

Behaviour, Law and Design: an interdisciplinary approach to improving intuitive road design, the road rules and cyclist safety

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Abstract

There is a high level of confusion and misunderstanding on the roads about the negotiation between drivers and cyclists when a cyclist is continuing straight and driver is turning left. This study builds on existing knowledge to go beyond problem identification to investigate potential solutions. The innovative, interdisciplinary team combines behavioural research with law and design to investigate and evaluate potential improvements in the road rules and road design. The study includes on-road trial of new left turn intersection design in Melbourne in Q2, 2019 with a pre- and post-study (roadside observations) and a review of the road rules to identify opportunities for amendment or clarification.

Background

It has been well established that there is confusion and misunderstanding among both drivers and cyclists about the left turn negotiation – that is a cyclist continuing straight and a driver turning left. A survey in Victoria (n=10,444 including drivers and cyclists) reported this interaction as one of the scenarios with the least clarity (Tierney, 2015). Observational studies of Melbourne commuter cyclists by Nicholls et al (2018) has provided an in-depth understanding of how drivers and cyclists behave on the road in this scenario.

This study moves beyond problem identification to explore and evaluate potential solutions. Support from an internal grant at Monash University provided the opportunity for collaboration between law, behavioural research and design to identify opportunities to simply and clarify the road rules and develop and test new initiative road designs on road in Melbourne, Victoria. The study identified three key issues that need to be addressed:

1. There is (observed) inconsistency in behaviours by drivers and cyclists across different infrastructure types which leads to conflict and potential crashes
2. Safer behaviours, particularly by drivers, are technically illegal. Regulatory expertise is required to determine the role of the road rules in improving clarity
3. Road design has a greater role to play to improve the intuitiveness of the road and the expectations of cyclists and drivers.

Method

This study is being conducted in two concurrent stages. One stage is a review of the road rules (led by VJ) was conducted to identify the key road rule, the legislative history, current operation of relevant road rule sand exceptions and opportunities to change the road rules to improve cyclist safety in the left-turn negotiation. The other stage combines innovative design (led by RN) and behavioural research (led by MJ).

Results

Road rules

The review of the road rules, including the legislative history, has identified that the key road rule in the left-turn negotiation is Road Rule r 141, which states:

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- (1) A driver (except the rider of a bicycle) must not overtake a vehicle to the left of the vehicle unless –
 - a) ...
 - b) ...
 - c) the vehicle is stationary and it is safe to overtake to the left of the vehicle.

However, there is also an exception to the rule that states:

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- (2) The rider of a bicycle must not ride past, or overtake, to the left of a vehicle that is **turning** left and is giving a left change of direction signal.

Lack of clarity about the definition of turning left (i.e. does this require continuous movement, does this include periods when the motor vehicle is stationary) places the onus of interpretation on the road users to determine what constitutes a turning motor vehicle. Variation in subjective interpretation may reduce the predictability and consistency of road user behaviour. Suggested amendments are currently being reviewed and will be included in the final version of this abstract.

Road design

The development and testing of new road designs stage is currently underway and scheduled to be completed in Q2, 2019. Progress to date includes a workshop with stakeholders from government (state and local) to discuss exploratory road design (with Lego) and identify potential sites for on-road testing. After a review of Australian and international best practice designs, the team have worked through iterations of potential intersection designs. Discussions with 3M have identified the incorporation of new technology to be included in the on-road tests. These designs will be evaluated in a before-and-after study (observational) to determine changes in predictability and consistency of behaviour by drivers and cyclists which are being used as proxy indicators of safety.

Conclusion

This study is currently underway and the findings will be included in the final version of the abstract and at the conference. This interdisciplinary study has provided a new approach to considering the interaction between cyclists and drivers that takes into account a range of system factors that goes well beyond the behaviour of individual road users. Considering the parameters and impact of the road rules during the development of new road design and then testing this on the road to understand actual behaviours, is leading to new insights that are likely to help to improve clarity for all road user and improve safety outcomes for cyclists.

References

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