

Effects of lane width and posted speed limit on speed selection behaviour of drivers

Jason Deller^a, Dr MD Mazharul Haque^a, Dr Mark King^a

^aQueensland University of Technology (QUT)

Abstract

Driving speed is a critical factor in road traffic crashes. Empirical evidence suggests that narrow roads and narrow lanes on roads lead to drivers selecting slower speeds. A program of study has been designed to examine the relationship between roadway design parameters and speed selection among drivers using both a driving simulator experiment in the QUT CARRS-Q advanced driving simulator and an observational study. The key research aim is to examine speed selection behavior of drivers in response to geometric feature changes.

Background

Driver behaviour is complex as it involves many differencing factors often at odds with each other. As an example, some drivers see trip time as more important than their safety, as they cannot quantify safety as easily^[1]. Speed remains a main contributing factor to road crashes^{[2],[3]} and is an important factor in road safety.

Drivers select the speed at which they travel as a function of many driving clues related to design and operational factors, as well as their own risk perceptions, risk taking behaviour, and skills and abilities. The resulting speed distributions along a road segment arising from numerous drivers are routinely used to design posted speed limits. Operating speeds are fundamental to the development of any roadway corridor and are used to determine an appropriate design speed, which in turn is used to identify and select appropriate roadway design elements^[4]. There exists a complex and often circulatory relationship between the design and operating speeds of a roadway.

A literature synthesis by Deller^[5] reported that the influence of roadway design such as lane widths and roadside features on speed selection behavior of drivers has not been well studied, and thus the relationship between design speed, posted speed limit and operating speeds in urban areas is unclear. The intent of this research is to uncover and better understand some of the complexity between roadway design and operating speeds, and how drivers respond to these roadway design characteristics.

Method

A program of study has been undertaken to examine the relationship between roadway design parameters and speed selection among drivers by using a comprehensive driver behaviour survey and a subsequent driving experiment using the QUT CARRS-Q advanced driving simulator. A repeated measures ANOVA and generalised estimation equation (GEE) models were used to model speed selection behavior of drivers with the data collected from the experiment. The results of the analysis were validated with an observational study implemented in an Australian urban local road environment.

The above research aims to achieve the following specific objectives:

- Understand the impact on speed selection when there is an inconsistency between design and posted speeds within an urban roadway corridor;

- Determine the effect of changes in roadway corridor attributes on drivers speed selection;
- Determine the change in speed distributions as a result of geometric feature changes;
- Examine the role of 85th percentile in setting posted speed limits.

Results and Conclusions

A variety of roadway design factors associated with driver speed selection behavior are identified and discussed, including road width, lane width, and driver characteristics.

References

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