

Advanced Warning Systems Increase Safety at Intersections, Study Shows

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Clemson, SC — Most drivers have experienced a traffic signal that turns yellow just as they approach an intersection, which makes it difficult for them to decide whether to stop or proceed through it. The wrong choice in this situation, known as the “dilemma zone,” may lead to crashes, especially at high-speed intersections.

A major factor making driving difficult is hazards that are sudden and hard to predict. Roadside and in-vehicle display warning systems may help drivers handle these hazards by predicting their occurrence and providing advanced warning to the driver, according to a new study published in journal *Human Factors*.

[Clemson University](#) [1] psychology professor and lead author on the paper Leo Gugerty and colleagues designed two driving simulator studies to compare the effectiveness of six types of roadway or in-vehicle warning systems. Participants were asked to navigate through traffic lights while their driving responses were measured based on the presence or absence of warning signals.

“In both studies, warnings led to more stopping at dilemma zone intersections and milder decelerations when stopping compared with no warning,” said Gugerty. “Drivers’ predominant response to warnings was anticipatory slowing on approaching the intersection, not speeding up.”

These advanced warning systems could improve driver safety by potentially reducing crashes at signalized intersections. This study provides some evidence that intelligent dilemma zone warnings help drivers behave more safely when approaching them.

“Sometimes drivers respond to safety measures in ways that undo safety benefits, such as driving faster when using antilock brakes,” he said. “However, the drivers in our simulator studies responded to the dilemma zone warning signals by driving more safely.”

Results indicated that both roadway and in-vehicle warnings led to more stopping and milder decelerations at dilemma zone intersections. When given advanced warning, the participants rarely exhibited unsafe driving behavior, such as accelerating to beat the lights. In time, implementation of such systems could lead to fewer traffic-related injuries and fatalities.

These studies may provide guidance to human factors researchers regarding performance models of how drivers use end-of-green warnings, control algorithms and warning displays for intelligent intersections and statistical methodology in human factors research.

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