

# Driver gaze monitoring for combatting distracted driving: A comparison of duration thresholds of eyes-off-road warnings and their effects on hazard detection



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## Background

- **Visual distraction** increases likelihood of **missed hazards**<sup>1,2</sup>.
- **Eyes-off-road (EOR) warnings** change drivers' gaze behaviour<sup>3,4</sup> and may help them **attend** to the road.
- EOR durations are typically **shorter than guidelines** (2s).

## Research Questions

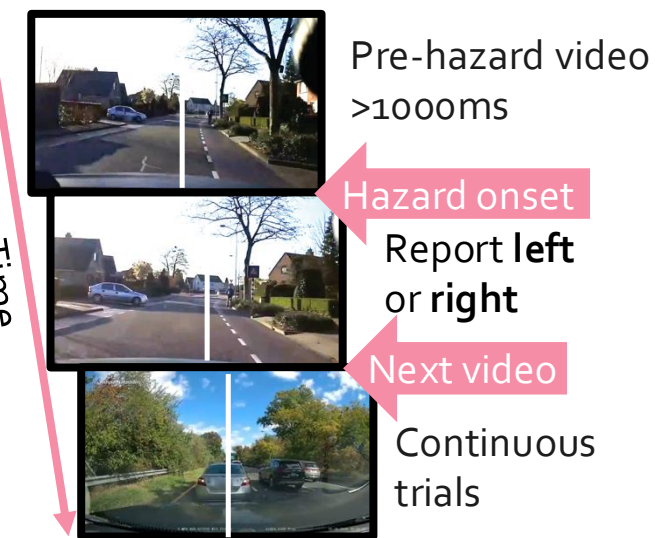
- Do EOR warnings of shorter thresholds of 1s and 1.5s:
  - Improve hazard detection accuracy and reaction time?
  - Change drivers' gaze behaviour?
- Are drivers aware of their EOR behaviour?



## Dual-Task Distraction Paradigm

### Hazard Detection Task

320 videos with noise mask (2 to 8s),  
50% contain hazards



### Meter Task

Press spacebar when meter enters **red** zone



Meter moves randomly  
**Bonus payments** based on overall meter task accuracy

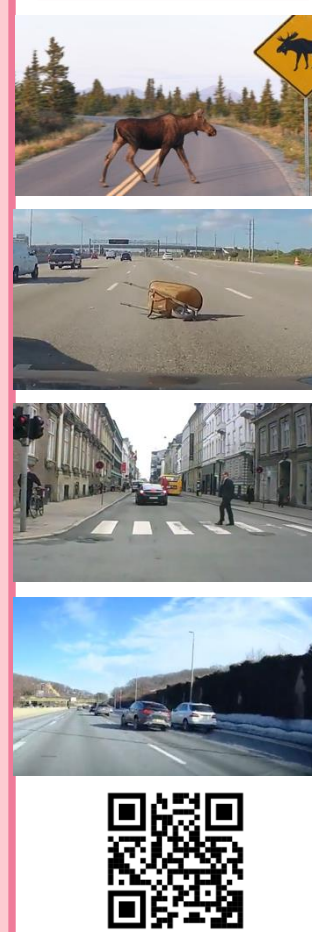
### EOR Warnings (1s or 1.5s)

18 drivers in each threshold  
2 blocks: warning present and absent



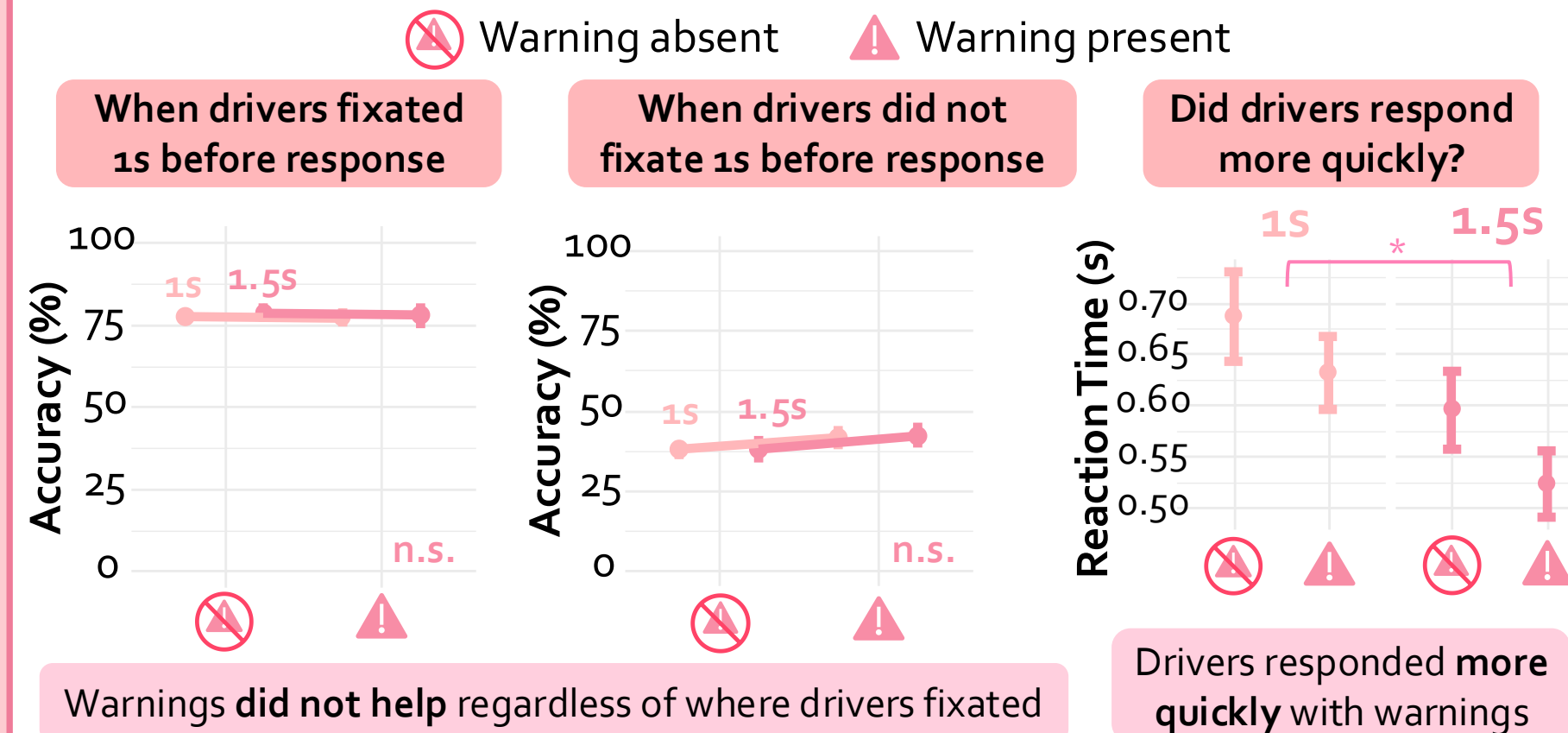
36 drivers, mean age = 19.28, SD = 2.17

## Hazard Examples

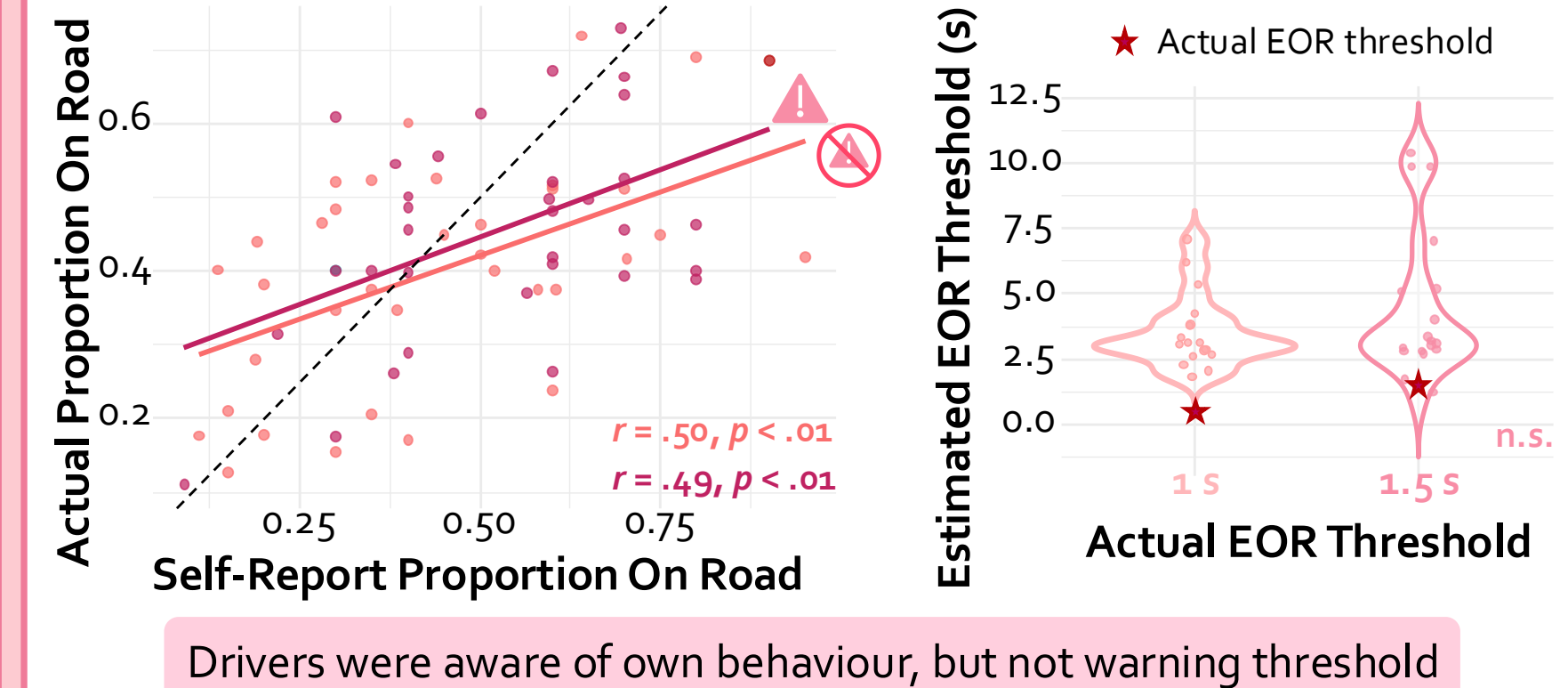


References: [1] D'Addario, P., & Donmez, B., *Accident Analysis & Prevention*, 127 (2019). [2] Harbluk, J.L., et al., *Accident Analysis & Prevention*, 39:2 (2010). [3] Ahlstrom, C., et al., *Transportation Systems*, 14:2 (2013). [4] Donmez, B., et al., *Accident Analysis & Prevention*, 39:3 (2007). [5] Song, J., et al., *Behav. Rev.* 56 (2024).

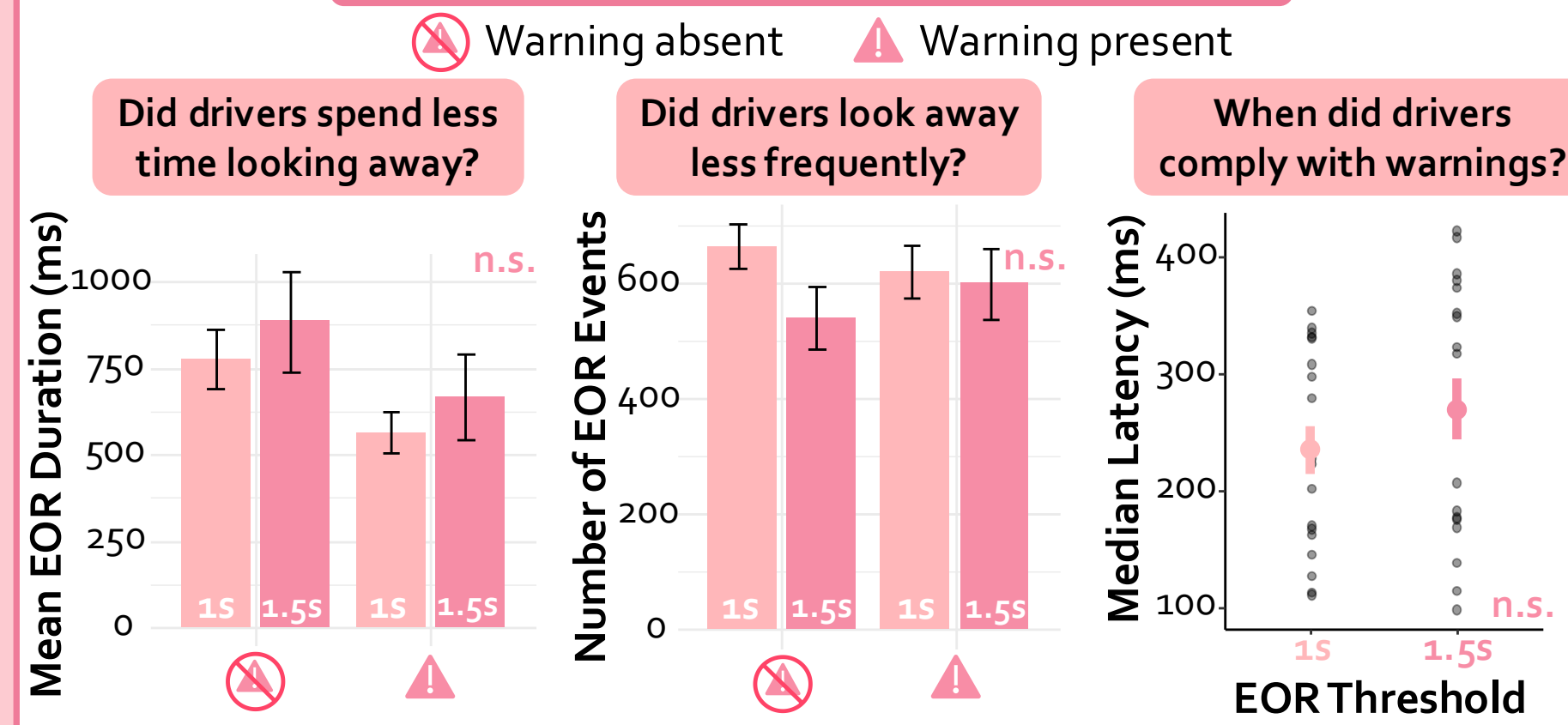
## Did warnings help drivers respond to hazards?



## Were drivers aware of their EOR behaviour?



## Did warnings change gaze behaviour?



## Gaze Transition Entropy (GTE)

