How well can drivers judge the distance when passing bicycles? A controlled photographic study

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Abstract

The evaluation of the Minimum Passing Distance Road Rule Trial in Queensland and earlier psychophysical research questions the ability of drivers to accurately judge the distance to cyclists they are passing. In an online survey, 196 Queensland drivers judged the passing distance in 36 photographs taken from the driver's perspective. Participants were more accurate when the portrayed distance diverged from one metre to a greater extent, when the vehicle was large and when the cyclist portrayed was a male wearing lycra. Accuracy was not influenced by age, gender, whether the participants were cyclists, or reported frequency of passing cyclists.

Background

Minimum Passing Distance legislation aims to improve cyclist safety on shared roads, however, the Queensland evaluation (Haworth et al., 2016) and earlier psychophysical research (Baumberger, Fluckiger, Paquette, Bergeron, & Delorme, 2005; Cutting & Vishton, 1995; Levin & Haber, 1993; Nilsson, 2000) questions the ability of drivers to accurately judge these distances. While previous studies have examined the effects of cyclist, driver, vehicle, road and traffic characteristics on measured and self-reported passing distance, the ability of the driver to judge the distance has not been systematically tested. The current study was a carefully controlled experiment to assess the influences of actual distance, vehicle size, experience in passing cyclists or being passed as a cyclist, and cyclist appearance on judgement accuracy in a safe and legal manner.

Method

Photographs were taken from the driver's eye position in three different sized cars (small - Ford Focus, medium - Holden Commodore, & large - Toyota Prado) of three cyclist types (male in lycra, male & female in casual clothing) at four lateral distances (500, 900, 1100 & 1500 mm).

After each image was displayed for 2 seconds, the participant was asked, "Was the distance between the vehicle and the cyclist…?" with the response measured on a 4-point Likert scale (1 = definitely less than 1 metre, 2 = probably less than 1 metre, 3 = probably more than 1 metre and 4 = definitely more than 1 metre).

The online survey was completed by 196 Queensland drivers (52% female, mean age 40.0 years). Two-thirds held a licence for 10 years or more and a small vehicle was the most commonly driven. Forty-eight percent had ridden a bicycle on Queensland roads in the previous 12-months (hereafter termed 'cyclists'), of whom 60% were male.

Results

The accuracy of judgements of whether the distance was less than or greater than one metre was 72.2% for 500mm, 43.8% for 900mm (less than expected by chance), 67.9% for 1100mm, and 80.2% for 1500mm. The regression analysis indicated the odds of a correct judgement were 1.26 times higher with every 100mm increase in relative distance. Judgements were more accurate for large vehicles (69.0%) than small or medium vehicles (65.3% and 63.8%, ns) and for the male cyclist dressed in lycra than the male or female cyclist dressed in casual clothing. Accuracy was unaffected by age, gender and whether participant drivers were cyclists or not. There was no evidence of

experience affecting judgement accuracy, either in terms of similarity between the size of the vehicle in the photograph and the respondent's vehicle or in how often respondents reported passing cyclists.

Conclusions

It is concerning that on about a quarter of the trials participants judged a portrayed distance of 500mm to be more than a metre, and judged 900mm to be more than a metre on more than half of the trials. This suggests that drivers may think they are leaving at least a metre when overtaking but actually are not, and is consistent with earlier visual perception research in natural scenes (but not in traffic scenes). We are planning further, more naturalistic studies to test whether this may contribute to close passing events. Experience as a cyclist or as a driver passing cyclists or with the size of vehicle being portrayed did not improve judgement accuracy, suggesting that explicit feedback regarding actual distance may be needed for improvement to occur.

References

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