Florida Department of Transportation Research

Aging Road User, Bicyclist, and Pedestrian Safety: Human Factors Studies
Phase 3, Effective Bicycling Signs and Preventing Left-turn Crashes
BDK83 977-15

The Florida Department of Transportation (FDOT) is dedicated to engineering safer roadways, but safety requires engineers and planners to go beyond their usual scope to understand behavior of road users of all ages. Driving, for example, is a complex activity that requires integration of many skills, such as safe vehicle operation, comprehending traffic control devices, and making good judgments in navigating the roadway system. In these studies, Florida State University researchers used a driving simulator to help examine how drivers and cyclists perceive and interact with several safety countermeasures to gain understanding and help support FDOT's aging road-user program, "Safe Mobility for Life."

The emphasis on multimodal design — in particular, bicycling — makes roadways more complex, with new markings and signage intended to improve safety for all users. In Task 1, researchers assessed how quickly younger, middle-aged, and older adults recognized and understood cycling and pedestrian signs and markings. Participants were shown signs and markings and asked what they meant. Then, recognition tasks were timed and simulated at different distances. Mostly, participants did well, but they had less understanding of sharrow markings, bicyclist detector markings (which show cyclists where to stand to trigger a traffic signal change), and bicycle Slippery When Wet signs. Participants more rapidly understood signs with a side view of a cyclist than a head-on/rear view.

In Task 2, drivers encountered cyclists after seeing a Share the Road sign or one of two versions of the Three Foot Minimum sign. Drivers encountered cyclists, alone or in a group, with and without a bike lane. Neither sign presence nor type of sign affected passing distances; drivers of all ages tended to pass cyclists carefully at much more than three feet. Passing distances were smaller when a car approached in the opposing lane and greater when a group of cyclists was present.

A participant uses the FSU driving simulator.

Consistent with previous research, drivers passed closer to cyclists in marked bike lanes, suggesting that the increased safety afforded by bike lanes does not result from greater passing distance.

Key to completing a safe left turn is correctly judging the gap in oncoming traffic, yet traffic in the opposing left turn lane often blocks the view of oncoming traffic because it is directly in front or, with a median, to the driver's left. Shifting opposing turn lanes to provide drivers a better view of oncoming traffic should result in better gap judgment, but research varies on whether there is a benefit. In Task 3, adults in three age groups either judged when it was safe to turn or executed left turns. For all drivers, turns from traditional, directly opposing turn lanes resulted in a significant safety advantage by causing drivers to wait for larger gaps in oncoming traffic. This advantage seemed less for older adults when oncoming vehicles were moving faster.

Human factors projects like this are vital to completing the feedback loop which compares a design's intentions with its actual effect on road users — drivers may not respond to designs as expected. Providing engineers and planners a deeper understanding of driver behavior promotes FDOT's goal to create safer roadways for users of all ages. Results of this study will be used by the FDOT and Safe Mobility for Life Coalition to help support the implementation of the Aging Road User Strategic Safety Plan.

Project Manager: Gail Holley, FDOT Traffic Engineering and Operations Office
Principal Investigator: Walter Boot, Florida State University
For more information, visit http://www.dot.state.fl.us/research-center