

How outdoor lighting affects cyclist travel behaviour

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Background

Street lighting is an important factor affecting preferences towards cycling as a transportation mode, particularly in wintertime when the number of daylight hours can be severely limited. Lighting also serves to improve cyclist security as well as safety. Several studies report that single-bicycle crashes are more likely to occur in the dark and twilight (Boufous, de Rome, Senserrick, & Ivers, 2013; Schepers & den Brinker, 2011).

Swedish data show that cyclists are dissatisfied with the current situation of street lighting, stating that it is insufficient (Niska, 2007). Almost half of the single bicycle crashes that results in severe injury are due to road surface deficiencies such as slipperiness or potholes. These deficiencies are more difficult to detect in darkness and, in total, 20% of single bicycle crashes occur during dark hours (Niska & Eriksson, 2013).

Aim

In this study, we develop a method to derive microscopic cyclist trajectory data from video analysis that can be synchronised with self-report data on cyclists' experiences. This method can be used to improve the quality of travel for cyclists in twilight and dark and increase the likelihood of replacing short motor vehicle trips with active, sustainable forms of transport.

Method

The participants are invited to individually cycle a predefined distance in an urban setting. They are video filmed along the entire route using a drone. In addition to the filming of the participants, filming of the locations in undisturbed conditions is also performed. The trajectories are extracted using special (semi-)automated software. The aggregation of trajectories in terms of average speed/lateral position profiles along the path allows for studying the changes in the entire group of participants while the individual trajectories are used for the analysis of specific interactions, e.g. overtaking or meetings with an on-coming cyclist/pedestrian. The actual lightning and unevenness of the predefined route are measured with a special designed equipment.

Study design

The method was tested at two different locations in Sweden during fall and winter seasons. The locations consist of road stretches of about 200 meters with different designs. One location has a mix of both cyclists and pedestrians while the second location has a separation between cyclists and pedestrians.

Expected results

Following the completed data collection, the next step of the project is to analyse how the travel behaviour differs between day and night conditions at the studied locations, and how differences in the designs might affect the behaviour of the cyclists. Using the data from the undisturbed conditions, an effort will also be made to investigate whether the behaviour of the participants is representative of normal road users.

References

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