Drivers overtaking bicyclists

Photo: University of Bath

KEY FINDINGS

When overtaking the test bicycle, drivers passed closer when the experimenter:

- rode towards the centre of the lane rather than the edge
- wore a helmet
- appeared male rather than female

The helmet effect is likely the result of drivers judging cyclists' skill levels from their appearance and adjusting their overtaking accordingly

Drivers of buses and heavy goods vehicles got significantly closer than other vehicles

Photo: Sarah Hardingham

Objective measures of overtaking

Background

Collisions as drivers overtake cyclists are often serious[1], but little is known about what affects the distance drivers leave when passing. This study collected objective measures of passing behaviour to investigate effects of riding position, helmet use, vehicle type and apparent gender on overtaking proximities.

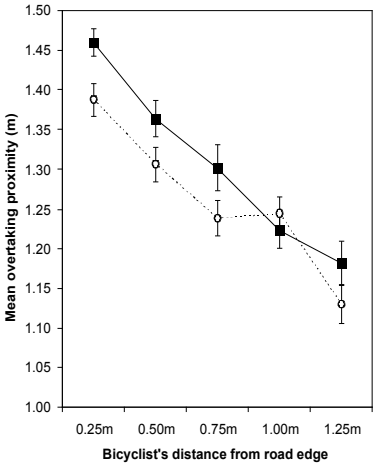
Method

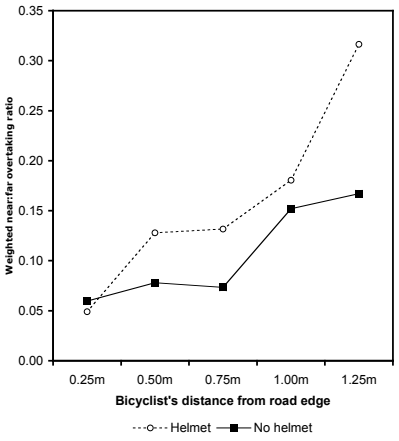
A bicycle subtly fitted with a video camera and ultrasonic distance sensor recorded around 2,300 vehicles overtaking on a range of urban/suburban road types similar to those encountered on a commute. Further data were then collected with the (male) experimenter wearing a feminine wig, in order that he appeared to be a woman to drivers approaching from behind.

Results

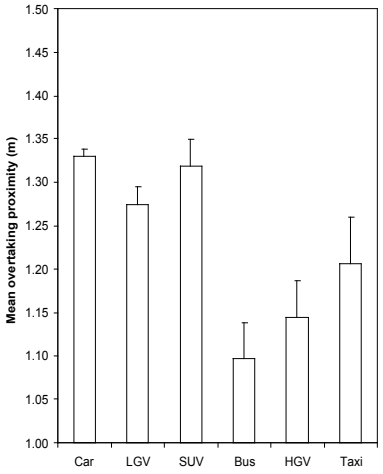
Riding position and helmet

Drivers passed closer to the rider the further out into the road he was. This is contrary to what many experienced bicyclists believed should happen. Drivers also tended to pass notably closer to the rider when he wore a helmet (white circles) than when he did not (black squares). Riding position and helmet-wearing accounted for 8% of the variance in overtaking proximities. The helmet effect was due to shifts in overtaking distributions rather than qualitative changes. The position effect operated in a similar way.





A second analysis calculated the likelihood of a given overtaking event being particularly near to the rider or particularly far away. The graph above shows the ratio of particularly near to particularly far events, demonstrating that drivers were more likely to get particularly close when the rider was towards the centre of the road or wearing a helmet. A logistic regression was relatively successful (15.2% better than chance) at predicting whether a driver would come close or not from the rider's position and helmet status.



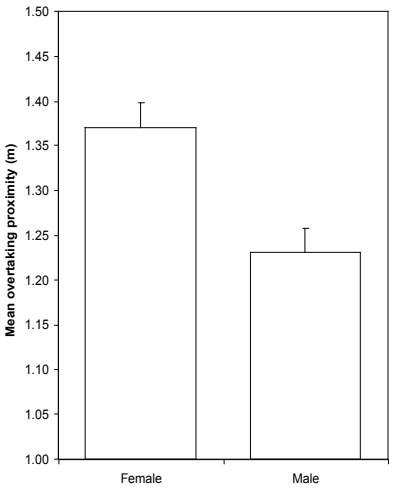
Vehicle type

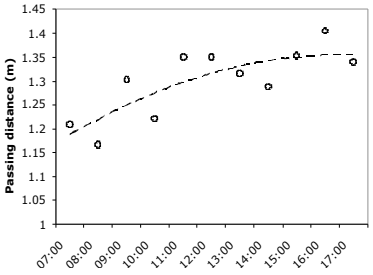
As shown above, professional drivers of large vehicles tended to get particularly close when passing.

Close proximities for large vehicles were particularly seen towards the end of overtaking manoeuvres. We believe a reluctance to travel on the wrong side of the road for the time taken to pass a cyclist (4-5 s) leads to drivers often moving back across before it is really safe to do so.

Gender effects

When the experimenter was wearing a wig, so that he appeared female to drivers approaching from behind, passing traffic gave significantly more leeway





Time of day effects

Overtaking varied as a function of time. There was an increasing quadratic trend, with the curve accounting for 64% of variance in the graph above. In general, drivers passed closer earlier in the day. Note that the graph shows one-hour bands (so 0700 means 0700-0759). Accordingly, there seem to be differences between the morning and evening rush-hours.

Discussion

Research suggests drivers tend to believe helmeted cyclists are more serious and less likely to make unexpected moves [2,3]; the helmet effect seen here is likely a behavioural manifestation of this belief. The gender effect could be the result of female cyclists being rarer than male cyclists in the UK, or it may again be related to drivers' perceptions of rider experience and predictability. Motorists might profitably be warned not to make assumptions about a bicyclist's likely experience, or their likely actions during an overtaking manoeuvre, based on their appearance, as in reality gender and helmet-wearing will not be particularly valid signs of experience.

The riding-position effect suggests drivers simply do not change their overtaking paths very much as a function of where a rider is: if a cyclist rides further into the road, they will on average be closer to passing vehicles as a result. However, there are also plenty of reasons why riders should not just stick to the road edge, e.g., debris, car doors, and drivers' attention patterns at junctions.

Long vehicles can need to cross into the opposite lane for several seconds to overtake a cyclist. Drivers should be reminded about how they get too close, and cyclists might also better understand how difficult it is for these vehicles to find overtaking opportunities in urban environments.

References

1. Murphy Jones, C. & Walker, I. (submitted). How types of pedal cycle accidents in Oxfordshire, England vary with age and sex of cyclist.

2. Basford, L. et al. (2002). Drivers' Perceptions of Cyclists. TRL Report 549.

3. Haddad, H. (2005). *Cycling Stereotypes and Identity*. Unpublished Master's thesis, University of Surrey.

A full account of this study is to be published soon: Walker, I. (in press). Drivers overtaking bicyclists: Objective data on the effects of riding position, helmet use, vehicle type and apparent gender. Accident Analysis and Prevention. *The work was funded by the EPSRC and the instrumented bicycle was designed and constructed by Jeff Brewster from the University of Bath Mechanical Engineering Department.*

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