

Truck drivers' behavior in encounters with cyclists and pedestrians in a test-track experiment

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Crashes involving cyclists and pedestrians in Europe cause the deaths of about 7500 persons every year. Both cyclists and pedestrians are especially exposed in crashes with motorized vehicles and collisions with trucks can lead to severe injury outcomes. The two most frequent crash scenarios between trucks and these vulnerable road users (VRU) are: a) when the truck wants to turn right at an intersection, with a cyclist riding parallel and planning to cross the intersection and b) when a pedestrian crosses in perpendicular direction to the truck, which is travelling straight. Advanced Driver Assistance Systems (ADAS) – that are expected to prevent or mitigate these crashes – benefit from detailed information about the behavior of truck drivers. This study lays in this research area, with the aim to assess how drivers negotiate the interactions with VRUs in the two scenarios described above. Thirteen participants drove an instrumented truck in the city environment at the AstaZero test-track. After some baseline recordings, the drivers experienced two laps where they interacted with the VRUs crossing, during right turn maneuvers. All the drivers showed a consistent behavioral process when they negotiated the same intersection by decreasing their speed approximately at the analogous distance from the junction. However, the truck drivers adapted their behavior in the laps where the VRUs were crossing the intersection: compared to the baseline laps, the speed profiles of the drivers diverged approximately 30 and 14 meters from the intersection, respectively for the scenario with cyclist and pedestrian crossing. The models of driver behavior resulting from these analyses can provide valuable information for the design of ADAS that warn drivers about the presence of a cyclist travelling in parallel direction or that intervene to avoid a collision with a pedestrian or a cyclist.