

# Creating Effective Graphic Changeable Dynamic Message Sign (DMS) Messaging

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**Alexandra Kondyli, Ph.D.**  
**Steven D. Schrock, Ph.D., P.E.**  
**Kirti Mahajan, Ph.D.**  
**Saumik Sakib Bin Masud, Ph.D.**  
**Aayush Maan Karki,**  
**Saurav Shrestha,**  
**Mahgam Tabatabaei**

*The University of Kansas*

## Introduction

Successful transportation messages are only effective if travelers can read and comprehend the message. However, text-based messages can be challenging for non-native English speakers or slow-reading populations, such as the elderly. The addition of graphics messages as a potential aid to improve message comprehension is uncertain, as is their effectiveness compared to text-only messaging campaigns. Current literature reviews have focused on the use of graphical shields and highway signs for messaging, but research is needed to analyze the effectiveness of graphics for conveying safety messages without explanatory text and evaluate whether this approach could be beneficial for specific populations.

The objectives of this project were to determine whether graphics can be used to enhance comprehension and effectiveness of messaging, and to help guide development of guidelines to determine when and how the graphics, either stand-alone or supplemental to text, can be used to enhance the comprehension and effectiveness of key safety messages.

## Project Description

Successful transportation safety messages are only effective if travelers can comprehend the notices. However, one method of safety messaging, text-only messages, can be challenging for non-native English speakers and slow-reading populations, such as older adults. The addition of graphics can potentially improve message comprehension, but their effectiveness compared to text-only messaging campaigns is uncertain. This study evaluated the role of graphics, both with and without text, in enhancing comprehension and the effectiveness of dynamic message signs (DMS), with attention to demographic factors.

Results showed that signs with graphics and text consistently outperformed graphics-only signs across all measures, including conspicuity, comprehension, ease of use, intention to comply, and memorability. The lowest-scoring signs lacked text, leading to poor interpretation accuracy and compliance. Statistical analyses confirmed that text significantly improved message effectiveness by reducing comprehension gaps between native and non-native English speakers. Age also influenced performance, with drivers older than 41 years old demonstrating higher effectiveness scores, likely due to driving experience. Logistic regression showed that age, literacy rate, and text presence positively predicted accurate sign interpretation.

The findings indicate that graphics alone are insufficient for effective DMS communication, although pairing graphics with text enhances comprehension and compliance for all populations, especially for non-native speakers and young drivers. Awareness initiatives are recommended to improve familiarity with graphic signs.

## Project Results

The results of this study showed that signs with text descriptions had higher scores for conspicuity, comprehension, ease of use, intention to comply, and memorability than signs without text. The signs with the top five scores all had text and graphics, while the signs with the lowest scores did not have any supplemental text. In addition, signs with low scores were due to low accuracy of interpretation, ease of use, and intention to comply. The results of t-tests showed that the presence of text significantly improved the effectiveness of DMS.

In summary, this study evaluated the effectiveness of various graphics signs with and without text when used as DMS. The most and least effective signs were determined based on composite scores derived from measuring the DMS's conspicuity, comprehension, ease of use, intention to comply, and memorability. Moreover, the study examined demographic factors to capture variations in sign effectiveness.

Based on the results, text should be used with graphics to increase the effectiveness of DMS. For the less effective signs shown in Table 4.5, text descriptions are recommended in addition to the graphics. A proper awareness of the various graphics used in DMS is also suggested, especially for young drivers. This research investigated a limited set of graphics and text options for specific themes such as congestion, crash occurrence, adverse weather, etc. It is recommended that future work explore additional combinations for these themes and develop a comprehensive list of effective graphics and text options.

## Project Information

For information on this report, please contact Alexandra Kondyli, Ph.D., University of Kansas, 1530 W 15th St, Lawrence, KS 66045; 785-864-6521; akondyli@ku.edu.

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