Space-Time Interference in Interception

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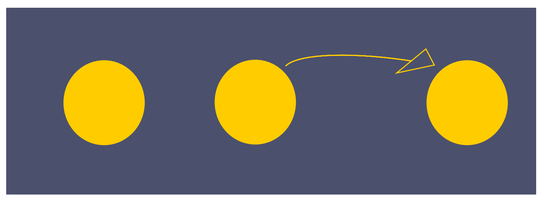
Background

Perceptual interference between space and time has been extensively demonstrated. A well-known example is the tau and kappa effects, where spatial distance between stimuli affects perceived temporal distance, and temporal distance influences perceived spatial distance. Schroeger et al. (2022) first explored this phenomenon in an interception task using a desktop setup. In our study, we employ a virtual reality environment, allowing participants full arm movement for a more naturalistic interaction. Since pupil dilation is known to respond to perceptual interference, we explored the behaviour of pupil dilation for space-time interference.



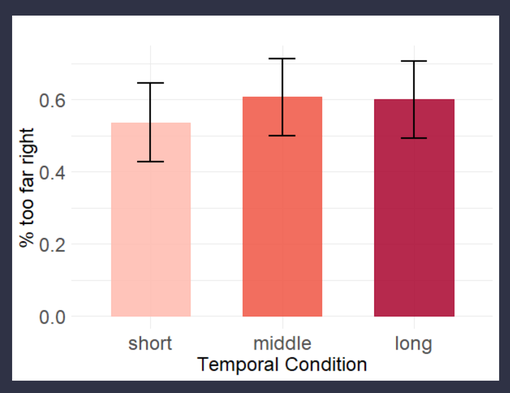
1. Does space-time interference extend beyond perception?

2. Is space-time interference reflected in pupil dilation?

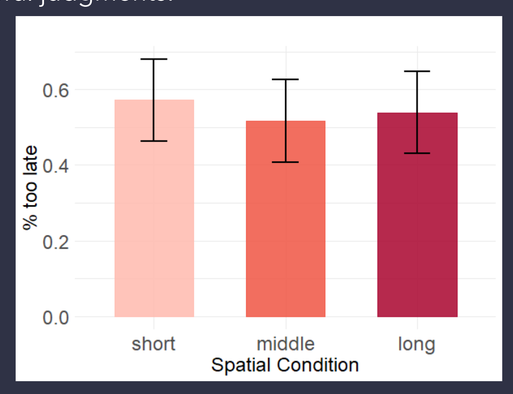
Results

Perception

Greater temporal distance increased the frequency of "too far to the right" responses.

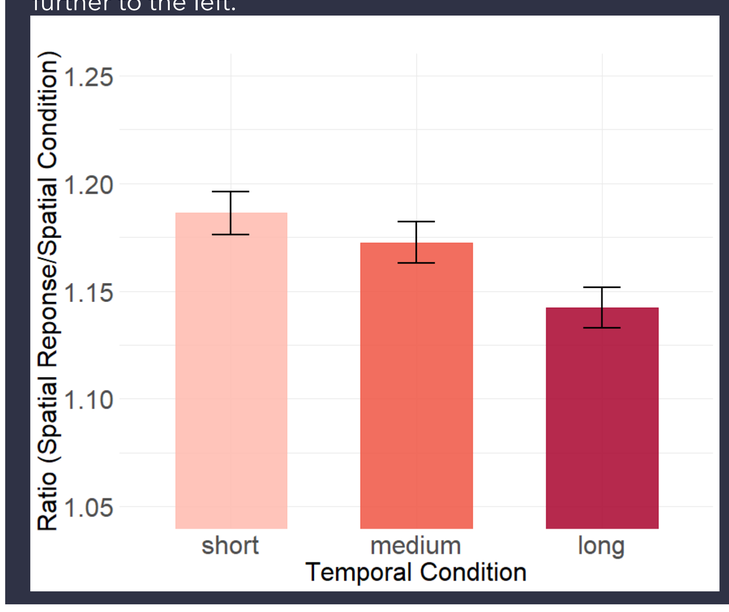


Greater spatial distance did not influence temporal judgments.

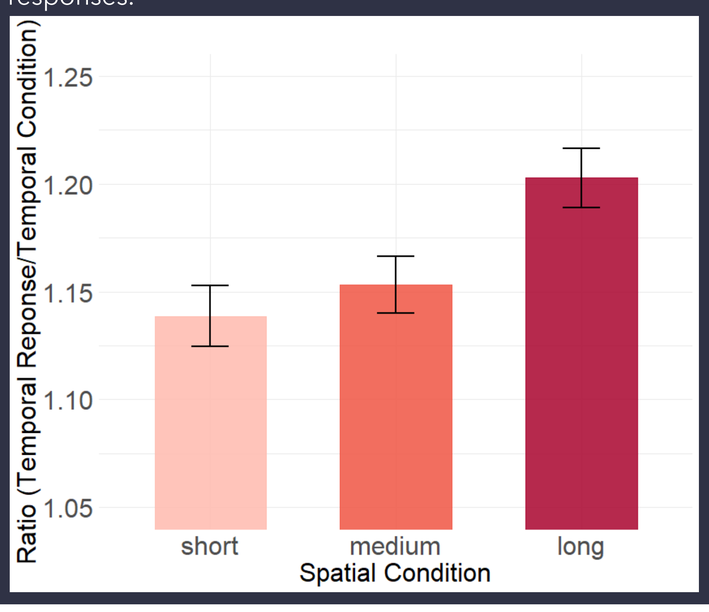


Behaviour

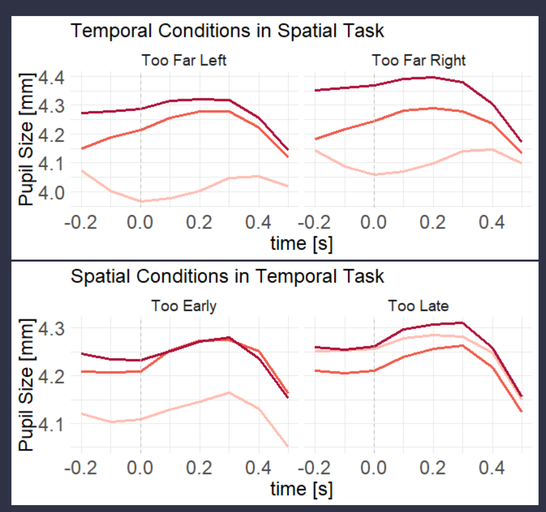
Greater temporal distance shifted spatial responses further to the left.

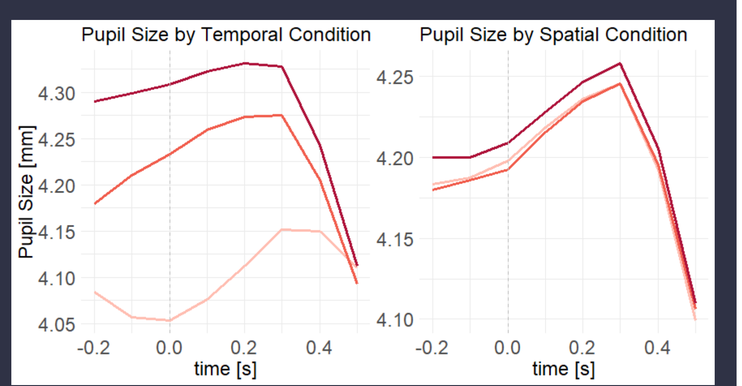


Greater spatial distance resulted in increased temporal responses.



Preliminary Pupil Dilation Results





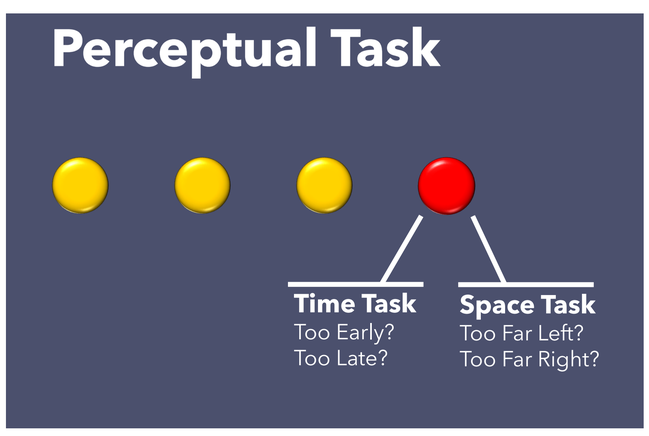
Methods

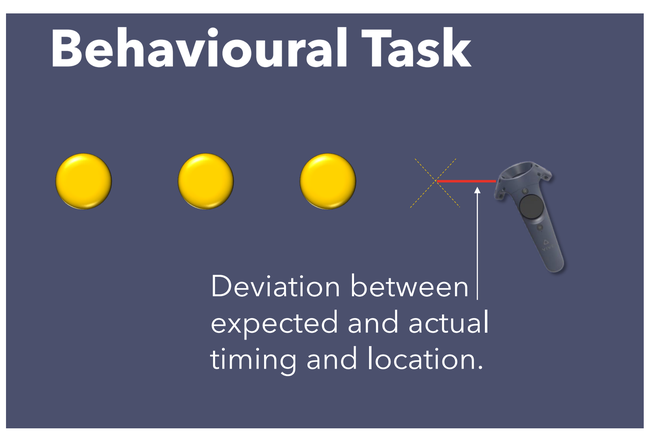
Participants

- 40 Participants, 22 Female
- Mean Age 26.8
- All Right-Handed

Pupil dilation:

- Recorded at 90 Hz
- Using integrated eye tracker of HTC Vive Pro Eye





Conclusion

1. **Higher Spatial Distance Leads to Higher Temporal Responses.**
2. **Perceptual and Behavioural Tau-Effects differ in their Direction, likely due to the Role of Perceived Speed.**

Literature

Schroeger, A., Grießbach, E., Raab, M., & Cañal-Bruland, R. (2022). Spatial distances affect temporal prediction and interception. Scientific Reports, 12(1), 15786.

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