

How will drivers interact with vehicles of the future? A Naturalistic Simulation Study

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Abstract

Future vehicles presenting level-3 automated functionality will enable drivers to engage in physically and cognitively-captivating activities while the vehicle is in control. However, little is known regarding the activities that drivers will undertake, and how these may affect their interactions with the vehicle and the road situation.

Previous investigations have utilized surveys or single-exposure driving simulator studies, and are therefore unlikely to reveal fully or accurately what might occur in prospective traffic situations. In contrast, we have developed a new user-centred experimental paradigm – Naturalistic Simulation – that exposes participants to extended or repeated exposures in a driving simulator, enabling behavioural adaptations to be studied. By utilising a simulator (rather than a naturalistic field study), technology that is not yet production-ready or may present a risk to participants, can be evaluated in a safe, controlled, and cost-effective environment.

Building on a previous qualitative investigation, fifty participants have been recruited to undertake a 30-minute ‘commute’ journey which supports L3-automation, on each of five consecutive days. Participants have been asked to consider what activities they might undertake in a L3-automated vehicle during such a journey, and bring with them whatever they require to enable these. Participants will then be able to undertake their chosen activities during periods of automation. In addition to observing activities and exploring behavioural adaptations over the week, various trust challenges will be presented to participants, including inclement weather (heavy fog) on the penultimate day of testing that creates an unexpected, emergency take-over request.

Collection and analysis of video recordings, eye-tracking data and physiological measures will commence shortly, and preliminary results will be reported. Findings will be used to understand the likely impact of L3-vehicles on the safety and efficiency of future driving situations, as well as the ultimate user experience and acceptance/uptake of the technology.