

Mirror Presence and Cognitive Functioning: Working Memory and Eye-Tracking

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Previous Literature

Gaze and Memory

- Averting gaze facilitates remembering (Glenberg, Schroeder, & Robertson, 1998)

Social Behavior and Mirrors

- The presence of a mirror increases the following of social norms (de Kort, McCalley, & Midden, 2008)
- The presence of a mirror increased participant self-awareness and decreased the amount of cheating on a test (Diener & Wallbom, 1976)
- The presence of a mirror increased the effort of participants (Silvia, 2012)

Research Questions and Hypotheses

How does the presence of a mirror affect cognitive load?

Cognitive load will be measured by accuracy performance on a digit recall working memory task.

I hypothesized that the presence of a mirror would decrease participants' accuracy on the memory task, but that looking away from the mirror would reduce the negative effect.

General Research Design

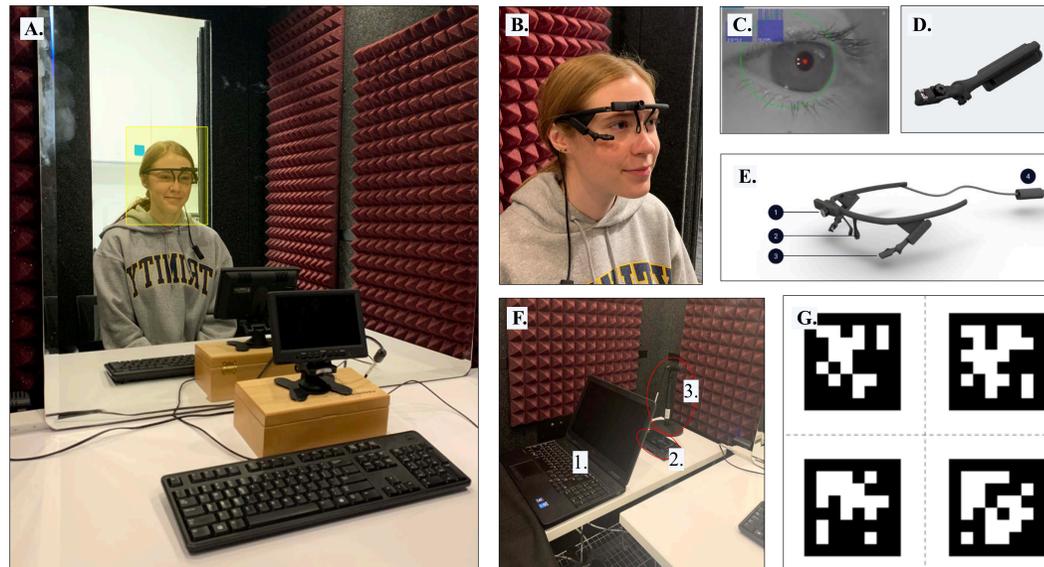
Variables:

- **Gaze:** looking at AOI vs. not looking at AOI
- **Cognitive load:** accuracy on digit recall memory task

What is the relationship between these variables? How do they affect each other?

Participants were recruited from Trinity College and were 18-22 years of age.

Methods



A: setup of sound booth and mirror, which is covered for the no-mirror condition. Approximated area of interest (AOI) shown by the yellow box, which would be the same area for when the mirror is covered, as well.
B: participant wearing the eye-tracking device
C: depiction of eye being tracked on pupil labs
D: eye camera that tracks the eye's positioning
E: eye-tracking device [1. "world camera", 2. nose support, 3. eye camera (shown in image D), 4. USB-C connector clip to computer]
F: 1. data-collecting computer connected to eye-tracking device, 2. recording device, 3. small-diaphragm condenser microphone
G: QR markers for eye-tracking data analysis

Setup (refer to image A above):

- Sound booth: participants completed this study in a sound booth for
- Mirror: was covered with a large fabric sheet for "No Mirror" condition
- Monitor: a PsychoPy script was run on the small monitor on the desk for the "words" condition

PsychoPy:

- PsychoPy randomly presented 160 pre-determined words on the monitor for 1 second, with 0.5 seconds in between words
- For Phase 2, an individualized, randomly produced span of digits was presented for the participant to remember and then repeat after reading 3 words aloud

Pupil Labs:

- The eye-tracking device (pupil core model with one eye camera) was purchased from the company "Pupil Labs"
- Refer to docs.pupil-labs.com for more device information

Additional participant data:

- Hearing test
- Find digit span
- Demographic survey
- Personal questionnaire

Tasks:

- Recite the English alphabet, spoken (referred to as the "ABC condition")
- Read words aloud from monitor (referred to as the "words condition")
- Digit recall

Phase 1:

- ABC condition + no mirror
- Words condition + no mirror
- ABC condition + mirror
- Words condition + mirror

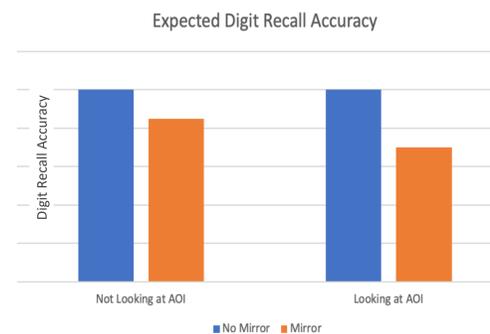
Phase 2:

- ABC condition + mirror
- Words condition + mirror
- ABC condition + mirror + digit recall
- Words condition + mirror + digit recall
- ABC condition + no mirror + digit recall
- Words condition + no mirror + digit recall

COVID-19 Circumstance

Due to the COVID-19 epidemic and leaving campus in the middle of the Spring semester, I was not able to collect participants for Phase 2 of my thesis project. Therefore, the following sections discuss different possibilities for what my results may have been. The discussion will then analyze what different results would suggest.

Results



- In the No Mirror condition, participant gaze pattern would likely not have influenced performance on the memory task
- As hypothesized, when looking at the AOI in the Mirror condition, performance would likely be significantly lower
- As hypothesized, when *not* looking at the AOI in the Mirror condition, performance would likely be slightly lower than in the No Mirror condition, but not as low as looking at the AOI in the Mirror condition
- These are not the only possibilities for how the presence of a mirror and gaze pattern can affect digit recall accuracy; it is possible that only one or neither of these variables affect digit recall accuracy

Discussion

If we did get the results that we expected, this would suggest:

1. the face is distracting and looking at one's self takes significant cognitive energy
2. diverting the gaze away from one's self takes some cognitive energy, but not as much as actively looking at one's face

Limitations

- Illumination of sound booth: must be bright enough for the eye-tracking device to function well
- Readability of QR codes: must be large and intelligible to accurately create an AOI for data analysis
- Corrective lenses: contact lenses are compatible for the eye-tracking device to collect accurate data, but eyeglasses are not

Future Research

Professor Casserly plans on continuing this line of research in her lab.

Acknowledgements

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