

# The Effects of Road Marking Patterns on Simulated Driving Speed and Lane Position

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Although road markings have been installed on highways for the sake of speed reduction and lane keeping, little is known about the effects of road marking shape. Moreover, it is not clear whether a set of road markings with converging intervals towards the direction of travel is perceived by drivers more as unobtrusive cues causing the illusion of acceleration, or as an obtrusive alarming object that makes drivers slow down.

An experiment with a driving simulator and 2 questionnaires was conducted to explore the effects of road marking patterns on driving speed and lane position in association with driver's subjective feelings, mental workload, and visual attention. Thirty-nine participants ( $M = 22.55$  years old,  $SD = 5.08$  years old) drove on a simulated two-lane rural road, which had road markings with different shapes (*Parallelogram Edge Line*, *Wide Chevron*, *Narrow Chevron*, and *Optical Dots*; Figure) and intervals (*Constant* and *Convergent*) as within-subjects independent variables at sharp curves. After driving, the participants watched video clips of the driver's view to rate subjective feelings (*Feel of Danger*, *Feeling of Speeding*, *Eyes on the Road*, and *Difficulty of Grasping Distance*) and mental workload (*Driving Difficulty*) for each road marking shape using the seven-point Likert scale. The participants also reported the areas they specifically paid attention to during the driving session by circling the areas on sheets of paper presenting the driver's view of each road marking.

The road markings reduced throttle value and mean speed before entering a curve, while throttle and mean speed remained the same in a curve. Although marking shape did not affect participant's speed choice, an alarming effect of the road markings was observed because the participants tended to drive slower with the road markings with a fixed interval than with those with converging intervals towards the travelling direction. Standard deviation of lane position was not fully investigated due to a floor effect. However, some participants showed relatively unstable lateral positions without the markings while they did not swerve with the markings. The questionnaire on driver's attention also implied a possible use of road markings for lane position keeping.

The results of the present study recommends to introduce road markings with a high alarming potential (e.g., *Wide Chevron* and *Optical Dots*) on the preceding hazardous curves for speed reduction whereas it would be effective to install road markings as steering guides (e.g., *Parallelogram Edge Line* and *Narrow Chevron*) in a curve. Further investigations in different situations are required to achieve the more fitting use of road markings. (安全行動学)

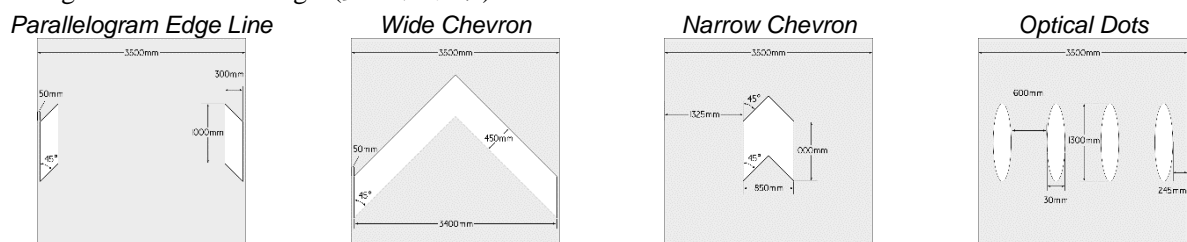


Figure. Pavement markings used in the present study. The upper side is the direction of travel.