



Driving Simulator Studies of the Effectiveness of Countermeasures to Prevent Wrong-Way Crashes

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Current Situation

Although relatively rare, wrong-way crashes are usually more severe and could be fatal. The majority of these crashes occur when a driver uses an exit ramp to enter a controlled access highway. Impaired driving is often a contributing factor, but age-related perceptual and cognitive declines put older drivers at greater risk as well.

Research Objectives

In this project, Florida State University researchers studied wrong-way crashes to understand the human factors element associated with this crash type.

Project Activities

The researchers reviewed literature on the characteristics of wrong-way entries and crashes, including interchange types that are associated with wrong-way entries, and evaluated factors that may have an impact on wrong-way crashes and entries. Based on this work, FSU researchers proposed a set of cues that are found to explain wrong-way movements. This was accomplished by incorporating the two most prevalent types of wrong-way crashes: night crashes involving impaired drivers and daytime crashes involving older drivers. However, because wrong-way crashes occur in two dissimilar contexts and because no set of countermeasures was strongly associated with decreasing wrong-way crashes in their review of the literature, the researchers conducted additional studies to help explain drivers' decision making in a wrong-way movement.

In laboratory-based decision tasks, younger and older drivers were asked to correctly identify entrance ramps in a series of photographs of entrance and exit ramps. Driver accuracy improved with an increase in the number of visual cues they registered as indicative of an exit ramp and reinforcing the researchers' cue-based approach to decision making. Certain countermeasures, such as additional Wrong Way and Do Not Enter signs, were found to be effective in providing cues to the wrong-way driver.

In simulator studies, younger and older drivers were asked to access a highway entrance. Exits were marked with a number of countermeasures, beginning with the minimum suggested by the *Manual on Uniform Traffic Control Devices* (MUTCD) and increasing to the number and type of countermeasures recommended by a recent FDOT study. Half of the young adult group performed the task under simulated impairment.

Project results indicated that wrong-way crashes could be reduced at problematic interchanges by increasing the number and diversity of countermeasures. Impairment seemed to be a high risk factor for wrong-way crashes. Use of driving simulators as a means of testing countermeasures for wrong-way crashes also appeared promising.

Project Benefits

This study indicated that countermeasures can be effective in reducing the number of wrong-way crashes, a particularly dangerous type of crash.

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A driver takes the wheel in a driving simulator.