Where do we ride from here? Takeaways from a PhD project on bicycle traffic simulation

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Abstract (300 words)

As some bicycles tracks in Copenhagen accommodate more than 3,000 cyclists per hour during peak hours, it is obvious that travel times may vary throughout the day. Likewise, as cyclists form a very heterogenous group – especially concerning speed – travel times also differ across cyclists. This speed heterogeneity combined with the fact that cyclists are very space efficient makes overtaking much more important than for car traffic.

Despite the obvious differences between car and bicycle traffic, little effort has been made towards dedicated models for realistic simulation of bicycle traffic and its influence on other transport modes at a large scale (Twaddle et al., 2014). Unfortunately, as the lack of suitable models for evaluating bicycle projects is seen as a major barrier among stakeholders (Aldred et al., 2019), and prevents important effects such as travel time savings to be included in project appraisals.

A recent PhD thesis (Paulsen, 2020) aimed at addressing this through three papers on bicycle traffic simulation. Paulsen et al. (2019) developed a tailor-made methodology for bicycle traffic simulation estimated and validated using video data of bicycle traffic from Copenhagen. The research highlighted the importance of recognising cyclist heterogeneity when modelling bicycle traffic. In Paulsen and Nagel (2019), the methodology was integrated in a dedicated bicycle traffic assignment model with route choices dependent on feedback from the network, and applied to a large-scale scenario of Metropolitan Copenhagen with 1,082,958 trips. Finally, multi-modal right-of-way at intersections was added alongside 3,210,685 car trips in Paulsen et al. (2020) for joint traffic assignment of cars and bicycles with results showing that urban car traffic is considerably delayed by bicycles at intersections.

Besides presenting a synthesis of the three studies, methodological as well as applicational directions for future research will also be outlined. Additionally, the presentation will discuss how and to which extend the findings can be used to guide cities towards smoother urban mobility and support bicycle-friendly development.

Keywords: Bicycle traffic; Large-scale traffic assignment; Agent-based simulation; Bicycle congestion modelling; Speed heterogeneity

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References


