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REVIEW and COMMENTARY

Effects of Electronic Billboards on Driver Distraction; T. Dukic, C. Ahlstrom, C. Patten, C. Kettwich, and K. Kircher; *Traffic Injury Prevention*; Manuscript submitted 08 July, 2012

This article is a report of a study using 41 participants to evaluate four of twelve electronic billboards installed temporarily along a four lane, heavily trafficked motorway through central Stockholm, Sweden. I have reviewed the report and also attended a presentation of the findings given by Sheila (Charlie) Klauer, Ph.D. at the Transportation Research Board's Digital Sign subcommittee meeting on January 16, 2013 in Washington, D.C.

The study had the participants drive past the four electronic billboards, six traffic signs, and one paper billboard sign while their direction of gaze was recorded using a SMI Iview head-mounted eye tracker. The electronic billboards changed their otherwise stationary message every seven seconds. Daylight and night-time conditions were studied during non-rush hour periods.

The reliability of the results was limited because of significant data loss issues where the tracking equipment failed to indicate eye position and because relatively few subjects were involved. The reliability was further reduced by the limited gaze position accuracy of the Iview eye tracker that, at the first available viewing distances (450 to 750 meters) four the electronic signs, had a gaze position accuracy of between roughly 26 feet and 43 feet). The validity of the results was limited because the traffic context in which fixations in the direction of the various signs were made was not recorded or evaluated.

The results that were presented showed that more participants in the aggregate looked at the electronic billboards than looked at the other signs. There were a total of 136 fixations towards the electronic signs versus 65 fixations toward the other signs. The saliency of the content of the signs was not reported. However, six of the seven "other" signs were traffic signs, likely of little or no interest to drivers who were being told what route to follow whereas the electronic signs presented two or more different messages as the participants drove by. Thus, if distinct messages are counted, this result becomes trivial.

The results also showed that dwell times (accumulated total time looking at the sign) and the number of fixations were greater and longer for the electronic as opposed to the "other" signs. The report, however, did not reveal the information content or novelty of

the two classes of signs beyond the two categories – advertising and traffic. It is likely that the information content of the "other" signs was significantly less than the electronic billboard advertising signs. Thus, the longer dwell times and the larger number and length of fixations observed may simply have been an indication of the number of fixations necessary to simply read the content and/or the more interesting and salient content of the advertising.

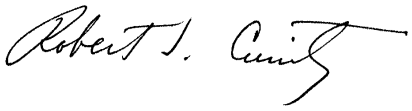
The researchers reported another finding of apparent interest. They observed that of the 136 observed fixations in the direction of the electronic signs, six fixations lasted longer than two seconds and there was only one fixation lasting that long in the direction of the "other" signs. To put this in context, people normally make and are able to make major changes in fixation direction no more than two to three times per second. The participants in this study obviously made tens of thousands of fixations as they drove the designated course. The significance of six "long" (greater than two seconds) glances out of 136 total electronic sign directed glances (4.4%) fades further in the light of the thousands of unreported fixations. Further, since the gaze position accuracy of the eye position recording equipment was between 0.5 and 1 degree, the smaller changes in eye position that occur every half second or so were not recorded. Any looking about within the position error of the recording equipment (as much as 43 feet at the 750 meter viewing distance) would have been recorded as one long glance. Likely, the recorded "long" glances actually involved the participants reading the signs. Finally, three of the "long" glances were associated with 6, 7, and 9 second dwell times indicating that the particpant looked at, then away and then back to the sign repeatedly. Also of importance is the fact that the situational traffic context present when these six longer fixations were made was unrecorded. Distracted driving is primarily dangerous when immediate hazards are present. Diverted attention beyond the two second criterion becomes consequential only if there is something more important from a safety viewpoint to attend to.

Further, the researchers indicated that some small segments of observed driver behavior evidences that they were distracted based upon multiple glances towards the electronic signs. As above, the situational context was not observed or reported. Such repeated glances may or may not have been dangerous – the data are insufficient to make such a determination.

Clearly, the research shows that some drivers attend to electronic billboards but not that doing so is either actually dangerous or viewed by the participants as dangerous. The authors point out that many participants did not look at the signs and that this may be a choice based upon traffic conditions or other factors. They present no evidence that the electronic signs compel viewing. In fact, their data are more readily interpreted to show, as they point out, that the signs can actually be ignored, whether purposefully or because they were not looked at for other reasons associated with controlling a vehicle on a highway with other vehicles close by.

The researchers concluded that their study "clearly indicates that they (electronic billboards) do what they are built for. Whether they attract attention too much, that is,

whether they are a traffic safety hazard, cannot be answered conclusively based on the present data." This reviewer concurs.



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