2012 - Some Hazards are More Attractive than Others - Drivers of Varying Experience Respond Differently to Different Types of Hazard

ABSTRACT

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Introduction

The ability to detect hazards in video clips of driving has been inconsistently linked to driving experience and skill. One potential reason for the lack of consistency is the failure to understand the structural differences between those hazards that discriminate between safe and unsafe drivers, and those that do not. The current study used a car simulator to test drivers of differing levels of experience on approach to a series of hazards that were categorized *a priori* according to their underlying structure.

Results

The results showed that learner drivers took longer to fixate hazards, although they were particularly likely to miss hazards that were obscured by the environment (such as a pedestrian emerging from behind a parked truck). While drivers with a moderate amount of experience were as fast as driving instructors to look at hazards, they spent the greatest amount of time looking at them. Only instructors' ability to detect hazards early in the approach translated into differences in driving speed for certain types of hazard. The results demonstrate that drivers of varying experience respond differently to different hazards, and lay the foundations for a hazard typology.

Overview

Hazard perception (HP) is the process of detecting, evaluating and responding to dangerous events on the road that have a high likelihood of leading to a collision. This has typically been investigated using video clips taken from the driver's perspective (Quimby and Watts, 1981, Olson and Sivak, 1986, McKenna and Crick, 1991, McKenna and Crick, 1994, McKenna and Crick, 1997, Chapman and Underwood, 1998, Crundall et al., 2002, McKenna and Horswill, 1999, Horswill and McKenna, 2004, Sagberg and Bjørnskau, 2006). Each short clip contains one or more hazards (e.g. a pedestrian steps into the road from between parked cars), and simple push-button responses to these events are often used as the measure of ability. Researchers have demonstrated that HP response times (RTs) are longer for crash-prone drivers (McKenna and Crick, 1991, McKenna and Horswill, 1999, Quimby et al., 1986) and a prospective study linked long HP RTs to the chances of being involved in a fatal accident in the first year of qualified driving (Drummond, 2000). Inexperienced drivers have also been found to have poor HP performance (e.g. Quimby and Watts, 1981, McKenna and Crick, 1991, Renge, 1998, Wallis and

Horswill, 2007). Newly qualified drivers are over-represented in the UK and US crash statistics compared to drivers with several years of post-licence experience (Braitman et al., 2008, Maycock et al., 1991, Underwood, 2007), and underdeveloped HP skills have been posited as one contributor to the increased crash risk of novice drivers (Horswill and McKenna, 2004).

The UK Government considered the evidence to be convincing enough to introduce HP testing to the licencing procedure in 2002. The rationale was that learner drivers who do not respond fast enough to video-based hazards might not respond fast enough to on-road hazards, increasing their probability of crashing (cf. Drummond, 2000), and that including HP testing would encourage learners and instructors to focus more upon driving hazards during training. Thus an HP criterion has been set that all learners must meet in order to progress towards a full licence.

Despite the wealth of evidence in favour of hazard perception testing, there have also been a number of studies that fail to find the expected differences in hazard perception ability as a function of age, experience, and accident propensity (e.g. Chapman and Underwood, 1998, Crundall et al., 2002, Sagberg and Bjørnskau, 2006), and an evaluation of the introduction of HP into the British driving test suggests that benefits may be limited to quite specific driving situations (non-low-speed reported public road accidents, especially when the driver accepts some blame; Wells et al., 2008). We suggest that these mixed results derive, at least partly, from a theoretical lacuna at the heart of hazard perception testing. Explanations for why some HP tests discriminate safe and unsafe drivers while others do not have so far been primarily post hoc; this is because we lack a theoretical understanding of how safe drivers spot hazards. The current study explores different cues and hazard types in a systematic way in order to begin to build a more general theory of hazard perception.