

Study of the influence of vehicle-bicycles interaction on two-lane rural roads through a driving simulator

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Nowadays, the presence of cyclists on Spanish two-lane rural roads is very common. Cyclists ride individually or in groups, sharing the road network with motorized vehicles. This causes high speed variations and, therefore, more interactions among the different road users. Due to the differences in terms of speed and vulnerability of cyclists, overtaking maneuver is one of the most dangerous and frequent interactions.

The regulations related to cyclist operation differs among countries. In Spain, cyclists must ride along the right shoulder as long as possible –moving into the lane when narrow or unsafe shoulder–. Furthermore, cyclists are also allowed to ride two abreast so as to be more visible to other vehicles, except on low-visibility zones or when clearly affecting traffic performance. Regarding overtaking maneuver, vehicles can overtake bicycles even on no-passing zones keeping a lateral clearance not lower than 1.5 meters. Lateral clearance, traffic –motorized and non-motorized– volumes, and relative speeds make overtaking a challenging maneuver that has been extensively examined in recent years. Various methodologies have been used to characterize the interaction between bicycles and motorized vehicles, but the influence of bicycle groups on overtaking has barely been studied.

This research aims at evaluating how the presence of cyclists and their grouping configuration affect traffic operation on two-lane rural roads by using a driving simulator. Driving simulators have become an important tool for that purpose as many different situations can be recreated and tested.

In this study, a real scenario –physical characteristics and operational conditions– has been recreated in a driving simulator. Three traffic scenarios have been developed consisting of different cycle traffic conditions. To analyze the effect of cycle traffic conditions on motorized vehicle performance, a total of 30 volunteers drove throughout the three scenarios. As a result, average travel speed and number of overtaking maneuvers were obtained for each round. Based on these parameters, diverse recommendations on how to integrate cyclists on two-lane rural roads in a safer way are proposed.