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Proactive Listening to a Training Commentary improves hazard prediction

Candida Castro [a,*], Petya Ventsislavova [c], Elsa Peña-Suarez [a], Andres Gugliotta [a], Pedro Garcia-Fernandez [b], Eduardo Eisman [a], David Crundall [c]

[a] Cimcyc, Mind, Brain and Behaviour Research Centre, Faculty of Psychology, University of Granada, Spain
[b] Electronic and Computer Technology, Faculty of Sciences, University of Granada, Spain
[c] Nottingham Trent University, UK

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ABSTRACT

The aim of this work was to explore the effect of Proactive Listening to a Training Commentary, using the recently developed version of the Spanish Hazard Perception test. Firstly, 16 videos were used in the pre-test session in its short version, cut to black just before the hazard appearance. The What Happens Next Assessment (at the pre-test stage) generates expectations about the outcome of the traffic situation. Then, the training (8 min in length) uses the complete version of the same 16 videos, revealing the hazards unfolding. It involves listening to a voice with relevant information about where to allocate attention in the complex driving scene in order to recognise and anticipate the hazard successfully. A total of 121 participants were included in this study. The sample consisted of learner, novice and experienced drivers, including re-offender and non-offender drivers. The participants were divided into 2 groups: a trained and an untrained group. Two assessment times were used: pre-test (16 videos) and post-test sessions (another 16 videos). The test presented a high internal consistency (Alpha = 0.875). This training shows significant positive effects for all types and groups of participants. No significant differences were found between the non-offender and the offender groups. Performance in gradual-onset hazard events can be improved after training but also by practice; however this training is essential and especially beneficial for training the ability to detect hazards that appear abruptly (which seems to be difficult to improve just by practice).

1. Introduction

The ability to perceive hazards while driving is a factor that reduces the risk of having accidents (Wells et al., 2008; Horswill et al., 2010a). A hazard in the traffic context is any permanent or temporary object which remains in the road environment and has the potential to increase the risk of an accident (Jackson et al., 2009). Hazard perception is the skill of detecting, evaluating and reacting to events on the road that have a high probability of producing a collision (Crundall et al., 2012) and is the only specific driving ability that correlates with a lower crash risk (Wells et al., 2008; Horswill et al., 2010a). Therefore, it is considered that improving the skill of hazard perception through training could decrease the crash risk. Beanland et al. (2013) assert that the training of higher-order cognitive skills, such as hazard perception, addresses the broader driving context, particularly anticipating or avoiding hazardous situations. Recognition of the importance of these cognitive skills has led to a proliferation of driver training programmes that directly target these skills.

In fact, it seems worth questioning whether training improves the ability to detect hazards of only learner drivers and drivers with less experience. It is possible that training could be effective for all groups of drivers, including those with considerable driving experience, safe drivers and re-offenders. However, training may not be equally effective when drivers are exposed to different types of hazard. It would also be interesting to find out whether practice in itself, using What Happens Next exercises (WHN) (McKenna and Crick, 1997), would be enough to improve hazard perception test scores. In each of these exercises, trainees had to view video footage of a traffic situation, which was freeze-framed at a given point (usually just before a hazard was encountered) and at that point trainees were asked "what might be about to happen".

* Corresponding author at: Experimental Psychology Department, Faculty of Psychology, University of Granada, Campus Cartuja, s/n 18011 Granada, Spain. Cimcyc, Mind, Brain and Behaviour Research Centre, Universidad de Granada, Campus Cartuja, Room 330, 18011 Granada, Spain. Tel.: +34 958 240663, +34 655 99 40 59; fax: +34 958 246239.
E-mail address: candida@ugr.es (C. Castro).

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Nevertheless, as Wetton et al. (2013) explained, the WHN exercises did appear to have a significant immediate training effect, independent of the expert commentary exercises, but the magnitude of this effect was reduced. That is, if one had to choose between using either WHN exercises or expert commentary exercises, then one would choose the latter. According to Endsley (1995), Situation Awareness operates at three levels that support hazard perception and make it possible to answer the three main questions: "What is the hazard?", "Where is the hazard?" and "What happens next?" which means perceiving and understanding the hazardous situation and anticipating future driving events (Jackson et al., 2009).

Specifically, Wetton et al. (2013) investigated what type of training would be most useful to improve hazard perception by using video-based tests featuring real driving footage at three points: immediately prior to the test (pre-); immediately post-test (post-); and after a one-week delay. They created four types of video training. The first was WHN, based on McKenna and Crick (1997) as referred to above. The second video was expert commentary training. The third type was hybrid commentary training (i.e., expert plus self-generated commentaries); and the fourth consisted of a full training package (i.e., WHN plus hybrid commentary training). All four types of training presented significant results compared with results from untrained groups. However, full training resulted in the greatest improvement and *WHN* training the least. The addition of self-generated commentaries to the expert commentary training (hybrid commentary condition) did not significantly improve response times. All training effects decayed considerably after the delay, but the effect of full training remained significant. Although no benefit was found in adding self-generated commentaries to expert commentaries, the possibility remains that the *WHN* exercises may provide an additional benefit when combined with commentary training.

In another study, Isler et al. (2008), taught drivers how to identify hazards by detecting clues from the environment using commentary training while concurrently performing a secondary tracking task, simulating the steering of real driving. After the training, novice drivers detected a higher percentage of hazards and had faster response latencies compared to a baseline than those without training. Crundall et al. (2010) investigated whether learner drivers would benefit from being trained to produce a commentary drive. They compared one group of commentary-trained learner drivers to a control group. The results showed that the trained group had fewer crashes, reduced their speed sooner on approaching hazards and applied pressure to the brakes sooner than untrained drivers.

There is also evidence that training in hazard perception benefits both novice and older drivers as they both reduce their significantly speed when approaching hazards (Horswill et al., 2010b). For instance, Horswill et al. (2010a) used a video of a driver's eye view of hazardous traffic situations. The participants in the trained group heard an expert driving instructor giving a running commentary on the footage, indicating what he was paying attention to and giving general advice about anticipating hazards. The following excerpt from the commentary is typical: "*Scanning ahead. Looking over the crest of the hill. Car turning left. Approaching traffic. More cars coming towards us. Cars on the right. Checking amongst the trees.*"

On the other hand, Meir et al. (2014) explored the formulation and evaluation of a new HP training test – the Act and Anticipate Hazard Perception Training (AAHPT) in young novice-drivers. There were three types of test mode (*Active*, *Instructional* and *Hybrid*) and a Control group. *Active members* observed video-based traffic-scenes and were asked to press a response button each time they detected a hazard. *Instructional members* underwent a tutorial which included both written material and video-based examples regarding HP. *Hybrid members* received a condensed theoretical component followed by a succinct *Active* component. The Control group was presented with a road safety tutorial. According to their results, one week later, the *Instructional* mode demonstrated inferiority in comparison to the other two modes; the *Active* and the *Hybrid* mode members were more aware of potential hazards relative to the control group.

However, the *Instructional* mode of training could be carried out as an active mode of training too. As McKenna et al. (2006) pointed out, commentary training improved drivers' situational awareness and led them to a better appreciation of the risks, by encouraging them to actively search for hazards. Although commentary training doesn't necessarily require a simulator response, it still provides an active search guide to the participants. The fact that commentary training based on instructions can be applied without using a simulator means that a less expensive tool is available that doesn't require great amounts of time, money or effort and that could be just as effective. During the hazard perception exercise and when the video footage is cut, the driver generates a process which consists of selection of information and decision making. Once commentary training begins (visualising the complete driving scene), drivers initiate an active listening process, which directs the top-down allocation of attention and generates expectations in drivers as to what may happen in the immediate future. Participants are eager to find out *WHN*, or in other words, they expect feedback from their performance, which is the best guide they could have. Indeed, these sequences of action assume an active role by drivers that culminates in expectations. It can also guide their attention as well as arousing expectations of receiving feedback on their performance.

Moreover, it seems worth exploring whether the training has a different effect on the improvement in their perception according to the kind of hazard. Underwood et al. (2013) suggested the following classification of hazard situations: those where hazards appeared gradually vs. those where hazards appeared abruptly. The gradual onset hazard videos are those that show events unfolding (for example, a football flying out of a driveway can predict that children are nearby) (Horswill and McKenna, 2004; Underwood, 2007). However, the abrupt onset hazards are those that involve the abrupt capture of attention and exogenous events (for instance, a pedestrian appearing suddenly). This type of hazard is under consideration for inclusion in driving tests, but it could be considered that what they are testing is the viewer's speed of reaction rather than their ability to assess a scenario and anticipate how the situation will develop. Experienced drivers gained an advantage in those situations where the hazard appeared gradually. This is probably due to the fact that gradual onset provides clues that allow experienced drivers to figure out how the situation will develop. So, it is expected that experienced drivers may have a more developed awareness of events on the motorway and of the behaviour of other road users.

Furthermore, according to White et al. (2011) young drivers show an optimism bias for their driving skills and accident risk perceptions. In addition, when comparing their driving self-assessment with their actual behaviour, there are indications that they overestimate their driving skills (De Craen et al., 2011). On the other hand, multiple road offenders obtain different hazard prediction scores from normal/safe drivers (see the classic study by Pelz and Krupat, 1974). The implication is that good drivers are more likely to avoid accidents than are drivers with a record of offending. According to Simon and Corbett (1996), results of accident history are positively related to offending. The number of accidents and offences is higher among young men and their index of accidents is higher than those of women or older drivers (Laapotti et al., 2001; Yahya and Hammarstroöm, 2011). Lapham et al. (2006) stated that repeat offenders are more likely to be