**BACKGROUND**

Developed in the animal literature, the traditional Morris water maze task has shown that males rely heavily on distal or far-way visual cues but can incorporate proximal or close cues to navigate, while females largely rely on proximal cues. This task has been developed for humans using virtual reality software.

From an evolutionary perspective, males evolved enhanced spatial skills by traveling far distances in outdoor landscapes.

However previously tested virtual Morris mazes for humans do not simulate natural navigation. These mazes have been:

- Predominantly indoor
- Small scale (around 30 m)
- Some inconsistencies in sex-specific cue use

**AIM**

Establish performance on a desktop virtual Morris water maze task that uses a large-scale and natural landscape.

Test whether sex-specific differences in cue preference are similarly observed in large and smaller-scale environments.

**HYPOTHESES**

Males will have higher accuracy than females in the distal cue condition but not the proximal cue condition.

The sex specific cue use may change with the scale of the environment.

**METHODS**

Participants: 86 participants (42 M, 44 F)

Between-subjects: Scale
- Large and small landscapes

Within-subjects: Cue condition
- Distal and proximal

Distal cues: Mountains, hills and the sun. (Cues over 100 meters beyond the arena)

Proximal cues: Trees, bushes and flowers

**PROCEDURE**

**Practice Phase:** participants gain experience using the equipment and joystick.

**Learning Phase:** participants were asked to locate a grouping of red hummingbirds in the virtual environment.

**Testing Phase:** participants were asked to return to the location of the birds, which were no longer visible, on 6 trials from different starting positions. After each trial feedback was given.

Example of the testing phase for the large scale distal condition.

**PRELIMINARY RESULTS**

Measure: Performance accuracy was measured by calculating the Euclidean distance from the remembered location to the actual location of the birds (distance error).

A 2 (sex) x 2 (scale) x 2 (cue type) mixed ANOVA, with gaming experience as a covariate.

- Gender, F(1, 81) = 6.155, p = .015, partial η² = .071
- Sex x Cue: F(1, 81) = 4.911, p = .029, partial η² = .057
- Sex x Scale: F(1, 81) = 6.089, p = .016, partial η² = .071
- Sex x Scale x Cue: F(1, 81) = 4.894, p = .03, partial η² = .057

**DISCUSSION / FUTURE DIRECTIONS**

-Sex difference was found for Distal but not Proximal cue condition.

-Large scale revealed that males had more errors with proximal cues which was not apparent in the small scale.

Future Analysis:
- Latency (time taken to complete each trial)
- Heading direction error
- Vandenberg-Kuse mental rotation
- Wayfinding Strategy Scale (Lawsont and Kallai, 2002)
- Harm Avoidance Scale (from Multiple Personality Questionnaire)
- Santa Barbara Sense of Direction Scale (Hegarty et al., 2002)
- Lifetime mobility

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