A study using the occlusion technique to evaluate visual distraction

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Abstract

The purpose of this study is to clarify a suitable static test method to evaluate the total glance time for car navigation systems while driving. Four types of navigation systems were tested. When the participants operated the navigation system repeatedly, the single glance time was 1.0 second for the navigation display and 0.6 second for the forward traffic situation. The upper limit of the total glance time for the navigation display estimated from the subjective judgements and the vehicle's lateral displacement was 8 seconds. Total Shutter Open Time based on Occlusion Technique was evaluated as indexes that could be used in a static test instead of using actual vehicles. Total Shutter Open Time had higher correlation with total glance time. The occlusion pattern with 1.5 seconds open time and 1.0 second close time had the highest correlation to the total glance time. Total Shutter Open Time of 7.5 seconds was equivalent to 8 seconds for total glance time. It became also clear that the Occlusion Technique can be useful for assessment of elderly driver's performance.

Introduction

Automobile navigation systems have come into popular usage because they are convenient. However, their use may impair driver performance as navigation functions become more complicated. The Road Traffic Act of Japan was revised in November 1999 and drivers were prohibited from fixating their visual attention to the navigation display so as to maintain safe driving. The Japan Automobile Manufacturers Association, Inc. (JAMA) drew up initial guidelines in 1990. JAMA has repeatedly revised the guidelines to allow control of complicated operations while driving, so that handling or glancing at a navigation system will have minimal effects on driving performance, and so that safely providing information to drivers is regulated according to system standards (JAMA, 2004). It is reasonable to expect that automobile systems will display additional and greatly varied information. Therefore, quantitative standards for the glance time of navigation systems must be defined. In this paper the results of static test methods used to evaluate acceptable upper limits for the glance time of drivers using navigation systems. In addition,

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