An Eye-Tracking Investigation of Voluntary Multitasking

Ashlyn Wilson[1],
Joseph M. Orr[1,2]

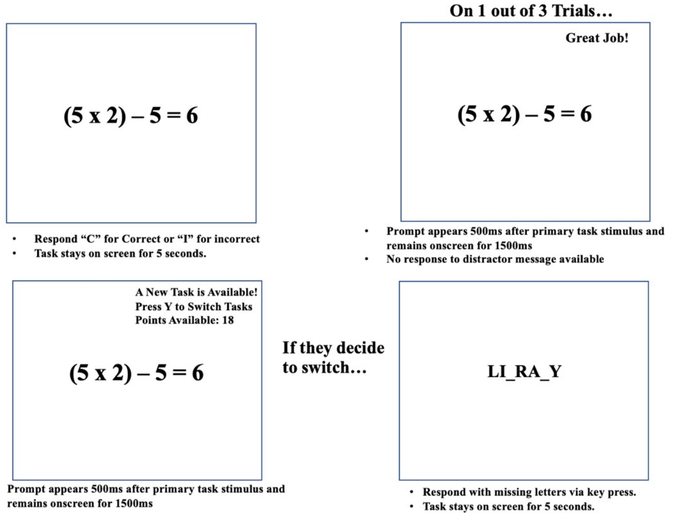
[1]Psychological and Brain Sciences
[2]Texas A&M Institute for Neuroscience

Introduction

- Frequent media multitasking was initially linked to decreased executive functioning, but findings are now mixed.
- Unlike most lab-based multitasking paradigms, real-world multitasking allows people to choose if/when to multitask.
- We recently developed a version of a multitasking paradigm where participants have voluntary control of when to switch.
- Eye tracking was used to obtain continuous measures of task engagement and decision-making processes to gain additional insights into multitasking choices.
- Linear mixed models were used to examine 'dwell time' on Areas of Interest (AOI) for the math problem and the popup.

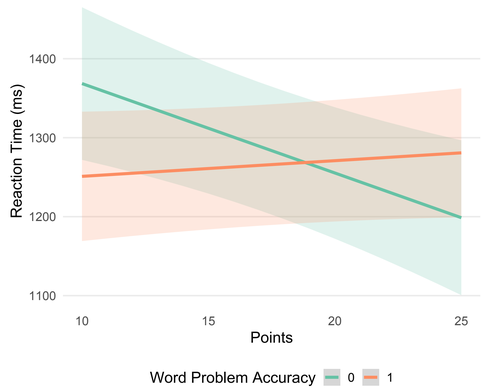
Methods

- 91 participants
- **Primary task:** math verification, 3 points for correct
- **Distractor popup**: during the primary task a popup with an encouraging message appeared on 1/3 of trials
- **Switch popup:** during the primary task a popup signaling an available secondary task appeared on 1/3 of trials.
- The popup showed points available for secondary task, ranging from 10-25 points.
- The secondary task was a word-stem completion task.
- Tobii Fusion Pro (120 Hz) was used to collect eye position and pupil dilation.



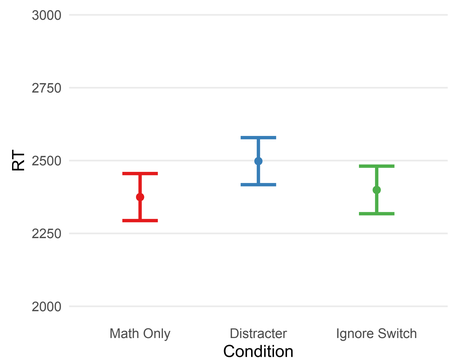
Background and Results

Switch Rate



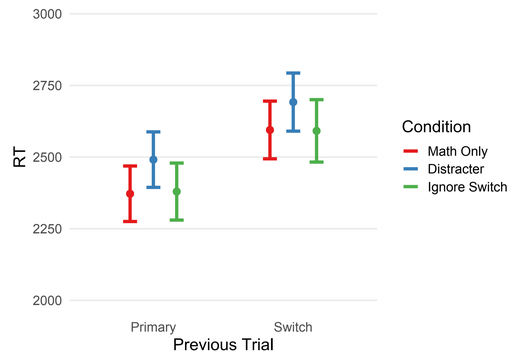
- Speed of switching was predicted by the number of points. This relationship had opposite relationships for incorrect and correct word problems.

Reaction Time by Condition



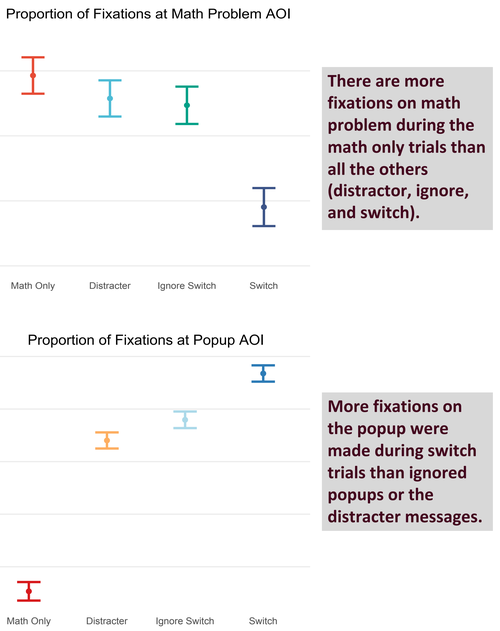
- Irrelevant distracters were more disruptive to task performance than popups that were ignored.

Switch Cost



- Participants were slowed after doing a word problem on the previous trial.
- This represents the well-known 'switch cost'

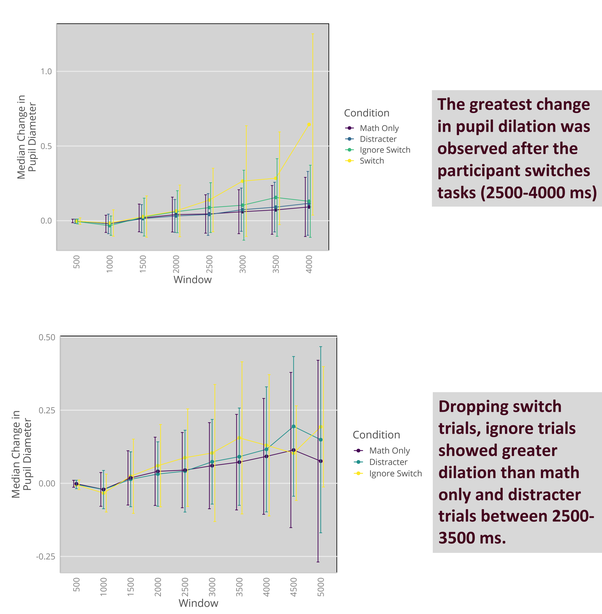
Fixations



There are more fixations on math problem during the math only trials than all the others (distractor, ignore, and switch).

More fixations on the popup were made during switch trials than ignored popups or the distracter messages.

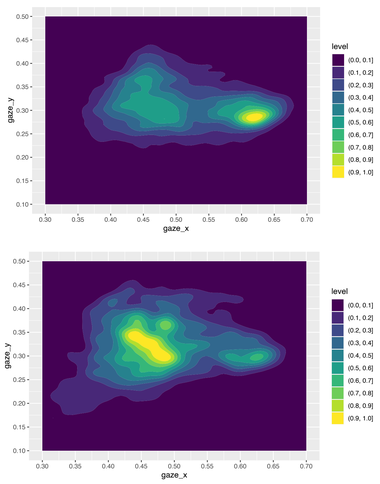
Pupillometry



The greatest change in pupil dilation was observed after the participant switches tasks (2500-4000 ms)

Dropping switch trials, ignore trials showed greater dilation than math only and distracter trials between 2500-3500 ms.

Gaze Density Plots



Discussion

- Eye-tracking in combination with voluntary multitasking allows us to observe continuous measurements of engagement and attention.
- Preliminary results show reaction time distraction effects.
- Preliminary results show no effect of condition on primary task dwell time and no effect on the association between dwell time and reaction time.
- There is a difference in how often participants switched, but further data is needed to allow for individual difference comparisons
- Next steps: Examining how reward responsiveness affects reaction time and points.

More Information

Ashlyn Wilson:
Ashlyngrace@tamu.edu
Joseph M. Orr:
joseph.orr@tamu.edu
Website:
www.congalab.com