



# Assessing Text Reading and Text Entry While Driving Using the Visual Occlusion Technique



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## Objective

Use visual occlusion to assess the distraction potential of text entry and text reading tasks of varying difficulty

## Background

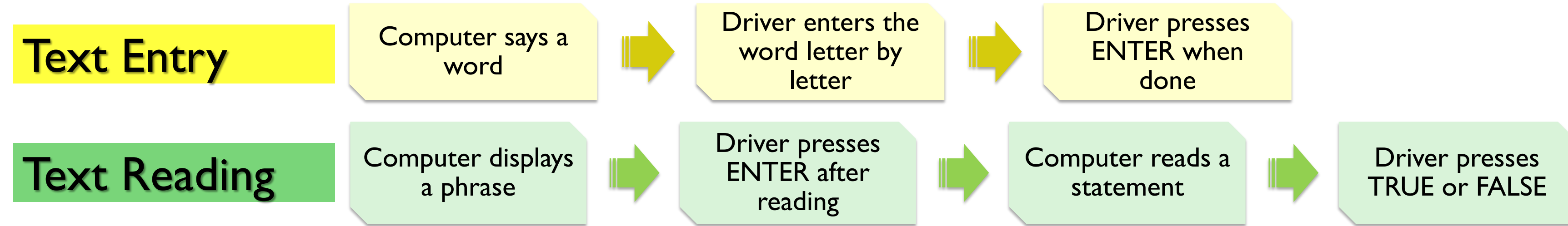
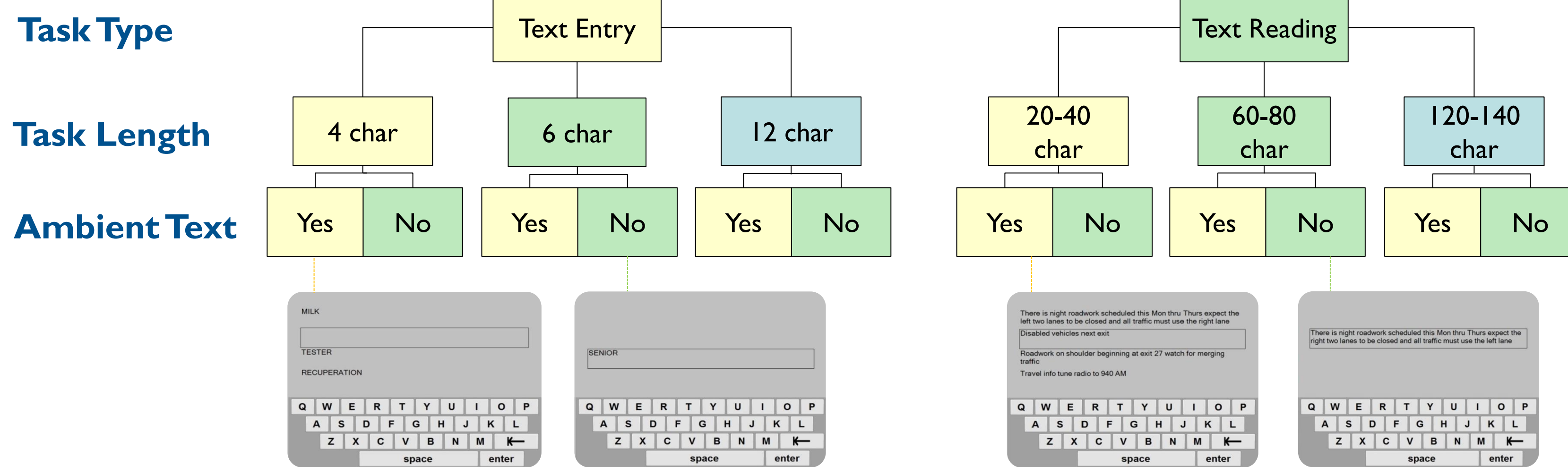
- Driver **distraction** impacts road safety
- Increasing presence of in-vehicle **infotainment systems** motivates the need to assess their distraction potential
- **Visual occlusion**: A surrogate driving task that may provide an efficient way to assess distraction potential

## Analysis Framework

- Repeated measures **ANOVA**
- **Dependent variable**:
  - **Total Shutter Open Time (TSOT)**: total time during which vision is not occluded while working on a task
  - Log transformed to meet ANOVA assumptions
- **Independent variables**:
  - **Within-subject factors**: task type, task length, and ambient text
  - **Between-subject factors**: gender and age group

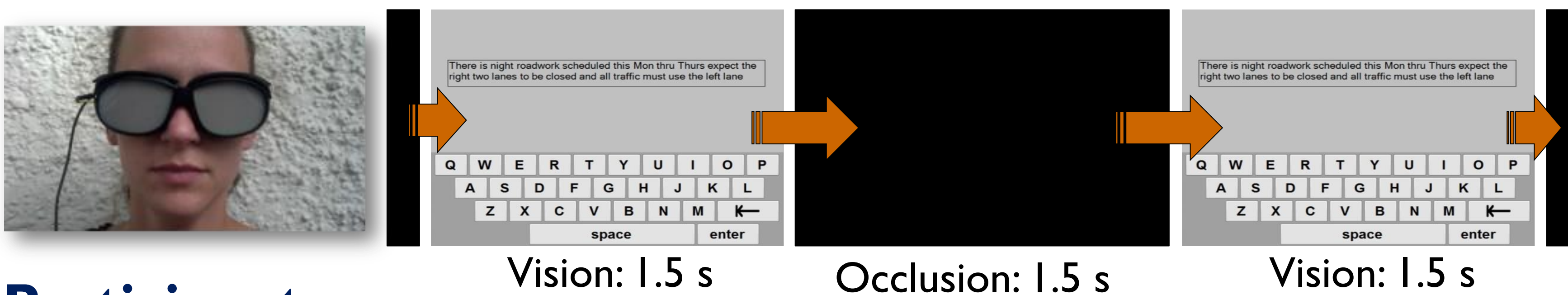
## Methods

### Experimental Design



Visual occlusion mimics eye glances to and from roadway by alternating vision and occlusion

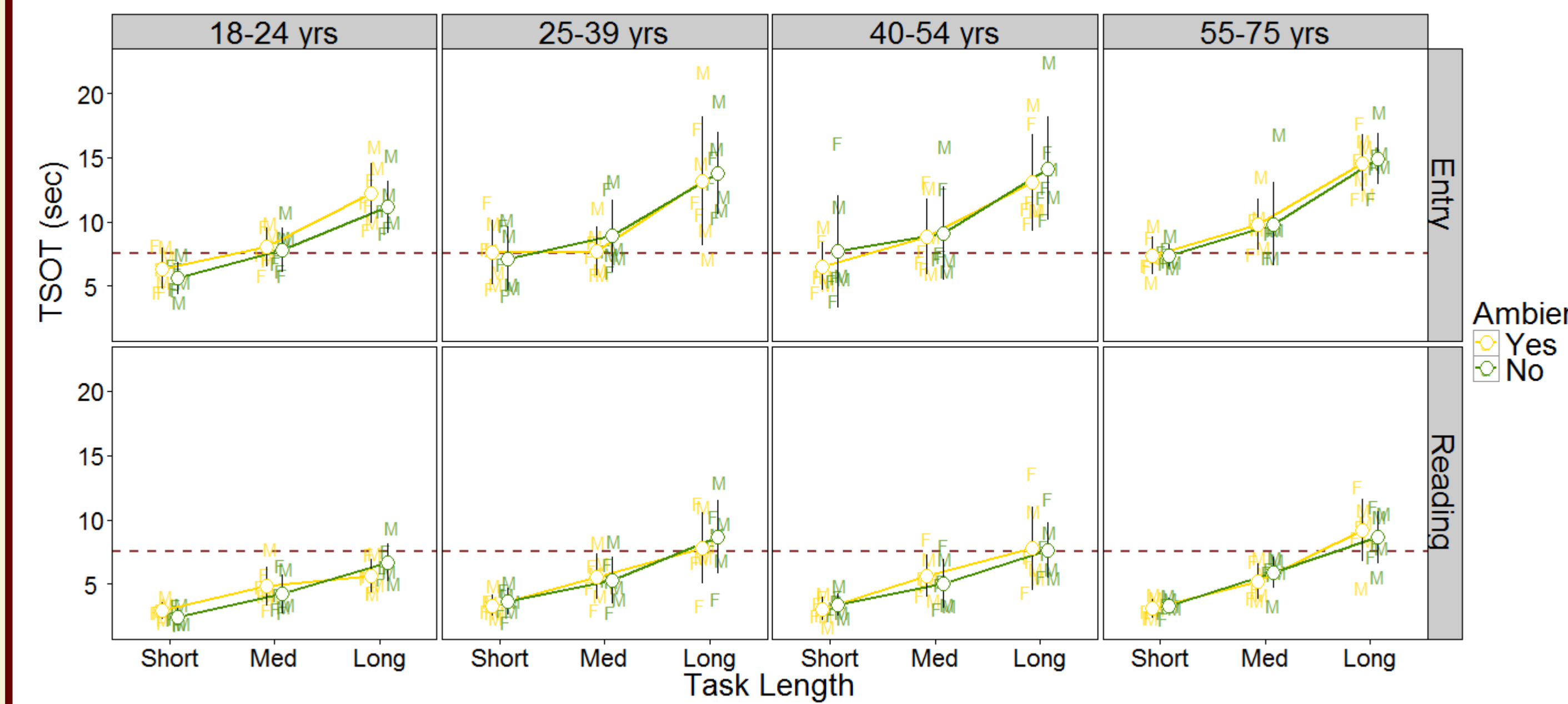
**Occlusion goggles** with 1.5 s vision : 1.5 s occlusion cycles (ISO 16673)



## Participants

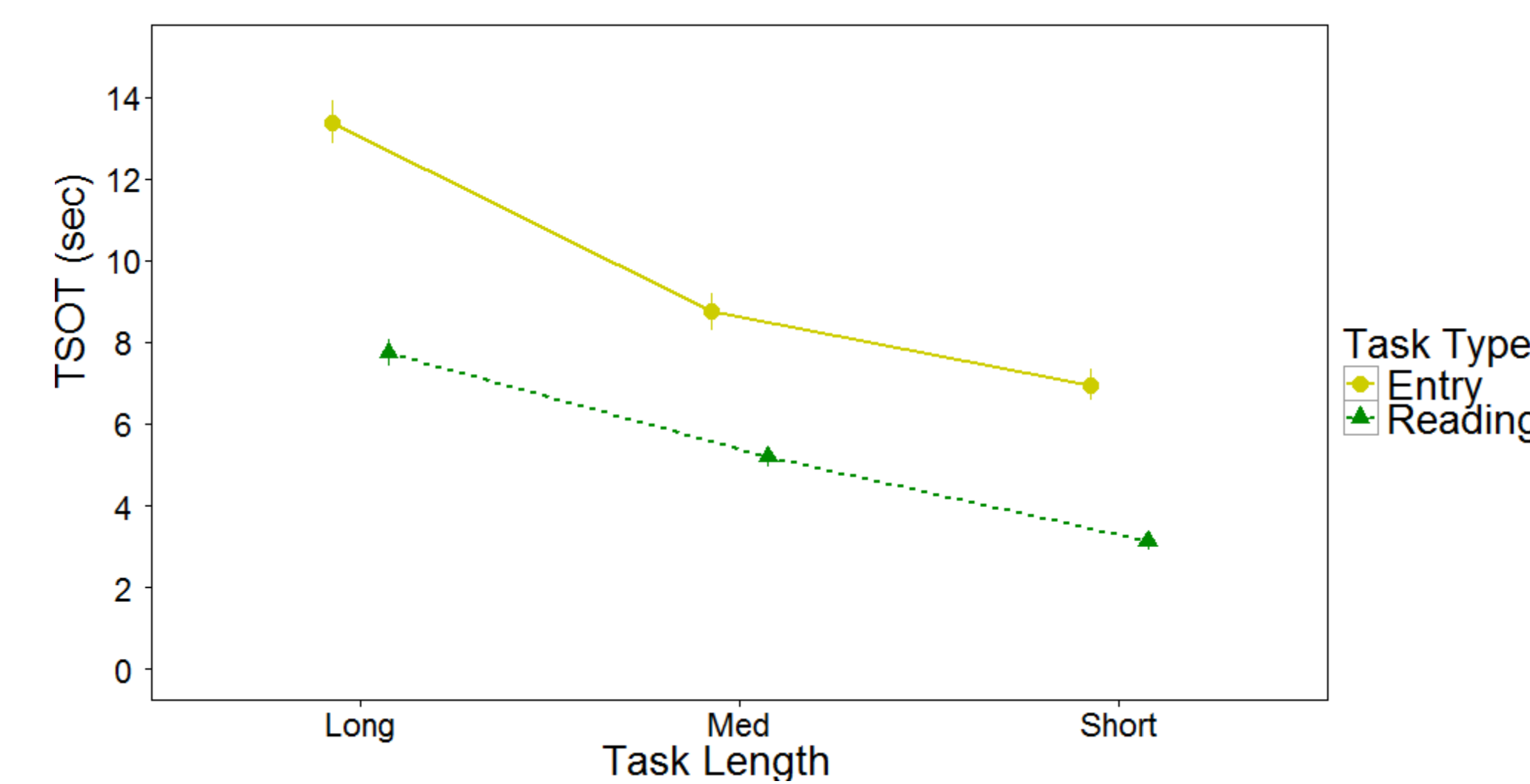
- 28 participants (14 men, 14 women)
- 4 age groups (18-24, 25-39, 40-54, and 55-75 years old); 7 in each group

## Results

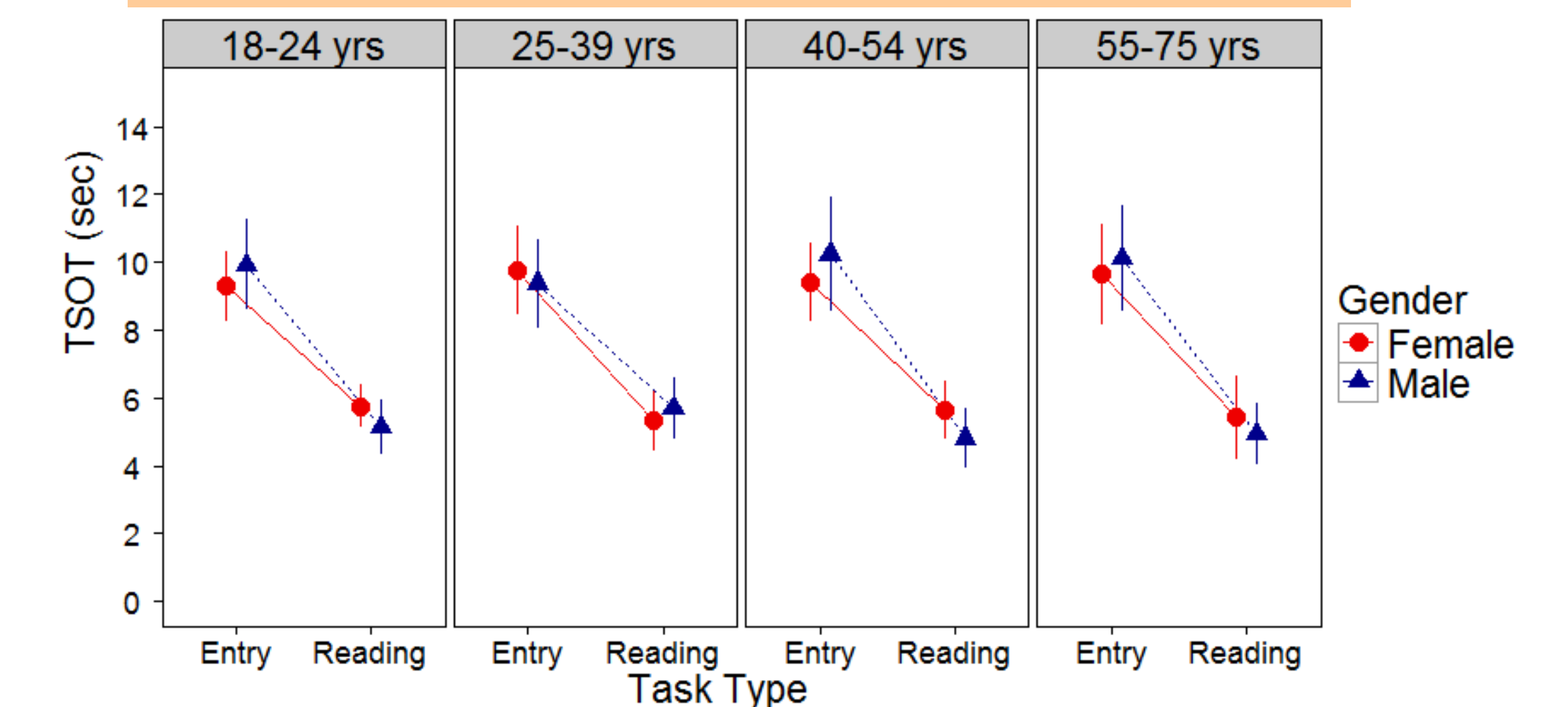


Text Type	Length	Ambient	TSOT ≤ 9s	TSOT ≤ 12s
Entry	Short	Yes	OK	OK
		No	OK	OK
	Med	Yes		
		No		OK
	Long	Yes		
		No		
Reading	Short	Yes	OK	OK
		No	OK	OK
	Med	Yes	OK	OK
		No	OK	OK
	Long	Yes		OK
		No		OK

### Task type-task length interaction



### Task type, age, and gender interaction



## Summary & Discussion

- TSOT was shorter than total task time in static condition
- Ambient text had no significant impact on TSOT
- The occlusion technique is **easier to implement and analyze**, compared to on-road and simulator studies (no eye tracking & coding of video needed)
- **Limitations of the occlusion technique**:
  - Does not provide insights on real-world situations; there is **no long glances** due to controlled occlusion
  - **No natural timesharing** occurs between driving and the secondary task; no task to attend to during the occlusion cycles

## Acknowledgements

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