Associating crash avoidance maneuvers with driver attributes and accident characteristics: a mixed logit model approach - DTU Orbit (09/12/2018)

**Objective:** The current study focuses on the propensity of drivers to engage in crash avoidance maneuvers in relation to driver attributes, critical events, crash characteristics, vehicles involved, road characteristics, and environmental conditions. The importance of avoidance maneuvers derives from the key role of proactive and state-aware road users within the concept of sustainable safety systems, as well as from the key role of effective corrective maneuvers in the success of automated in-vehicle warning and driver assistance systems.

**Methods:** The analysis is conducted by means of a mixed logit model that represents the selection among 5 emergency/lateral and speed control maneuvers (i.e., “no avoidance maneuvers,” “braking,” “steering,” “braking and steering,” and “other maneuvers) while accommodating correlations across maneuvers and heteroscedasticity. Data for the analysis were retrieved from the General Estimates System (GES) crash database for the year 2009 by considering drivers for which crash avoidance maneuvers are known.

**Results:** The results show that (1) the nature of the critical event that made the crash imminent greatly influences the choice of crash avoidance maneuvers, (2) women and elderly have a relatively lower propensity to conduct crash avoidance maneuvers, (3) drowsiness and fatigue have a greater negative marginal effect on the tendency to engage in crash avoidance maneuvers than alcohol and drug consumption, (4) difficult road conditions increase the propensity to perform crash avoidance maneuvers, and (5) visual obstruction and artificial illumination decrease the probability to carry out crash avoidance maneuvers.

**Conclusions:** The results emphasize the need for public awareness campaigns to promote safe driving style for senior drivers and warning about the risks of driving under fatigue and distraction being comparable to the risks of driving under the influence of alcohol and drugs. Moreover, the results suggest the need to educate drivers about hazard perception, designing a forgiving infrastructure within a sustainable safety systems, and rethinking in-vehicle collision warning systems. Future research should address the effectiveness of crash avoidance maneuvers and joint modeling of maneuver selection and crash severity.