Analyzing Task Differences and the Ambient-to-Focal Switch within Static Scene Viewing

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ACCELERATING SUCCESS BY PROVIDING INTENSIVE RESEARCH EXPERIENCE
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Introduction

Background

- Eye movement behavior reveals information about cognitive processes during scene-viewing.
- Fixation Duration (ms): the time in which the eyes are focused on an area of a scene
- Saccade Amplitude (px): the distance the eyes move between fixations
- Ambient-to-focal switch: the transition of gathering information from one's periphery to extracting details from one's central vision over the course of scene viewing, characterized by:
  - Increasing fixation duration
  - Decreasing saccade amplitude

Methods

- 100 participants freely viewed 100 scenes for 12 seconds
- Eye movements were recorded by an EyeLink 1000+ eye tracker
- Each participant performed two tasks:
  - Memorization: remembering scenes for recall after viewing
  - Aesthetic judgement: viewing a scene and rating it (like, neutral, dislike)

Questions

- Does our data replicate the ambient-to-focal switch?
- Do fixation durations and saccade amplitudes change during scene viewing when participants are prompted with different tasks?

Analysis

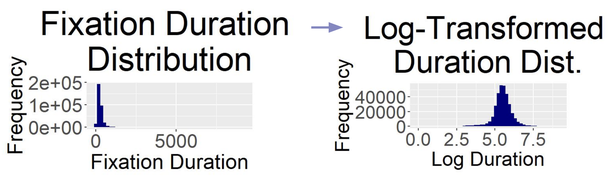
Temporal bins are used instead of raw fixation number data:

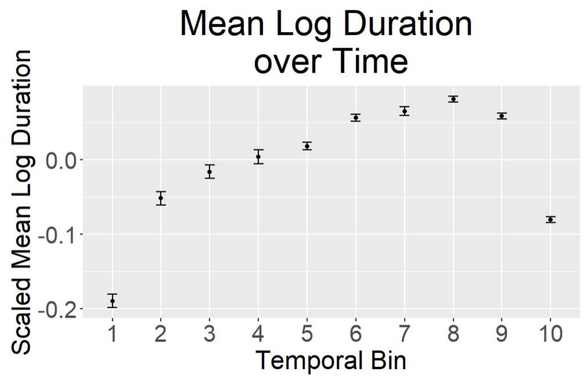
- Accounts for different participants and scenes having various total fixation counts
- Idea: early fixations are more informative

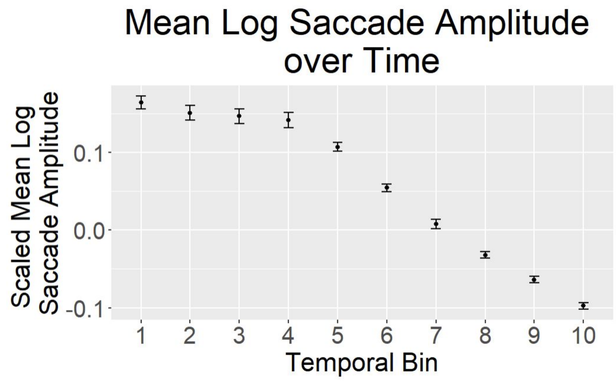
Temporal Bin	Fixation Number
1	2
2	3
3	4
4	5
5	6-8
6	9-12
7	13-15
8	16-22
9	23-29
10	30+

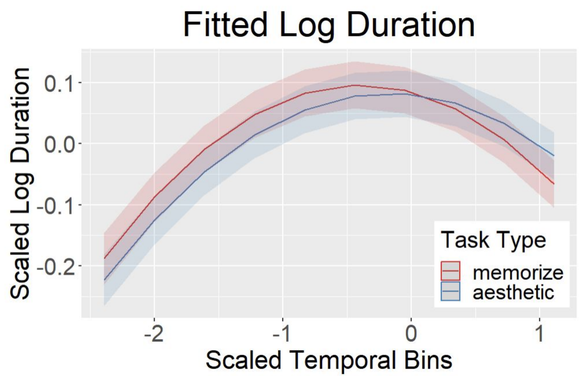
Observations:

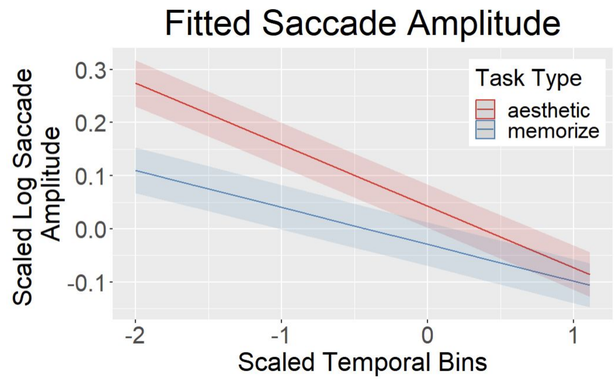
- Fixation durations increase initially then decrease toward later viewing
- Saccade amplitudes decrease linearly over time
- Task differences are practically insignificant











Conclusion

- Viewing task has little practical influence on saccade amplitudes and fixation durations over time.
- Our data partially replicated the ambient-to-focal switch:
  - As anticipated, we observed decreasing saccade amplitudes
  - Contrary to our expectations, fixation duration increased before decreasing again toward late scene viewing rather than a steady increase
- Our findings regarding fixation duration and saccade amplitudes somewhat align with prior research, while also analyzing task differences.

Future Directions

- Examining the role of the ambient-to-focal switch within:
  - Dynamic scenes
  - Recall
  - Other variables, e.g. pupil size

References

- Tatler, B. W., & Vincent, B. T. (2008). Systematic tendencies in scene viewing. *Journal of Eye Movement Research*, *2*(2). https://doi.org/10.16910/jemr.2.2.5

Acknowledgements

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