Ratio between crossing and rear-end conflicts at crossing streams Empirical evidence for a microscopic traffic model describing crashes

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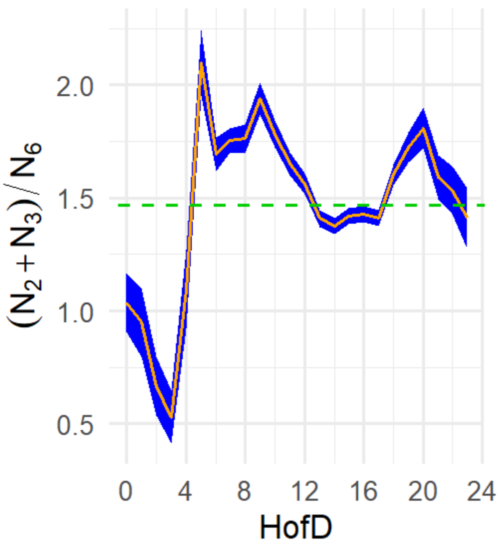
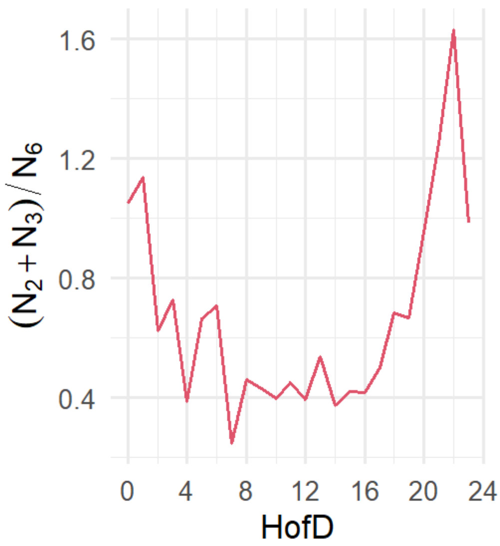
A recent simulation study [1] with a very simple car/driver model and a very simple crash model proposes, that the number of crashes at crossing traffic streams (intersection) depend in a complicated manner on the traffic state of the (simulated) intersection. The simulation model was only sensitive to crossing (X) and to rear-end (RE) conflicts. Re-analysing these simulation data with respect to the ratio between these two crash-types (this is not included in [1]) shows a complicated dependency on the traffic state. However, on average, this ratio turns out to be 0.1, i.e. in the simulation there were 10 times more rear-end conflicts than there were crossing conflicts.
This can be compared with data from real intersections, within reasons. There, in most cases we have only a classification into crash types, where the crash-types 2, 3, and 6 are the relevant ones. Crash-type 2 contains crashes by turning, type 3 contains crossing, and crash-type 6 contains rear-end. Nevertheless, the ratio $r = N_{23}/N_6$ between types 2, 3 and 6 appears to be larger than the simulation results indicate. This is evidenced by the ratio between these two types in the whole Berlin data set, as well as in the (open) German crash data set (left figure). Furthermore, this observation is supported by the ratio for one intersection in Berlin with the highest number of recorded crashes (7,363 crashes in a 22-year period). Both datasets display considerable daily and weekly variation, which may in fact being attributed to changes in traffic flow and traffic state, see the Figure.





So, there is a weak correspondence between the prediction from the simulation model and the empirical data. This gives hope, that sensible simulation models can be developed that are capable of predicting the influence of traffic organization on traffic safety.

[1] A Leich, R Nippold, A Schadschneider, and P Wagner (2024), *Physical models of traffic safety at crossing streams*, Physica A: Statistical Mechanics and its Applications, **640**, 129669, https://doi.org/10.1016/j.physa.2024.129669