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TITLE: Simulator study on the influence of an illuminated digital billboard on driving behaviour with a focus on variable display time and distance from a pedestrian crossing

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The presence of an illuminated LED-advertising sign can influence driving behaviour. This study investigates the effect of display time and location of LED-billboards on driving behaviour.

Forty-one participants drove seven different routes (3.8 to 5.2km) in a medium fidelity fixed-base simulator. In every scenario the illuminated billboard was presented in 2 different road environments: a transition road to a built-up area and an area with retail stores. We used a within-subject design (repeated measures ANOVA) with presence of an illuminated billboard, display time (3s, 6s and 15s) and distance from a pedestrian crossing (41m and 65m) as the manipulated conditions in a randomized order.

Test scenarios with an illuminated billboard resulted in a higher approaching velocity towards the pedestrian crossing with the minimum approaching speed during this being reached later (closer to the crossing). A display time of 3s resulted to the highest approaching speed. Presence of the illuminated billboard, display time and distance did not influence the standard deviation of lateral position. The first time that a pedestrian crossed the road (effect of surprise), reaction time to the crossing pedestrian was higher when the illuminated billboard was present. The NASA Task Load Index revealed that the presence of a LED-advertising sign resulted in a significantly higher mental load and a lower estimation of personal driving performance.

Based on the results, we conclude that the presence of an illuminated billboard potentially has a negative effect on driving behaviour, especially when display time is short. Practical implications will be discussed.