Where’s Waldo?: Analyzing visual search behaviour with a web-based eye tracking system

INTRODUCTION

- It is an axiom in cognitive psychology that “where the eye is looking is where the mind is attending”.
- Here, we explore how eye movements inform spatial attention within a visual search task, and whether the speed and duration of these eye movements is associated with task performance.
- We modelled our task after the classic game Where’s Waldo, then tested for changes in eye movement performance across multiple training sessions.
- The experiment was conducted remotely using Gazer, as a 3-session training experiment ($n = 36$).

Our motivating research questions:

1. Are there individual differences in participant’s baseline performance, measured by reaction time and number of fixations?  
2. Do participants become more efficient with their eye movements across sessions?

A NEW TOOL: GAZER

- An online tool that combines open-source eye-tracking [1] with the popular web-based experimental framework jsPsych.
- In a pilot attention ask, we demonstrated that our online Gazer system could record an exogeneous eye movement with comparable resolution to the in-lab Eyelink system.

RESULTS: RESPONSE TIME AND EYE MOVEMENTS

- Participants became more efficient with their eye movements by making fewer and more focused movements but not moving their eyes faster.
- Evidence of eye movement efficiency; as participants made fewer fixations, they also performed the task more quickly.
- An investigation of eye movement speed as the number of fixations per second found that there was no change across sessions.

DISCUSSION

- Visual search behaviour was captured as a focus on the Waldo target location, prior to indicating he was found.
- We captured baseline performance differences in eye movements (number of fixations) and a behavioural measure (reaction time), and improvements over time.
- Participants became more efficient with their eye movements by making fewer and more focused movements but were not moving their eyes faster.
- Overall, the results demonstrate Gazer’s capability to explore eye movements and make inferences about strategy and performance.

References