

Evaluation of cyclist behaviour at stop signs: a before and after analysis on All-Way stops intersections

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Background

Intersections have been a significant paradigm since we started interacting between different users at them. Various traffic controls have been implemented through the years: yielding and stop signs, roundabouts, traffic lights, etc. where some rules have been established. Under the law, cyclists tend to be treated as drivers, where it is not clear if warrants considered if it is necessary or beneficial for a bicyclist to stop. For a cyclist stopping at each intersection, significantly increase energy, travel time and discomfort.

Aims

The purpose of this research is to implement a statistical model with before – after information to identify the cyclist behaviour at intersections that are controlled with stop signs, and evaluate their safety risk with surrogate measures. More specifically, the objective of this work is to explore the bicyclist behaviour and speed reduction to avoid conflicts with other users at the stop sign and their safety measures as post-encroachment time (PET). Additionally, the compliance of cyclists towards pedestrians at the stop sign is investigated.

Methods

A before and after high-resolution sample, a video-based traffic collection system from 30 intersections is collected at five different neighbourhoods in the city of Montreal, where intersections were converted from two-ways to all-ways stop. The information related to road users is extracted with the help of the tvaLib software, which is based on the open-source applied computer vision Traffic-Intelligence. Road users are handled as trajectories, and these trajectories are classified into three categories: pedestrian, cyclist, or motorized vehicle. Cyclist behaviour as wavering, placing the foot on the floor, use of helmet and gender were tagged. Also, the cyclist speed profiles with the minimum, average, median, and maximum speed are determined for each user per approach with the extracted trajectories. Additionally, surrogate measures are obtained.

Results

Results are showing the not compliance of cyclists to the stop signs. Although, cyclist show precautions while crossing and stopping if they perceive that there is risk involved. Also, surrogate measures are showing that the number of PET conflicts persist, the median of the values is slightly moved towards a safer number; however, this result is not significant. Nevertheless, this research in the city of Montreal is showing that cyclists could use stops signs as yield signs, improving their comfort and travel time while commuting, without increasing the probability of a collision at the intersection level.

Conclusions

It is found that installing stop-signs in the approach reduces cyclist speed around 1.0 km/h. Even though it is a small reduction, it is significant for the different speed measures. Also, it was found that less than 2% of the cyclist do a complete stop placing their foot in the ground. Nonetheless, cyclists compensate the non-stop compliance with a wavering movement towards the pedestrian to avoid the conflict and to continue with the flow.