

# Driver Gaze Behaviour Before Predictable and Unpredictable Automation Failures

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## Types of Automation Failures

### 1. Predictable

- Cues would allow a driver to anticipate the failure
- E.g., bad weather, stopped vehicle

### 2. Unpredictable

- Cues that would allow a driver to anticipate the failure are not available
- E.g., mechanical failure, algorithmic error
- Studies have not looked at the impact of these different failure types on driver takeover and monitoring performance
- First step in quantifying these differences



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## Methods



Image from: Hopkins (2019)

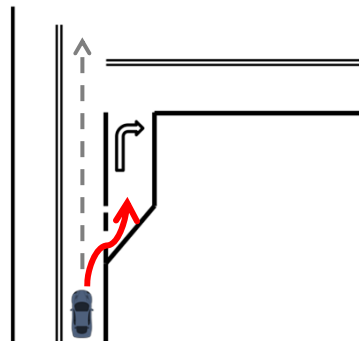


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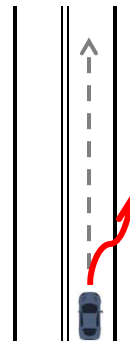
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## Methods

Predictable failure



Unpredictable failure



- 16 participants (8 male, 8 female)
- All received training so that they could identify predictable failures

Image from: Hopkins (2019)

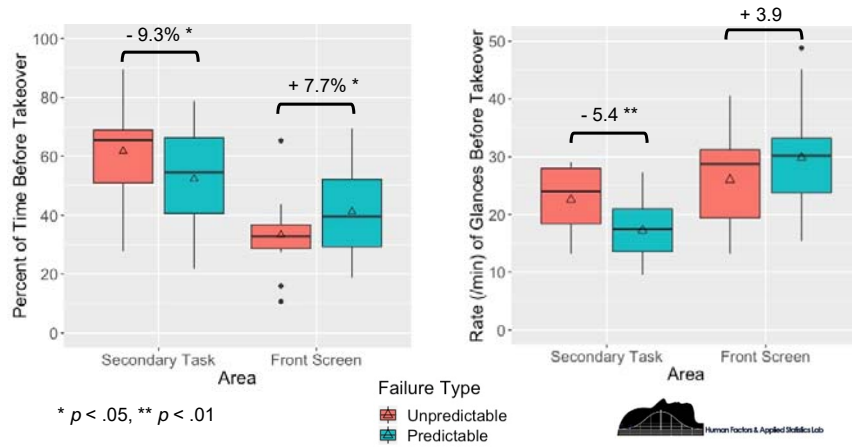


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## Findings

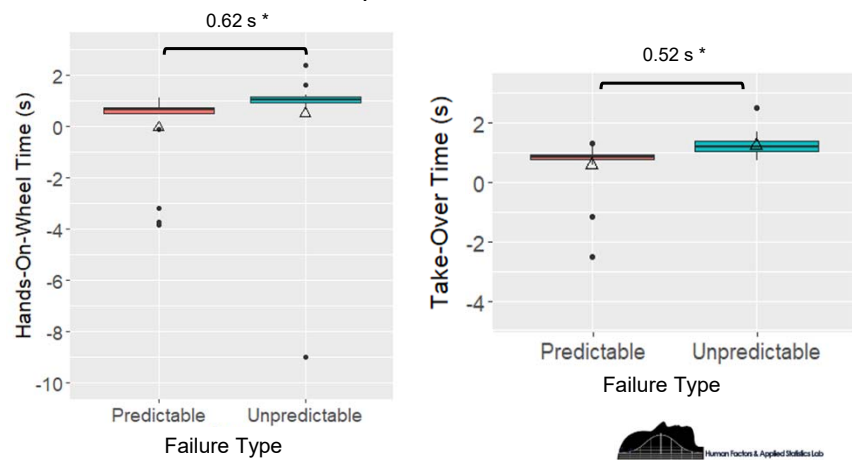
- Drivers were able detect predictable failures and change their monitoring strategy accordingly



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## Findings

- Drivers also put their hands on the wheel sooner and took over control sooner at predictable failures



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## Safety Implications

- If drivers do not have a complete understanding of the automation's limitations, failures that should be predictable may actually become unpredictable
- Would lead to drivers being unprepared for a failure event that they could have anticipated
  - In critical situations this could result in a collision
- Should aim to improve drivers' mental models of the automation so that predictable failures are anticipated
  - So that drivers decrease time spent looking off road and prepare to take over



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# Thank you!

### Contact Information

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