

Effects of spatial and non-spatial cognitive distraction on drivers' mental representation of spatial and situational information

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Where numerous studies demonstrate the detrimental effects of distraction on drivers' reaction time, action selection or scanning behaviour, only few studies investigate the causal mechanisms underlying these distraction effects. The aim of the research presented here - as part of a general project to build computational cognitive models of driver behaviour - is to examine the effect of cognitive distraction on the driver's mental representation of situational and spatial information of traffic situations, such as intersection situations. The driving task explicitly demands the driver to process and represent situations in terms of space. Distortions of this mental representation are one of the key factors for the development of driving errors and we assume that cognitive distraction will interfere with the construction and maintenance of such representations. Additionally, by manipulating the kind of cognitive distraction information will be gathered about the nature of the spatial and situational representation and the cognitive structure responsible for maintaining this representation. As existing cognitive architectures are lacking structures and resources especially to process spatial information, these results will provide a first step for modeling drivers' spatial and situational representation, thereby addressing an issue central to the development of cognitive models of driver behaviour. Hence, we set up an experiment that particularly addresses the demands of situation assessment when approaching intersections. Videos of such approach situations were presented to participants and in varying distances to the intersection they had to perform an auditory spatial vs. an auditory non-spatial reaction time task. An effect of the spatial dual task on the dependent measures is expected due to the assumed demands posed by assessing the driving situation in terms of space. Eye tracking, pupil dilation and reaction time data will be presented. The empirical results will be discussed with respect to their evidence for or against spatial processing.

PAPER PRESENTATION