

# Connect 4? The compatibility of driver, motorcyclist, cyclist, and pedestrian situation awareness

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*Paul M. Salmon, Kristie Young, & Miranda Cornelissen  
Monash University Accident Research Centre, Victoria  
Australia*

## **Abstract**

Compatibility between different road users' situation awareness is critical to safe and efficient interactions between them. This paper presents an exploratory proof of concept on-road study conducted to explore situation awareness across four road user groups: drivers, motorcyclists, cyclists, and pedestrians. The aim was to test the assumption that different road users interpret the same road situations differently and to explore the extent to which these interpretations are compatible with one another. Participants from each group negotiated a pre-defined route either on foot (e.g. pedestrians) or using an instrumented car/motorcycle/bicycle. Based on verbal protocols provided en-route, a network analysis procedure was used to describe and analyse participants' situation awareness. This revealed differences both in the content and structure of each road user groups' situation awareness, along with evidence of incompatibilities at intersections. The implications of this are discussed along with potential initiatives for enhancing compatibility between different road users.

## **Introduction**

Each form of road transportation (e.g. driving, motorcycling, cycling) requires different physical and cognitive tasks for safe and efficient performance. Evidence suggests that distinct road users, such as drivers and motorcyclists, interpret the same road situations differently (e.g. Shahrar et al., 2010; Walker et al., 2011). This is perhaps not surprising; however, for safe interactions between road users, some degree of compatibility between their situational interpretations is required (Salmon et al., 2011; Walker et al., 2011). In situations in which awareness across road users becomes uncoupled, conflicts between them are likely; for example, 'right of way' accidents between cars and motorcycles (e.g. Pai, 2009) represent instances where one road user is not aware of the other. The concept of Situation Awareness (SA), which accounts for how humans understand 'what is going on' (Endsley, 1995), offers one approach to investigate different road users' understanding of the same road situations. Despite this, to date SA has received scant attention in the road transport context (Salmon et al., 2011).

In this paper we present the findings from an exploratory on-road study of SA across four different road user groups: drivers, motorcyclists, cyclists, and pedestrians. The

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