Project Summary

Texas Department of Transportation

0-5147: Guidelines for the Use of Diagrammatic Guide Signs and Their Alternatives

Background

Guiding freeway drivers to their desired destinations safely is the primary function of freeway guide signs. Sign designs must clearly display information to drivers about the upcoming road geometry in order to facilitate accurate and early lane changes to get drivers into the lanes that take them where they want to go.

While text-based guide signs are commonly seen on freeways in Texas, diagrammatic signs are used by other agencies and exist as an option in the Texas *Manual on Uniform Traffic Control Devices* (MUTCD). The MUTCD recommends diagrammatic signs for guiding drivers through uncommon freeway interchange geometries. Recent research has proposed other designs using graphics as well as words, referred to here as "modified diagrammatic signs," which may prove to be useful to drivers navigating unfamiliar areas or heading to unfamiliar destinations.

Project 0-5147 tested standard text signs, MUTCD-style diagrammatic signs, and modified diagrammatic signs for four interchange types for three-lane roads. The geometries tested were left exits, left lane drops, two-lane right exits with optional exit lane, and freeway-to-freeway splits. These are the four situations listed in the MUTCD as candidates for diagrammatic signs and represent unusual configurations that may violate driver expectations.

Example of a standard text sign

Example of a diagrammatic sign

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What the Researchers Did

After considering current standards for signing highway interchanges in different locations around the country and performing an extensive literature review, researchers chose candidate sign designs to be tested in Phases 1 and 2 of this project. In five locations around the state, 200 participants viewed slides of advance guide signs and responded by choosing which lane or lanes would lead them to a desired destination.

The signs performing best were then used in Phase 3. Using a driving simulator, 60 participants were asked to navigate a route of up to 20 different highway interchanges. Participants drove through a simulated "world" composed only of freeways and viewed up to 20 sign sequences each. Participants were asked to drive either to the through destination or the exit destination of an interchange, using only two advance guide signs and the exit direction sign to navigate. In some trials the participants would begin in a lane that would not lead them to their desired destination. For these trials, the distance from the gore at which the participant changed lanes was recorded, under the assumption that earlier lane changes indicate a better understanding of the sign sequence. The average lane change distance from the gore was calculated for each sign sequence, as well as the proportion of trials in which the participant made an unnecessary lane change.

After the drive, participants completed a short computer-based questionnaire, which constituted Phase 4 of the project. Some questions used signage similar to the simulator, while others asked for subjective opinions from the participants on their preference for sign designs.

What They Found

In general, this project found that the current standard text-only sign sequences are effective at guiding drivers to their desired destinations. While diagrammatic signs may offer benefits to some drivers, no evidence was found that they perform significantly better across the entire population. When comparing standard diagrammatic signs to modified diagrammatic signs, standard diagrammatic signs were preferred by drivers. Driver unfamiliarity with modified diagrammatic signs or the cluttered designs required in order to display all the relevant information, or likely both, might have been a factor in the subjective preference scores.

What This Means

The current guidance of the Texas MUTCD and accompanying standards sheets are supported by this research. No changes to current standards or practice are recommended.

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