Expert Drivers and Situational Awareness

Kristen Pammer, Yu Liu, Maria Borzycki

The Research School of Psychology, The Australian National University

Abstract

Situational Awareness (SA) refers to knowing what is happening around you, and is closely related to task performance and safety. Here, we were interested in how SA differs between expert (paramedics) and non-expert drivers, controlling for memory, driving experience and age. We demonstrated that non-experts were better at reporting low-level perceptual features (e.g., "there is a blue car"), but experts were better at understanding the situation and predicting future events (e.g.,"that car may pull out into the lane we are in"). The results are discussed in terms of rapid strategy development that might occur with experts compared with non-expert drivers.

Background

Situation awareness is defined as the capacity to know what is going on in a given situation, to integrate relevant information, evaluate the importance of elements in the situation, and predict future events based on this information (Endsley, 1995). Thus a traditional conceptualisation of SA is: perceiving elements in the current situation; integrating and comprehending those elements; and projecting what the future status of those elements will be. Failures of SA in driving have been associated with more collisions, speeding violations, and more missed stop signs and turns (Kass, Cole & Sanny, 2007).

Through driver training, expert drivers gain better understanding and advanced skills (Walker, Stanton, Kazi, Salmon, & Jenkins, 2009), and they should, therefore, be able to outperform non-experts with similar experience in all three levels of SA. Specifically we would expect higher levels of SA in terms of their ability to comprehend and anticipate the future state when driving, compared with non-expert drivers.

Method

The expert group (N = 25) was comprised of paramedic officers, who receive considerable systematic training in driving, including explicit training in low risk thinking when driving. The non-expert group (N = 25) consisted of normal drivers who, as a group, and regardless of years driving, have not undertaken any formal driving courses, thus separating experience and expertise – a common confound in the expertise literature. All participants were between the ages of 23-55 years, and all participants held a current drivers licence. Participants engaged in a novel SA task, based on the What Happend Next task (Jackson, Chapman & Crundall 2009) in which they reported on videoed driving scenarios. The scenarios depicted a range of normal driving conditions that an average driver would be expected to encounter, and ranged from 3 – 16 seconds. There were no staged or obvious hazards other than those that occur in normal driving situations, and participants were not explicitly instructed to look for hazards. Participants were asked to describe what they had just seen in the video, imediately after each scenario.

Results and Conclusions

The recorded responses for each participant was transcribed, coded and categorized into the 3 levels of SA (Perception, Comprehension and Projection). A grounded theory approach (Glaser & Strauss, 1967) was taken to the categorisation of participant responses. The first step was to open code the response data by breaking it down into smaller response units that ranged from a word to several sentences (Strauss & Corbin, 1990). Secondly, response units that referred to similar phenomenon

were grouped into response categories (Strauss & Corbin, 1990). Thirdly, the response categories were divided into different levels of SA according to Endsley's (1988) definitions, which specifies propositions (suggested the generalised relationships among different categories) in grounded theory.
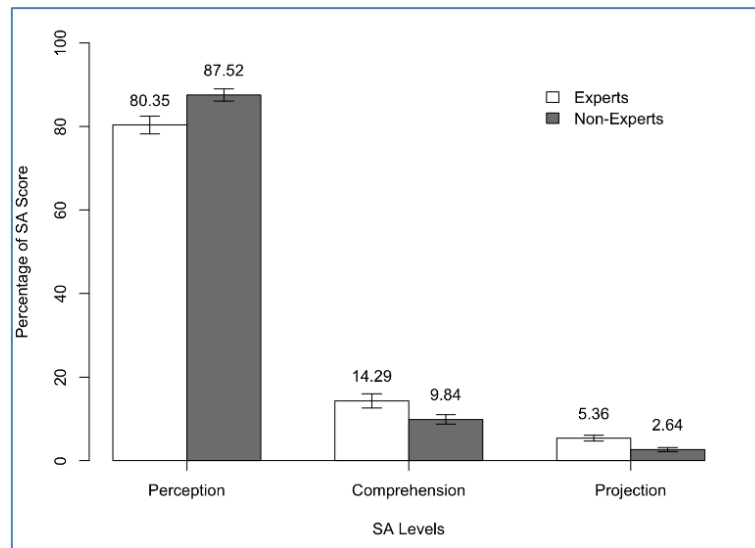

Figure 1. Elements of situational awareness in the three levels, demonstrated by expert and non-expert drivers

Regarding the proportion of verbalisations that were categorised into the 3 levels (relative to the number of verbalisations overall for each participant, refer to Figure 1), experts reported more 'comprehension' and 'projection' level information compared with non-experts, and this appeared not to be due to simply reporting more information, as non-experts reported more 'perception' level information. Moreover, the pattern of reporting differed for the two groups over time, suggesting that the experts adopted a different strategy for coding SA compared with non-experts.

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