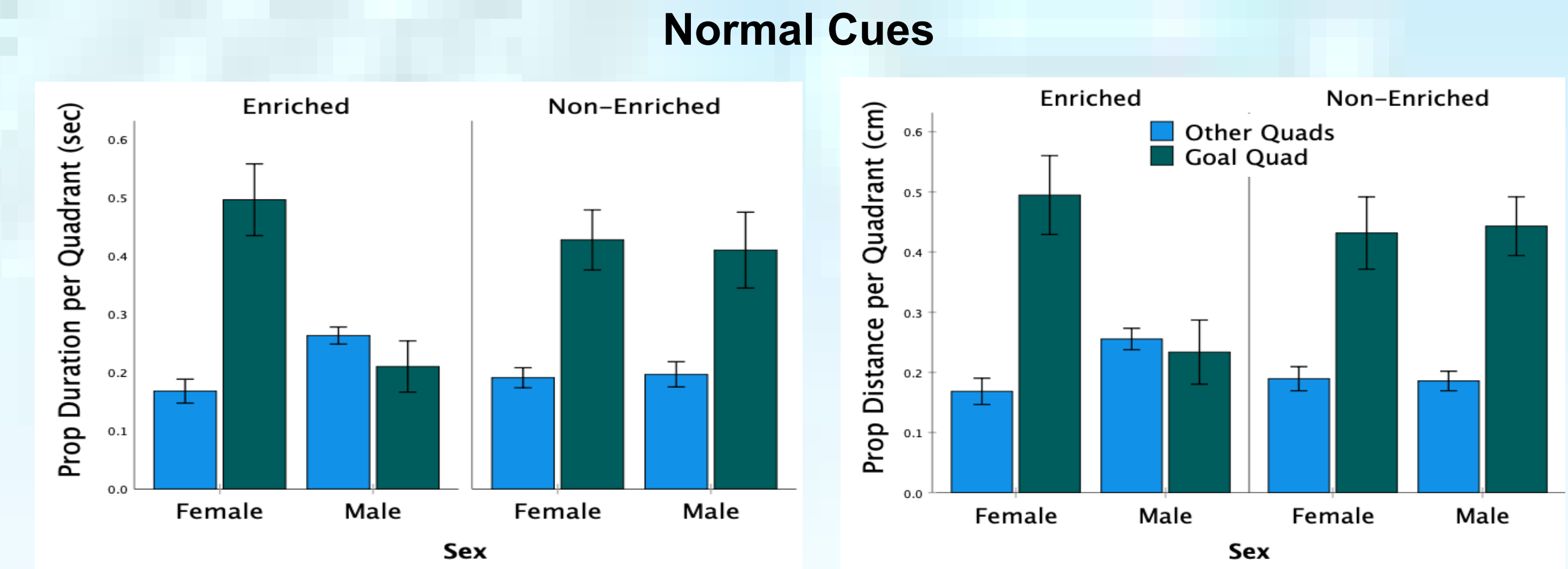


Figure 1. There is an interaction between quadrant, sex and treatment (GLM, $p=.025$) as well as quadrant and sex (GLM, $p=.013$), in which all birds except enriched males spend a greater proportion of time in the goal quadrant than in other quadrants. Error bars: ± 1 SE

Figure 2. There is an interaction between quadrant, sex and treatment (GLM, $p=.023$) as well as quadrant and sex (GLM, $p=.035$), in which all birds except enriched males travel a greater proportion of their total distance in the goal quadrant than in other quadrants. Error bars: ± 1 SE

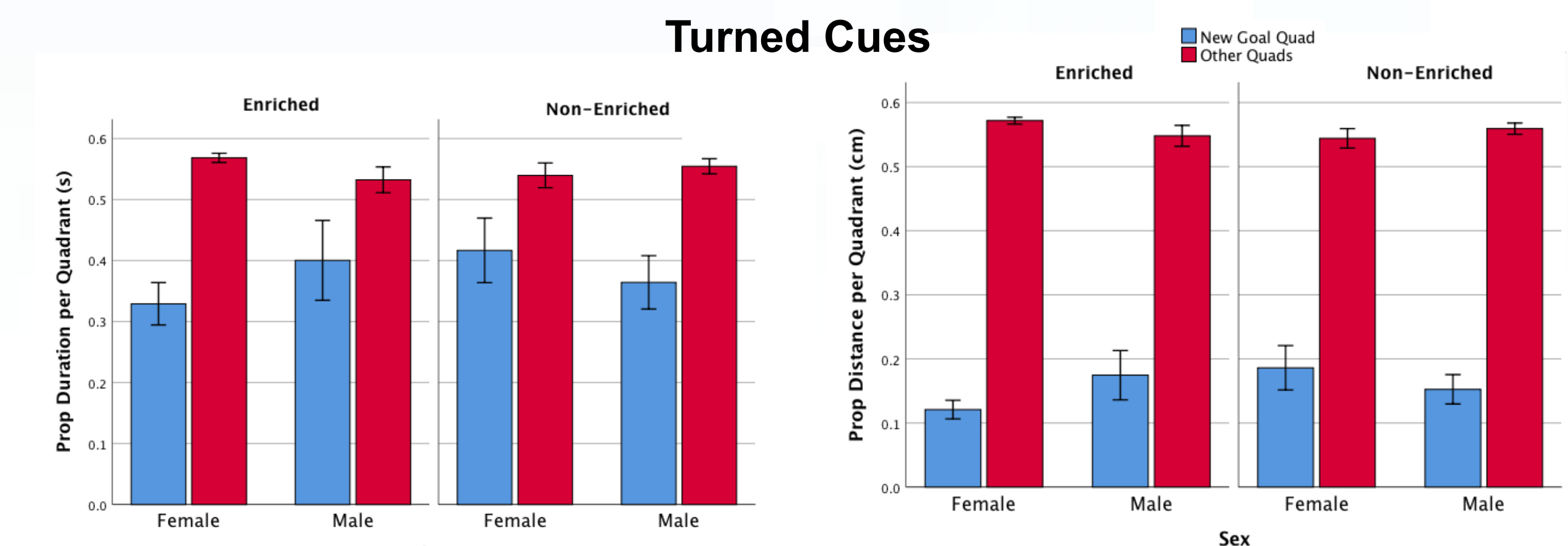


Figure 3. Regardless of sex or treatment, birds spent a greater proportion of their time (GLM, $p<0.0001$) in the previous goal quadrant instead of the quadrant 180 degrees from it as would be expected if they were using the visual cues to exit. Error bars: ± 1 SE

Figure 4. Regardless of sex or treatment, birds moved a greater proportion of their total distance (GLM, $p<0.0001$) in the previous goal quadrant instead of the quadrant 180 degrees from it as would be expected if they were using the visual cues to exit. Error bars: ± 1 SE

Discussion and Conclusions

- Escape Maze: With normal cues, all BUT enriched males traveled a greater proportion of their total distance in the goal quadrant than in the other quadrants (averaged proportion)
 - Enrichment may increase tolerance to stress of maze, reduce directness of exiting
 - With turned cues, each sex and treatment group traveled a greater proportion of their total distance in the normal cue goal quadrant than the current goal quadrant.
 - Birds were NOT using visual cues to exit...actual cue is unknown
 - Need to determine what birds are using as cues in Escape Maze, and perform experiment on juveniles

Acknowledgements

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