ACCEPTANCE OF VARIABLE MESSAGE SIGNS DISPLAYING BILINGUAL MESSAGES BY TURNS

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SUMMARY

This study investigated drivers' acceptance of a variable message sign (VMS) displaying bilingual messages. The VMS displayed Finnish and Swedish text message by turns (2.0 s in each language). Totally, 350 drivers were interviewed, downstream of the sign, regarding recall and preference of messages. Drivers reported no major problems in obtaining the information displayed by this method. However, some older drivers felt that display time was too short, and some drivers expressed the feeling that the task of reading has become more complicated. The overall implication of the study is that most drivers accepted the VMS displaying bilingual messages by turns.

INTRODUCTION

TROPIC (Traffic Optimisation by the Integration of information and Control) is a research project that is supported by the European Commission (DGVII) and aims a widescale and consistent application of variable message signs (VMS's) in Europe. This part of the TROPIC project deals with acceptability of bilingual messages.

Finland has two official languages, Finnish and Swedish. Ninety-five percent of the population use Finnish as their native language, while five percent use Swedish as their native language. There has been fixed traffic signs both in Finnish and Swedish, but until recently all VMS have been in Finnish only.

In December 1997, the Finnish National Road Administration (Finnra) started testing bilingual text messages on E18. The text message module displays Finnish and Swedish text message by turns. There is clear economic advantage in using one sign and showing the messages in different languages by turns, instead of constructing two separate signs (one for each language). It is possible, however, that the alternating bilingual messages might be more difficult to read and to understand, than the alternative of a separate message location dedicated to each language. Consequently, the present study was designed to investigate how drivers perceive (i.e., recall) such signs and what are their opinions about it. The information was collected, on site, by structured interviews of drivers passing the sign location.

METHOD

SITE

The experimental site was located in southern Finland on inter-urban road E18. The variable, bilingual text messages had been used six weeks before the interviews took place.

When approaching the sign, the two-lane road was rising and slightly curved to the right. Past the sign, the road went downward and was straight until a bus stop where drivers were interviewed, approximately one kilometer downstream of the sign. The posted speed limit was 80 km/h but reduced to 60 km/h before the bus stop.

EQUIPMENT

The sign consists of two modules, a text message and a warning sign (Figure 1). The background of the signs is black, the triangle in the warning sign is red, the letters in the text message are yellow, and the pictogram in the warning sign is white. The height of the warning sign is 1414 mm and width is 1633 mm. The warning sign is of fiber-optic technology, in which the sign and the letters are formed by small lenses. The light is conducted to the lenses along optical fibers which are illuminated with an halogen lamp at the end of the fiber bundle. The output level is automatically adjusted to ambient light. The warning sign is capable of displaying three standard traffic icons: slippery road surface, general warning, or road construction ahead. When these symbols are not needed, the sign module is dark.

Figure 1. A schematic diagram showing the sign used in the study.

The text message module consists of two lines of text, ten characters each. The characters are 225 mm high. The text message can be displayed with or without the warning sign. Unless more important cautionary messages are needed, only air and road surface temperatures are displayed. A message is displayed for 2.0 seconds in Finnish and Swedish, separated by intervals of 0.5 seconds (blank display).

PROCEDURE

During the data collection period the VMS displayed a symbolic 'general warning' sign and the text message "TRAFFIC LANES NARROWED". Figure 2 shows this message in Finnish and Swedish, as well as display durations.

Figure 2. The text message in Finnish and Swedish.

Drivers passing by the survey site were selected randomly to be interviewed. Only cars and vans with Finnish license plates were sampled. Interviews were conducted on two weekdays between 9 a.m. and 3 p.m. The drivers were stopped by two uniformed police officers. Because of the hill between the sign and the bus stop, drivers were not able to see the police officers before passing the test sign.

At the beginning of the interview, drivers were informed that the interview dealt with an investigation of variable traffic signs. First, they were asked if they remembered what was the last warning sign they passed. Next, the picture of the sign, with blank text message box, was shown to them and they were asked to recall the text message that was displayed there.

The next questions inquired drivers about the details of the message text, about their noticing two languages, about having sufficient time to read the message in their preferred language, and opinions about that type of VMS. Drivers were given the option to be interviewed in Finnish or Swedish, however, only one driver preferred Swedish.

RESULTS

DRIVERS

Of the 460 drivers who were stopped for the interview, 15% did not remember seeing the sign at all and another 9% remembered seeing the sign, but could not recall seeing the text messages. Further analyses used only data for the 350 drivers who reported seeing the VMS and the manner of presentation.

Most (80%) of these drivers were men and 88% drove passenger cars. The age distribution was: 19% 18 to 30 years old, 68% 31 to 59 years old and 13% 60 to 82 years old. The median annual amount of driving reported was 25,000 kilometers. These sample characteristics appear to be quite similar those of the driver population at the site. Because of the known relevance of drivers' age in issues of sign perception and comprehension, the results were examined, whenever possible, in relation to this variable.

Twelve percent of all drivers stated that they were fully bilingual and 28% reported that their comprehension of the written second language was excellent or good. Close to 19% of the drivers said that they did not understand the second language at all. They tended to be older than others.

Most drivers have had previous exposure to the specific bilingual VMS at the site; 45% of the drivers had passed the site daily, 29% weekly, and 26% less than weekly.

RECALL OF THE TEXT MESSAGE

Ninety-two percent of the interviewed drivers (final database, n=350) recalled the text message correctly, in their primary language. Eight drivers (2.3%) remembered the sign, but recalled the text message incorrectly and 19 drivers (5.4%) remembered seeing the sign, but could not specify the text (e.g. "something in Finnish").

Recall of the text message was related to driver's age ($\chi^2(2) = 27.1$, $p < 0.001$), with the highest recall rate for younger drivers (100%), followed by drivers between 31 and 59 years (93.7%) and older drivers (74.5%).

SATISFACTION WITH DISPLAY DURATION

Most (89%) drivers thought that the display duration of the message in their own native language was appropriate. However, 10.3% of the drivers reported that duration was too short and two drivers (0.6%) said it was too long. To examine the effect of age, the response categories "duration appropriate" and "too long" were combined. The proportion of drivers saying that the duration of the message was "too short" was 21% of the old age group, 10%, and 3%, of the middle-age and young age categories, respectively ($\chi^2(2) = 9.74$, $p < 0.01$).

THE MANNER OF PRESENTATION

Fifty-six percent of the drivers reported that the manner of presentation (by turns) did not affect the reading of the text message, 24% reported that the manner of presentation facilitated the reading and 20% indicated that it complicated the reading. Opinions were not related to drivers' age.

An analysis of drivers' free comments indicated that 30% mentioned positive effects such as "the manner of presentation improves the conspicuity of the sign", or "the alertness of drivers is improved" (mentioned by 1.1%). In contrast, 10% of the drivers indicated negative effects such as "the sign results in long fixation durations" (7.7%), and "acquisition of the information is difficult" (2.6%).

DISCUSSION

This study was designed to investigate driver acceptance of variable message signs displaying bilingual messages. The text message module displayed Finnish and Swedish messages, by turns.

The results showed that about 90% of the interviewed drivers considered the time they had for reading the message in their own native language as being appropriate. Over 90% perceived the information in the message correctly. Most of the other comments drivers provided about the particular bilingual VMS were positive.

However, these percentages are based on the sample of 350 drivers who recalled seeing both the warning sign and the text boxes. Another 110 drivers had no recollection of passing the sign or did not remember any of its features. This in itself is a familiar and not an uncommon phenomenon. Nevertheless, the results suggest that most drivers had no substantial problems in obtaining VMS information when it is displayed by turns.

Older drivers experienced some difficulty in recalling the messages and they were more likely to report that the presentation duration was too short. Many previous studies have demonstrated age-related problems in divided attention tasks involving complex or demanding conditions (1,2).

The overall implication of the study is that most drivers accepted a VMS displaying bilingual messages by turns. However, more research is needed to investigate potential workload problems that might come up, especially with old drivers, in more demanding traffic conditions. Drivers might have then difficulty allocating attention to widely separated areas of visual field. The issue of duration might also become more critical.

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REFERENCES

1. Hakamies-Blomqvist, L. Older drivers in Finland: Traffic safety and behavior (Reports from Liikenneturva No. 40/1994). Helsinki 1994: Finland: The Central Organization for Traffic Safety.

2. Schieber, F. Recent developments in vision, aging, and driving: 1988-1994 (Report No. UMTRI-94-26). Ann Arbor 1994: The University of Michigan Transportation Research Institute.