



# Attending overtaking cars and motorcycles through the mirrors before changing lanes

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## ARTICLE INFO

### Article history:

Received 15 June 2010  
Received in revised form  
15 December 2010  
Accepted 1 January 2011

### Keywords:

Hazard perception  
Motorcyclists  
Eye movements  
Look-But-Fail-To-See errors

## ABSTRACT

Right of way violation crashes are the most common type of accidents that motorcyclists face. This study assessed right of way decisions in scenarios which require noticing whether there is traffic from behind that is about to overtake. A test was created which presents participants clips with a wide field of vision (from a driver's perspective in a moving vehicle), with mirror information inset that allows either cars or motorcycles that are about to overtake, to be attended. Novice and experienced car drivers, and dual drivers (with both car and motorcycle experience), watched these clips while their eye movements were monitored. The results indicated that in the rear-view and the right-side mirrors, and in the right hand lane, conflicting motorcycles garnered more attention than conflicting cars. This pattern however was particularly driven by the dual drivers group. Additionally, novice drivers and dual drivers made more use of the right side mirror than the experienced drivers. Dual drivers also made more use of the rear view mirror than experienced drivers. Finally, significant positive correlations that were found between percentages of safe manoeuvres and measures of visual search provide direct evidence demonstrating that the frequency of risky manoeuvres was indeed larger in those cases where less time was spent gazing at the mirrors, indicating that the additional attention devoted to process conflicting vehicles contributes to reduce risky manoeuvres. The general pattern of results also provides some indirect support that non-motorcyclists drivers are more likely to have Look But Fail To See errors with conflicting motorcycles than motorcyclist drivers.

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## 1. Introduction

Motorcyclists' overrepresentation in road fatalities is a well established fact. Right of way violation (ROWV) crashes where another vehicle violates the motorcyclist's right of way has been identified as the most common type of accident that motorcyclists face (Clarke et al., 2007; Hurt et al., 1981; Wulf et al., 1989). ROWV crashes, typically referred to as Look But Fail To See errors (LBFTS; Brown, 2002) because drivers involved in these accidents frequently report that they failed to notice the conflicting vehicle in spite of looking in the appropriate direction, commonly occur at T-junctions (Clarke et al., 2007; Hole et al., 1996), at crossroads (Clarke et al., 2007; Hurt et al., 1981), roundabouts (Clarke et al., 2007), when drivers change lanes (Clarke et al., 2007) and when they perform u-turns in front of motorcyclists (Sexton et al., 2004). At least in the UK, in most such cases these crashes are primarily the fault of the other road user (Clarke et al., 2007).

ROWV crashes involving motorcycles may be attributed to a wide range of reasons (for reviews, see Crundall et al., 2008b; Wulf et al., 1989). Much of the research has focussed on investigating the physical attributes of motorcycles, and of the riders, that may contribute to enhance salience (e.g., size, spatial frequency, daytime running light, colours). Road users may, for example, have more difficulties in spotting motorcycles (compared to cars) simply because motorcycles are smaller objects.

Due to the (smaller) size of motorcycles, road users may also have greater difficulties in correctly estimating their arrival times. Specifically, the size of an approaching vehicle can influence the perception of its speed and the time it will arrive at the junction (*size-arrival* effect; DeLucia, 1991; Horswill et al., 2005). This typically leads to overestimation of arrival times for smaller, as compared to larger vehicles, resulting in larger safety margins that drivers tend to apply to large, as compared to small vehicles (for gap acceptance decisions, see also Caird and Hancock, 2007).

Perception of motorcycles is also influenced by top-down factors such as familiarity with motorcycles and expectancy to see them. Typically referred to as cognitive conspicuity (e.g., Hancock et al., 1990), previous experience and expectations of the observer play a significant role in failures to detect unexpected vehicles such as motorcycles. For example, Brooks and Guppy's (1990) finding

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