

# Anticipatory Driving in Automated Vehicles

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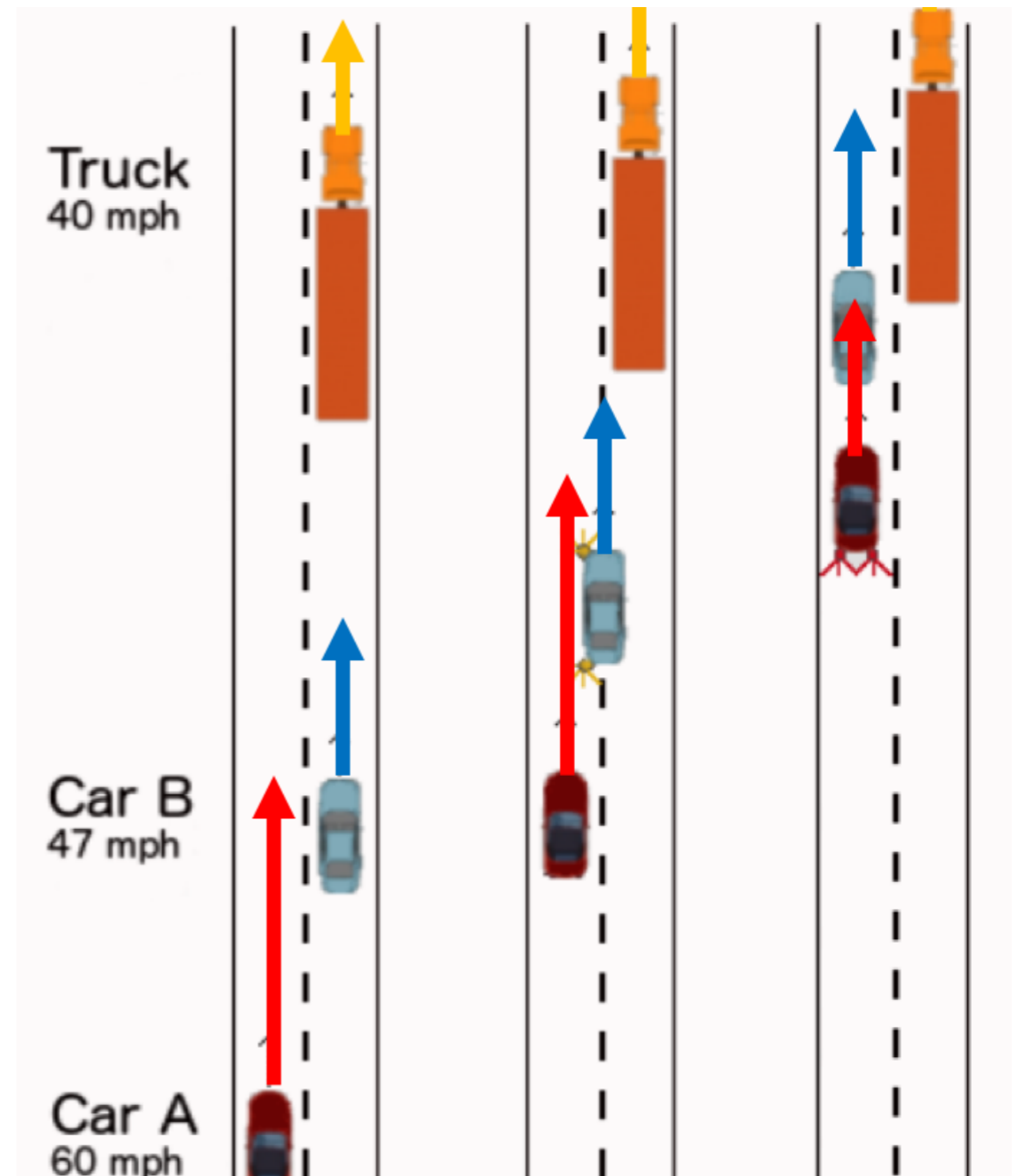
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# Anticipation Behaviour in Driving

*“a manifestation of a high level cognitive competence that describes the identification of stereotypical traffic situations on a tactical level through the perception of characteristic cues, and thereby allows for the efficient positioning of a vehicle for probable, upcoming changes in traffic ” (Stahl et al 2014, p. 603)*



# Background on Anticipatory Driving in Automated Vehicles

## Anticipatory driving

- A significant element of driver competence
  - More prevalent among experienced drivers (Stahl et al., 2014)
- May be influenced by secondary task engagement
  - Both visual and cognitive distraction can degrade hazard perception (Borowsky et al., 2015; Sagberg and Bjørnskau, 2006)

## Automation in vehicles (SAE level 2 or 3)

- Still requires drivers to monitor and take-over in emergency
- Reduces situation awareness (Stanton&Young, 2005)
- Increases secondary task engagement (De Winter et al., 2014)

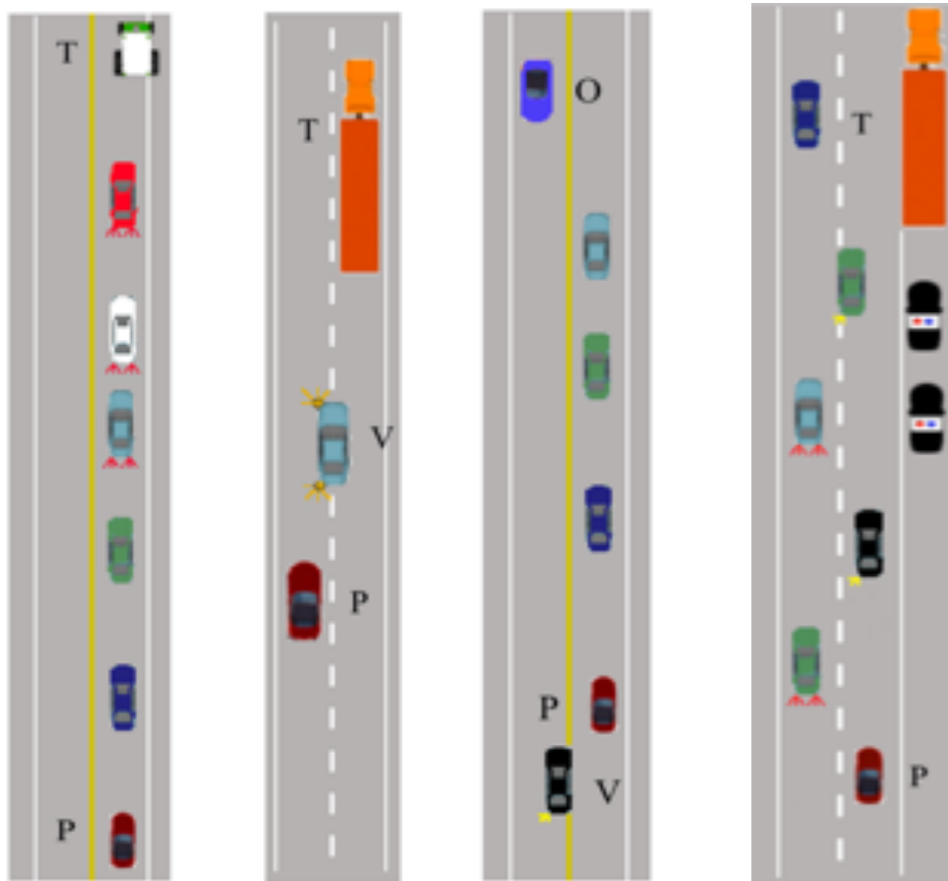
**Unclear how automation influences anticipatory driving**

# Driving Simulator Experiments

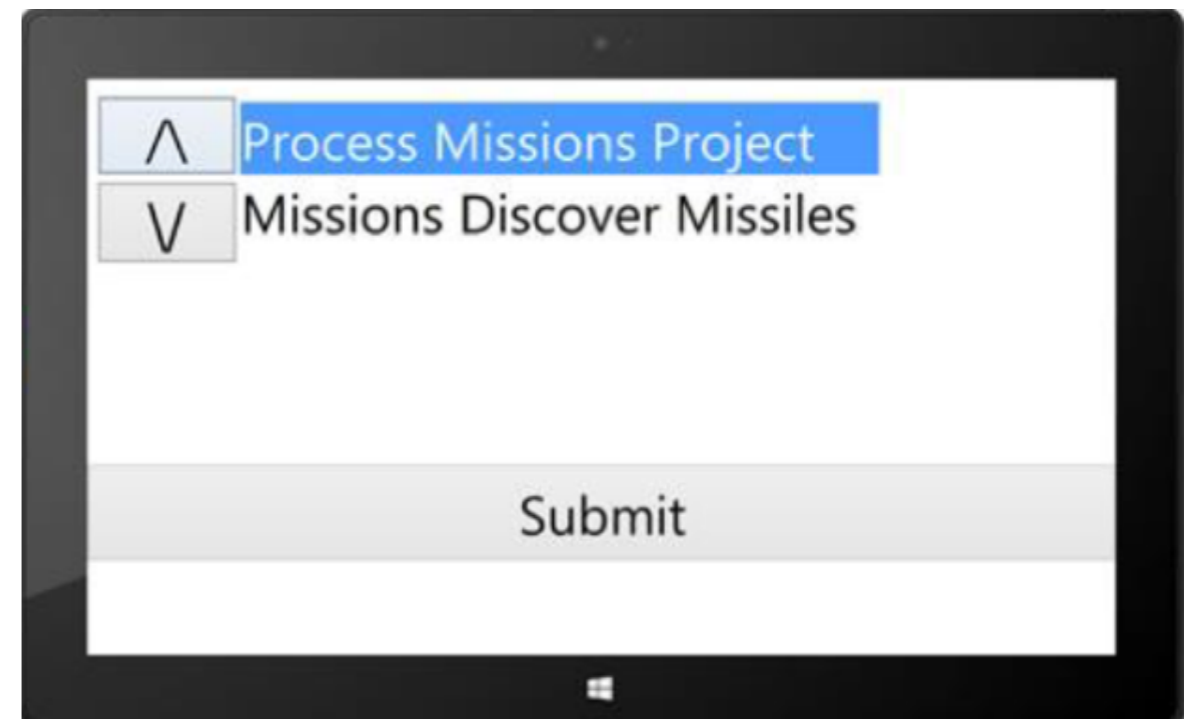
- 64 participants in 2 experiments

	Years of licensure	Distance driven in the past year (km)
Experienced	$\geq 8$	$>30,000$
Novice	$< 3$	$<10,000$

- Scenarios that enable anticipation



- Visual-manual self-paced secondary task



# Experimental Design

	<b>Group: Participant no</b>	<b>Experience</b>	<b>Secondary Task</b>
<b>Experiment 1: No automation</b>	1: #1-8	Experienced	Yes
	2: #9-16		No
	3: #17-24	Novice	Yes
	4: #25-32		No
<b>Experiment 2: Level-2 automation</b>	5: #32-40	Experienced	Yes
	6: #41-48		No
	7: #49-56	Novice	Yes
	8: #57-64		No

# Preliminary Results from Exp1: **No automation**

- Anticipatory behaviours were more prevalent among experienced drivers
  - Confirms findings of Stahl et al. (2014)
- Experienced drivers paid attention to anticipatory cues earlier, indicating better visual scanning capability
- Secondary task reduced the likelihood of exhibiting anticipatory behaviours for both groups

# Questions?

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