



## Transitions in Automated Driving

Virtual, 9-10 September



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Volvo Cars

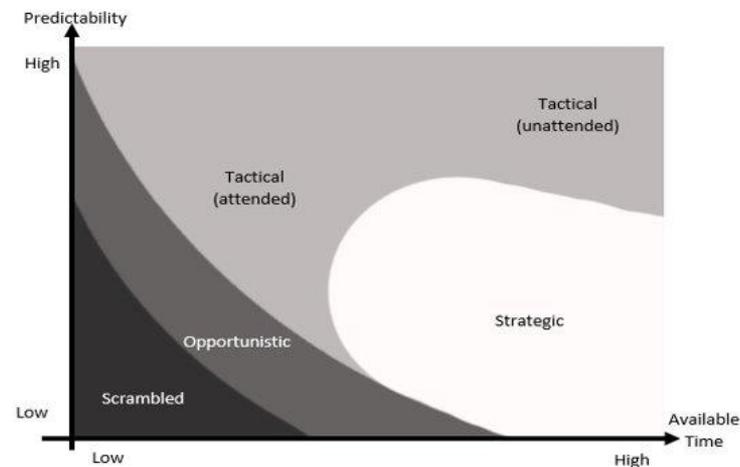
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**”Take over + automated driving” yields > 1m hits on Google Scholar**



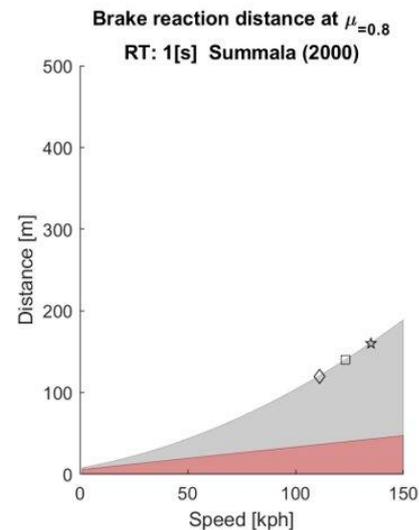
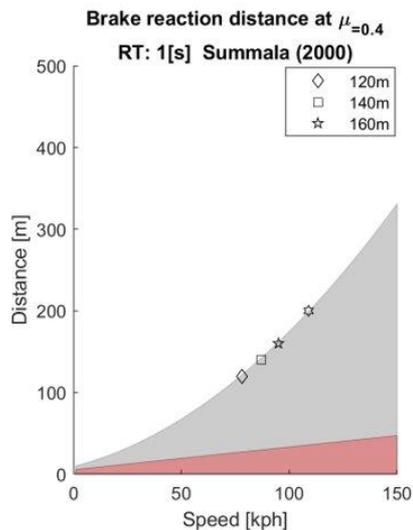
# Take-backs

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- Heavy focus on the **'hot-potato'** transition.
- Drivers are ill prepared at responding to an unanticipated, critical situation.



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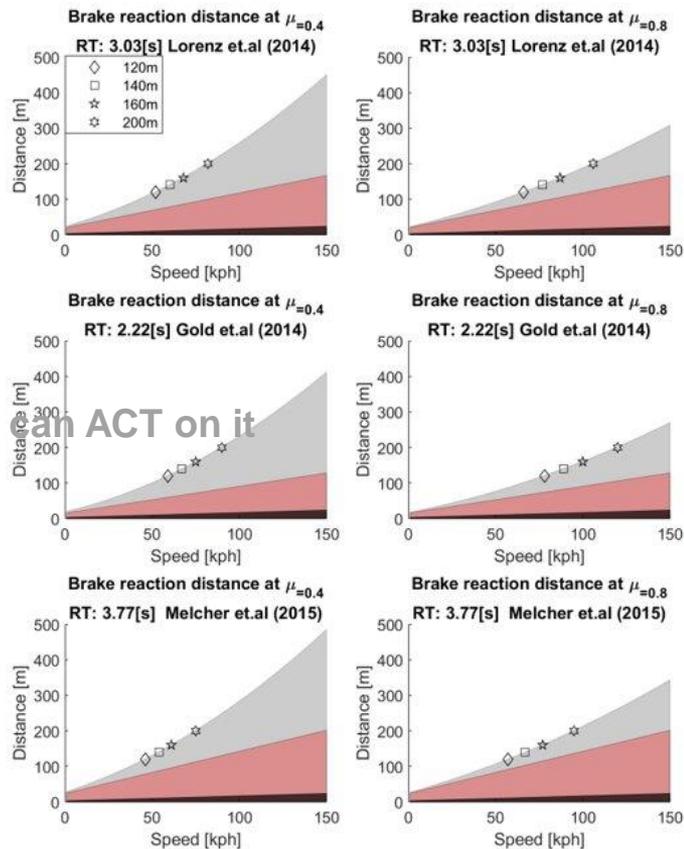
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- Heavy focus on the **'hot-potato'** transition.
- Drivers are ill prepared at responding to an unanticipated, critical situation.
- Drivers of a manual vehicle respond to sudden events fairly fast, and are able to mitigate.
- Riders of AD vehicles are less prepared to do the same.

IF we can see it, we can ACT on it



# The trolley problem

Some reflections

If we can act on it, than is the trolley problem really a problem?

- Trolley problem based on scenario where there is no way to escape a negative outcome
- **Time** is a key factor in recognising and processing multiple, potentially better, viable solutions
- If we can act decisively to buy more **time** (i.e. early emergency braking), the severity of the trolley problem is mitigated to a large extent

The technology being able to act earlier and more decisively than a human, thus offering a plurality of options, which circumvents the trolley problem





• **Simulators are extensively used in contemporary studies.**

- Validity

- Driver risk perception

• **Our results don't replicate with sim studies.**

# Re-focus

Other transitions warrants additional attention for example, activating AD.

- Faults
- Mistakes
- Mode confusion

Move testing out of the simulator, where possible

# Wizard of Oz



# Wizard of Oz



# Mixed reality



Transitions are now regulated to a larger extent by the **ALKS** framework from UNECE.

§ 5.4.1 The activated system shall recognise all situations in which it needs to transition the control back to the driver.

§ 5.4.4.1 ... a minimum risk manoeuvre shall be started, earliest 10 s after the start of the transition demand

§ 5.1.5 If the driver fails to resume control of the DDT during the transition phase, the system shall perform a minimum risk manoeuvre. During a minimum risk manoeuvre, the system shall minimise risks to safety of the vehicle occupants and other road users.

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Thank you for your kind attention.

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