

The effect of facility width on following and passing: a bicycle simulator study

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Many municipalities are introducing new bicycling facilities and improving existing infrastructure to meet the needs of an increasing number of bicyclists. In Germany, for example, new design guidelines for bicycle highways require a minimum width of three meters, which is assumed sufficient for a bicyclist to pass two bicyclists riding beside one another. In this paper, the following and passing maneuvers of bicyclists are examined to determine whether the width of the bicycling facility has an effect on the number and duration of following events and the distance between bicyclists during a passing event. Three facility designs are tested using a bicycle simulator study: standard bicycle lanes with a width of two meters on each side of the road, widened bicycle lane with a width of three meters on each side of the roadway and two-way widened bicycle lanes with a total width of six meters on one side of the roadway. The last two facility designs meet the specifications for a German bicycle highway. Each of the twenty-three participants in the bicycle simulator study rode along a bicycle lane segment approximately 1.5 km in length three times. The behavior of surrounding bicyclists in the simulated environment is controlled by the microscopic simulation software SUMO. Initial results indicate that both the number and duration of following events are reduced when the bicycling facility is widened from two to three meters. No significant difference in the characteristics of the following events is found between the one-way and two-way bicycle highways. However, the distance between the simulator study participants and the simulated bicyclists was not found to differ as expected when the width of the bicycling facility is increased. The bicycle simulator proves to be a useful tool in examining the following behavior of bicyclists as the behavior and interactions of one bicyclist can be precisely measured over a long period. Although longitudinal (speed) control of the bicycle simulator was easily achieved by the simulator study participants, the lateral control (steering) proved to be more challenging. This may limit the validity of the results concerning the distance between road users in a passing event.