Flashing Lights for Assistance Vehicles – Is Red Best?

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Abstract

It is widely believed that vehicle-mounted lights are effective in making vehicles more visible/conspicuous to other road users. For roadside workers, conspicuity is their first, and often only, line of defense. Following numerous near misses and impact incidents involving vehicles operating on high-speed (>80km/h speed limit) roads, RACQ trialed red flashing warning lights with the existing yellow flashing warning lights, comparing traffic speed and passing behavior.

Background

RACQ conducted this trial using RACQ tow trucks, Traffic Response Units and Roadside Assistance vehicles. This trial was permitted by the Queensland Department of Transport and Main Roads and the National Heavy Vehicle Regulator.

The objective was to compare vehicle passing speeds and lane change behavior when passing vehicles displaying flashing red and yellow lights, or flashing yellow lights alone. No prior public education about the lights' meaning was undertaken.

Method

RACQ research staff accompanied roadside staff at 70 incidents (e.g., disabled vehicle, traffic crash, debris on road) between November 2017 and February 2018.

Using an LTI-20/20 Ultralyte LIDAR Device with an attached Contour 2+ High Definition Digital Video Camera, speed data and passing distance behavior was captured for 7,493 passing vehicle movements.

While appropriate safety measures where undertaken by research staff, staff remained as inconspicuous as possible to minimize distraction. Staff complied with all directions of the Traffic Response Operator and Queensland Police Service officers.

A Linear Regression model was used to analyse passing speed, and a Multinomial Logistic Regression for passing distance. Several other factors were considered, including congestion, police presence, and speed limit reductions, among many others.

Results

The model suggested that fitment of flashing red lights did not reduce passing vehicle speeds, instead suggesting that passing speeds increased slightly when red flashing lights were fitted. This result was statistically significant. The analysis identified that other factors influenced passing behaviour.

The model also suggested that the following factors lead to a reduction in passing speed:

- Congestion – a reduction of 22.3km/h
- More than one disabled vehicle – 13.1km/h
- Site blocked by vegetation or infrastructure – 11.5km/h
- Police presence – 7.4km/h

- Vehicle stopped in lane – 8.2km/h
- Current speed limit lower than normal – 2.9km/h
- Fluid or debris on road – 4km/h
- Wide shoulder – 7.3km/h
- Road has a crest – 6.7km/h

The quality of the model was measured using standard measure of R-squared. The model returned an R-squared of 0.626, this suggests that 63% of the variation in passing speed is explained by the model.

Lane changing behaviour (move over) was analyzed using a Multinomial Logistic Regression model. The model used returned a Pseudo R-squared of 0.158, which suggests only 16% of the variation in behavior is explained by the model. As it was a weak model, it could not be used.

Conclusion

Red lights alone, did not provide a reduction in passing speeds, instead showing a slight increase.

Given that red flashing lights do not reduce passing motorists' speed, the RACQ's focus will be placed on improving passing distance behavior, as limited vehicle/engineering-based solutions are available.