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Title:

Implementing a cognitive factor as an individual constituent in a driver model by inference from multiplicative relationships between cognitive sub-factors

Abstract:

The ability to model the mental processes behind the execution of complex driving tasks allows the development of driver assistance systems to be accelerated, by reducing the number of time-consuming and expensive studies required, and the improvement of holistic assistance strategies containing knowledge about driver behaviour. The production of a suitable model entails describing these mental processes such that the key characteristics of the driver behaviour being considered are captured. The description must comprise constituents which allow it to be expressed formally. In order to achieve this goal, the first task is to identify and model the cognitive factors, which are crucial when describing driver behaviour. A resulting single cognitive factor, which is composed of the mental sub-factors (SF) expectation, distraction, stress, and strain, has been developed and forms an essential constituent of our driver model. The cognitive factor has been defined such that, the individual SF are in multiplicative relationship with one another. Each of these SF represents the visual, auditory, tactile-kinetic, and verbal information channel in each case. This results in a lattice-like network of relationships, which can be expanded modularly in horizontal (SF) and vertical (information channels) directions. The topology of this multiplicative cognitive factor is presented.