Impact of Tesla Autopilot on Cognitive Workload and Glance Allocation

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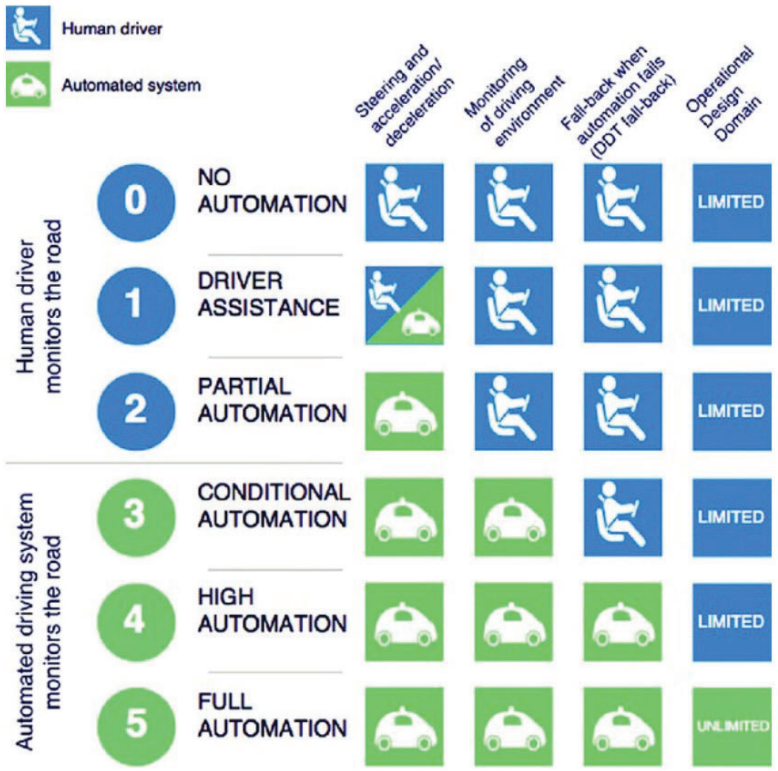
SAE taxonomy

Partial automation requires the human operator to:

- Monitor the functioning of the L2 system
- Regain control when necessary



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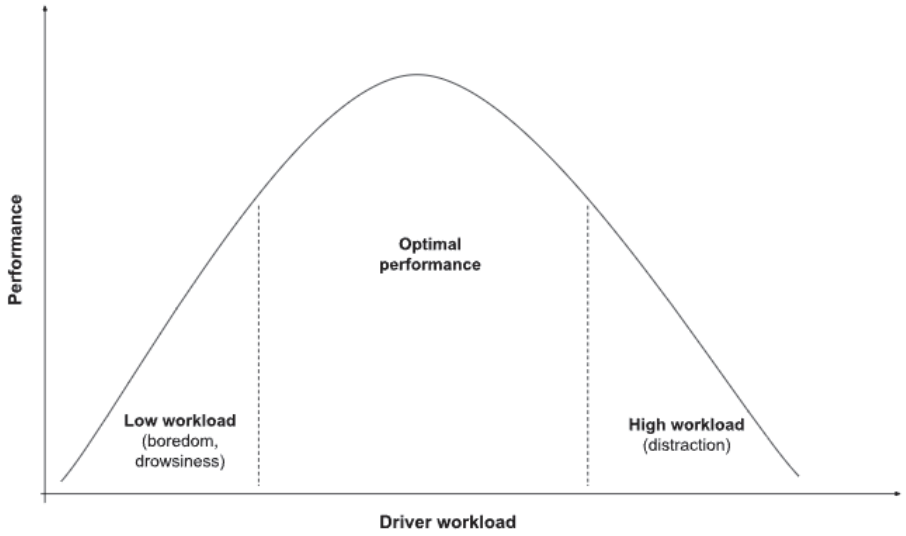
Cognitive workload

- Driver's role transitions from *system operator* to *system supervisor*.

- It is expected that this will reduce cognitive workload, resulting in boredom and reduced performance.



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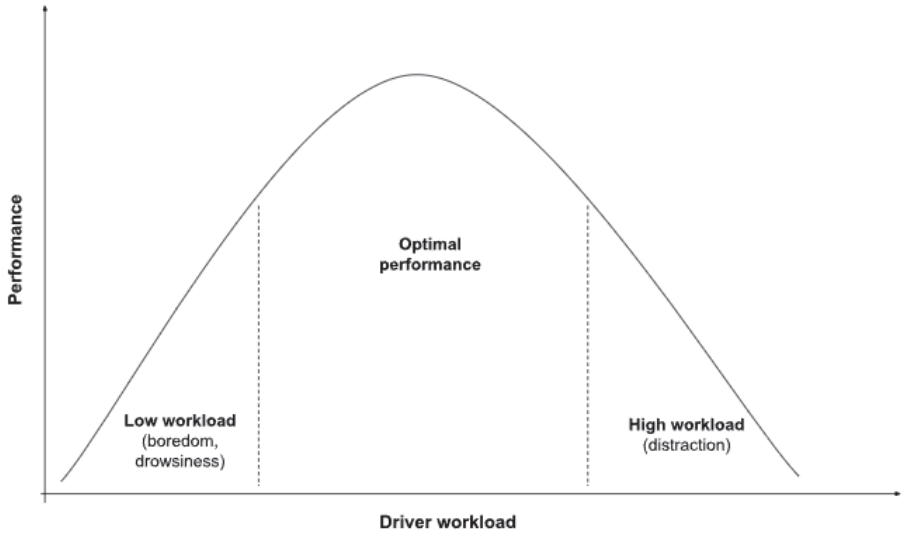

Current study

- This study investigates cognitive workload and glance allocation during Autopilot use.
- On-road study with drivers being monitored during Autopilot and manual driving.
  - Detection Response Task performance
  - Glance allocation

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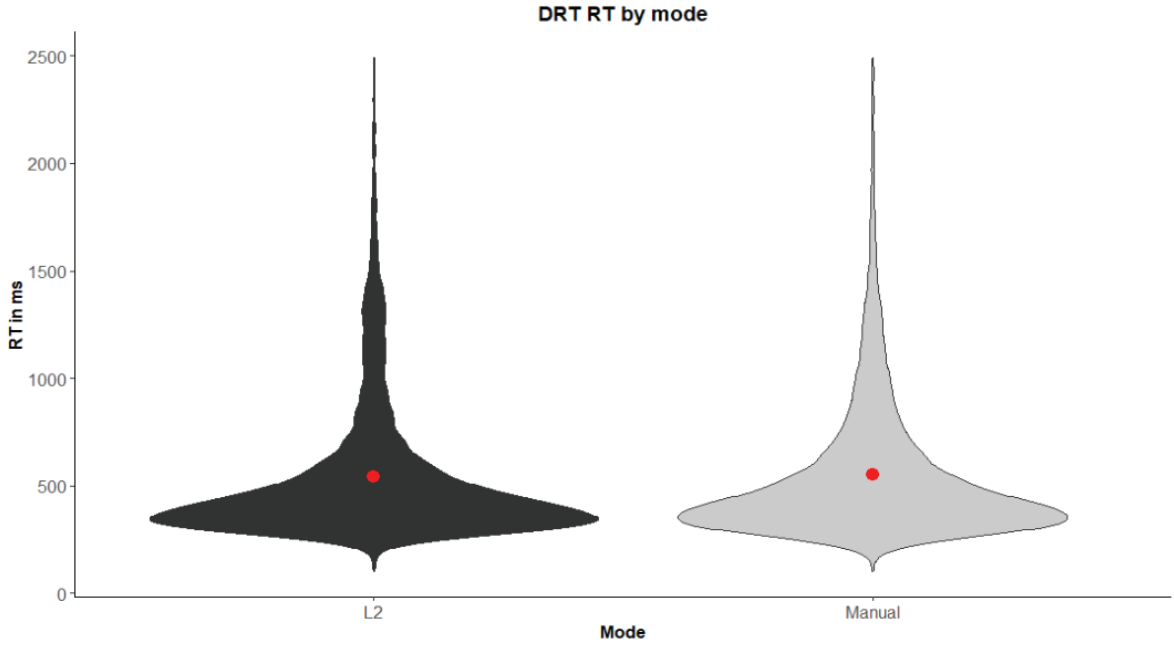
Cognitive workload

Cognitive workload

- **No difference in DRT performance**



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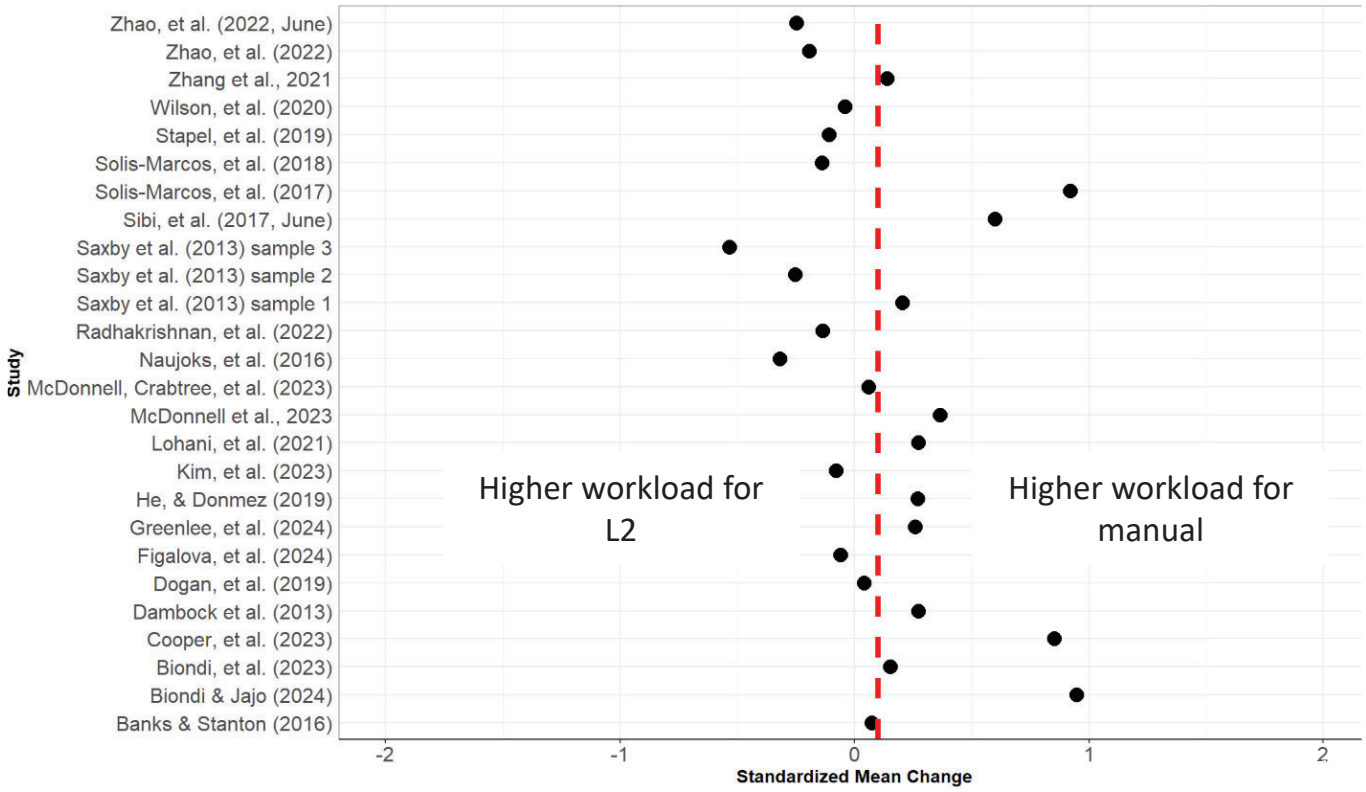
Cognitive workload

- Consistent with the rest of the literature.
- A meta-analysis by Vasta and Biondi shows no differences in cognitive workload between manual and L2 driving.



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Glance allocation

Glance allocation

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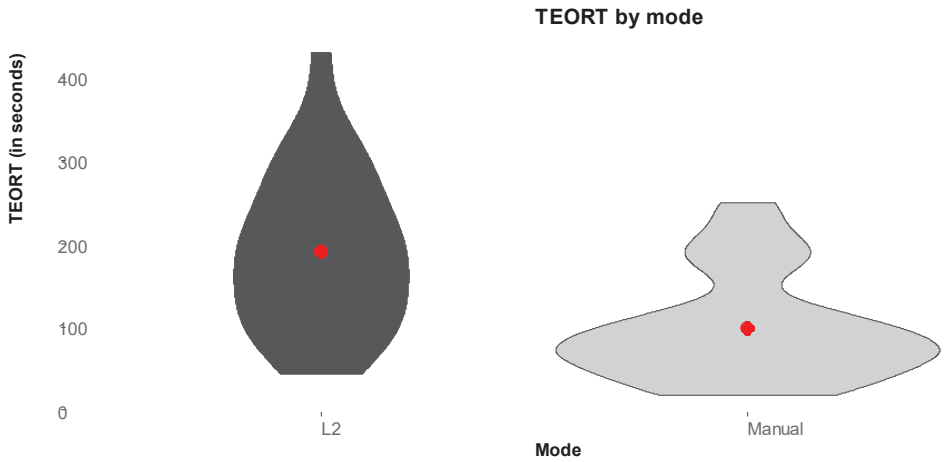
Glance allocation



	Average TEORT (in sec)	Max TEORT (in sec)
L2	190 (8% of total drive)	431 (18% of total drive)
Manual	98.8 (4% of total drive)	250 (10% of total drive)

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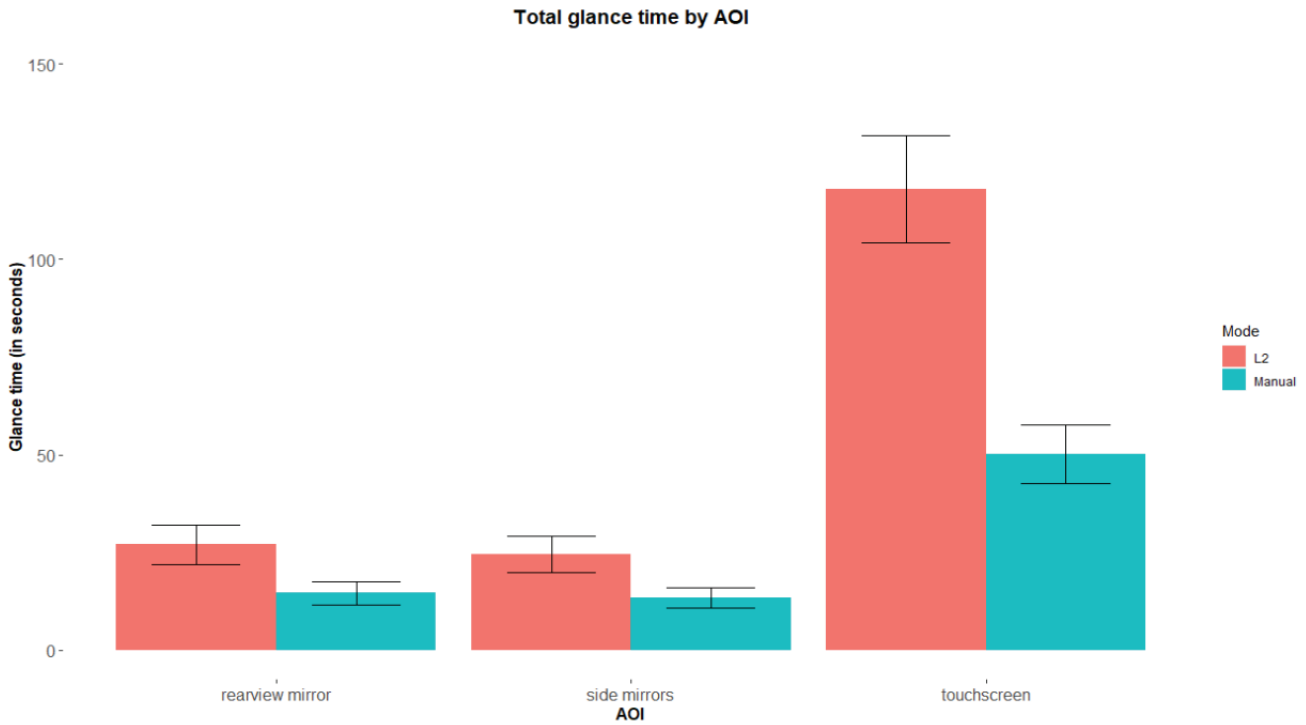
Glance allocation

Total glance time by AOI

- The total time spent looking at each AOI



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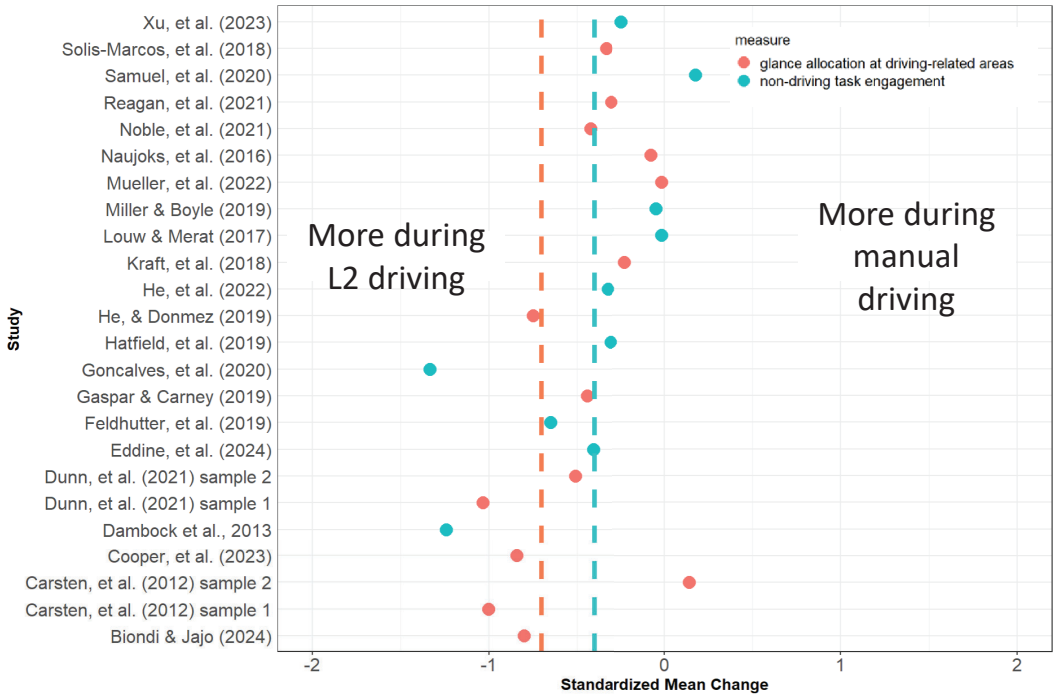
Findings

- Drivers' cognitive load was not affected by driving mode.
- Glance data revealed significant differences between L2 and manual mode
  - Drivers spent **more time looking away from the forward road** during L2 mode.
  - Consistent with, e.g., Noble et al. (2021), Reagan et al. (2021), and Mueller et al. (2024)



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Considerations

- Plausible that when in L2 mode, drivers are inclined to divert their attention away from the road to self-regulate.

- More research on accuracy of driver monitoring systems whose ability to detect inattention and distraction is unproven at the moment.

The end

Special Section on Investigating the Human Factors of AI

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Topics of Interest Include:

- Effects of AI on cognitive performance and behavior
- Benefits and unintended consequences of AI on work performance and innovation
- Organizational implications stemming from increased AI integration in the workplace
- Safety risks associated with AI across various Human Factors domains
- Ethical considerations surrounding AI in Human Factors practice

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Submission Guidelines

Select the Human Factors in AI special issue available after initiating the manuscript submission on the Human Factors journal submission system.

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