Kansas Department of Transportation

TECHNICAL SUMMARY

Effect of Vehicle Color and Background Visibility for Improving Safety on Rural Kansas Highways

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Introduction

The effect of vehicle color on crash involvement has been an interesting topic for several decades; however, the effect of vehicle color on its visibility to drivers has not been studied in detail, especially at rural intersections. There has been some speculation that the combination of vehicle color and background environment can cause a camouflage effect on a vehicle's visibility for drivers stopped at an intersection.

Project Description

In this research, a stopped vehicle was simulated at a rural intersection in Kansas, where a large number of crashes have occurred. Various vehicles with different colors approaching from eastbound and westbound directions under different daytime light conditions were shown to participants. Response times of participants to identify the approaching vehicles were measured for each vehicle color under different conditions. The collected data were analyzed using an Analysis of Variance (ANOVA) test to determine whether there is a difference between the mean response times to various vehicle colors moving in the same direction and the same daytime light condition, and the same vehicle color moving in the same direction and several daytime light conditions. A Least Significant Difference (LSD) test was then used to identify which vehicle colors or daytime light conditions are different from the others using Statistical Package for the Social Sciences (SPSS) statistical software.

Project Results

ANOVA test results showed no significant difference between vehicle colors for (a) morning, eastbound direction and (b) mid-day, westbound direction, while there is a significant difference between response times to vehicle colors for (c) mid-day, eastbound direction and (d) evening, westbound direction. The ANOVA test results for various daytime light conditions showed no difference between response times to (a) black, eastbound vehicles. However, response times to (b) black, westbound vehicles, (c) red, eastbound vehicles, and (d) white, eastbound vehicles were impacted by daytime light conditions. Moreover, the results of the LSD test for mid-day, eastbound direction showed no difference between red and black vehicles. On the other hand, the LSD test showed all vehicle colors have different response times in evening, westbound direction. For daytime light conditions comparison, LSD test results showed black, westbound vehicles in mid-day have a shorter response time compared to the evening time period. Red, eastbound vehicles in morning have shorter response time compared to mid-day. Also, white, eastbound vehicles in the morning have shorter response time compared to mid-day.

Considering the aforementioned results of data analysis, findings of this research do not conclude that the differences between the response times to colors are consistent, meaning a specific color does not stand out above the others. Despite differing lighting conditions where some colors were slightly more recognizable, the difference is not uniformly significant. Based on the results of this study, there is not enough evidence to determine that the elevated number of crashes at the study intersection is due to camouflaging of vehicles due to coloring, and no other immediate cause can be identified.

Project Information

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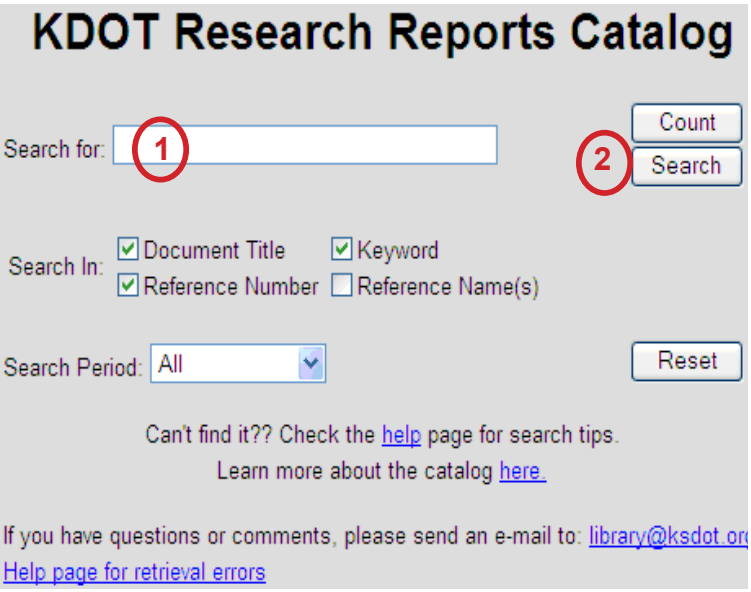

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