Body and mind in driving abilities: how electrodermal correlates can explain the improvement of hazard perception in a virtual training

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Hazard perception is a high cognitive ability, crucial to predict the potential occurrence of dangerous events in order to prevent them and their outcomes. Research in road safety showed that driving experience modulates hazard perception, leading to the paradoxical consequence that novice drivers have to experience on-road risks to improve their hazard perception. The aim of the present study is to investigate the psychophysiological mechanisms through which learning in hazard perception develops, using virtual reality technology in order to guarantee a safe context. The study is based on the recent evidence that inexperienced drivers show a greater percentage of Skin Conductance Responses (SCRs) while driving in a virtual environment, than during the passive viewing of risky scenarios. Sixteen undergraduates, with a mean age of 20 years old, participated in the study. All the participants were novice drivers/riders (less than 2,5 years of driving license). We used a moped-riding simulator (the Honda Riding Trainer – HRT, specifically developed for hazard perception training) and an acquisition system to record electrodermal activity during the HRT training. The Experiment consisted in riding the HRT during two sessions scheduled a week apart. All the participants were administered the same 5 courses per session according to the degree of difficulty (from the easiest to the most difficult), representing peripheral road at the HRT, with an initial familiarization course. In each session, the same 39 potentially hazardous scenes were shown and we recorded changes in electrodermal activity (SCRs) in proximity of hazardous events. In the second session, we expected to observe an overall improvement of riding performance, together with earlier SCRs onset associated with the detection of hazard. The design was a 2 *Sessions* X 5 *Courses* repeated-measure design. The dependent variables were the percentages of accidents and SCRs over the total of the scenes, and the mean onset anticipation of SCRs. We found a reduction in the number of accidents as the training develops, both within and between Sessions. The percentage of SCRs decreased along the courses: such reduction might be interpreted as a consequence of an improved ability to behave in such a way that the hazard does not occur at all. This is confirmed by the results of the analysis on the SCRs onset**,** which is significantly anticipated in the second Session, indicating an earlier implicit response to hazards that might enhance the likelihood ability to avoid them. These results represent a further contribution to the comprehension of implicit mechanisms underlying hazard perception and its development, that might become a turning point both for road education and road safety.