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on:

Sustainable and safe road design from a human behaviour point of view
Challenges for interdisciplinary work in road safety

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Identification of individual problematic driving performance parameters in curve taking

Abstract

To make progress on road safety, it is widely agreed that rather than only focusing on crash data, more policy attention should be paid to the underlying risk factors influencing safety. In this respect, road user behavior has been acknowledged as the primary cause of mortality. Although numerous studies have been carried out with the purpose of investigating road user behavior with respect to safety, there is limited research on individual driver performance in the traffic and human factor engineering field. This is an important gap because identifying and analyzing high-risk drivers will greatly benefit the development of proactive driver education programs and safety countermeasures.

The main purpose of the present study is to investigate drivers' behavior by using the data from a driving simulator, in order to distinguish the best drivers and identify the problematic behavior of 'underperforming' drivers. To this end, 129 participants with different age and gender were enrolled to take part in a particular simulator scenario (i.e., curve taking) and their speed, acceleration and lateral position, the three most important driving performance indicators based on literature review, were monitored at various points (before, during and after the curve) while driving a STISIM simulator. As a widely accepted tool for performance monitoring, benchmarking and policy analysis, the concept of composite indicators (CIs), i.e., combining single indicators into one index score, was employed, and the technique of data envelopment analysis – an optimization model for measuring the relative performance of a set of decision making units, or drivers in this study – was used for the index construction. Specifically, this model searches for the best possible value for each driver separately while respecting the given boundaries (e.g., the performance during the curve should receive a higher share in the index value than the performance before or after the curve). Based on the results from the model,

- 1) All drivers were ranked, and best performers were distinguished from underperforming drivers.
- 2) For drivers performing less than ideal (i.e., having an index score different from one), the most problematic parameter (e.g., lateral position) and point in curve taking (e.g., at curve end) can be identified, leading to specific driver improvement solutions (e.g., training programs).

Keywords: Drivers performance , Data Envelopment Analysis, simulator, curve taking