Highly automated driving: How to get the driver drowsy and how does drowsiness influence various take-over-aspects?

In the context of highly automated driving (HAD) the driver state drowsiness is becoming increasingly important. For assessing the usefulness of different strategies to manage drowsiness during HAD, appropriate test methods are needed. To determine whether a right-hand-drive vehicle (RHDV) is a suitable method, a study with 31 participants was conducted on the motorway A9 in Germany. Two investigators evaluated the drowsiness level (DL) of the participants during the test drive. Depending on the participant's DL Requests to Intervene (RtI) were triggered. There was no statistically significant influence of drowsiness on take-over-time aspects. Our results indicate that extremely drowsy drivers are still able to perceive and to react to a RtI. However, it should be considered that the take-over scenario used in this study was rather simple and quality aspects could not be assessed by the RHDV-setting. This study demonstrates that it is possible to induce and enhance drowsiness by controlling several influencing factors such as caffeine and atmosphere. Thus, this approach can be helpful for future studies when evaluating the effectiveness of different
reactivation or transition strategies to manage drowsiness during HAD.

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