



Studying Non-coaxiality in Non-lane-based Car-following Behavior

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Abstract

In this paper, in order to study non-lane-based car-following, the non-coaxiality concept is defined, where there is a significant lateral difference between the leader and follower vehicle. Two main reasons for non-coaxiality were addressed by drivers in the interview: providing more visible distances beyond leader vehicle and increasing the possibility of escaping in sudden brakes to avoid rear-end collision. Results showed that non-lane-based behavior was due to the effect of the existence of other cars in the traffic flow. By reducing speed or increasing density, vehicles more affect each other. But this trend will continue up until vehicles fill the free spaces. In other words, vehicles make others stick to the leader's path in high-density flow. Studying the relationship between lateral distance and time headway demonstrated that time headway threshold for initiation of car-following behavior in Iranian drivers can be approximately 2 seconds. In this study, Overtaking was defined as a part or continuation of the non-lane-based driving behavior. For overtaking on the left, steering angle, the final lateral distance and the lateral speed difference between the follower and leader were 33%, 28% and 15% less than overtaking on the right.

Keywords: Non-Lane-Based Behavior; Car-Following; Traffic Engineering; Overtaking Behavior.

1. Introduction

Non-lane-based driving behavior can be seen in developing countries, such as Iran, extensively. This behavior can interrupt the traffic flow. This behavior may be adjusted by knowing its nature and details. Non-lane-based driving behavior leads the drivers adjust their headway based on speed and lateral distance, simultaneously. Non-lane-based driving behavior is important by considering traffic flow and safety aspects. This behavior reduces the predictability of vehicles for other drivers, moreover it prevent the traffic flow to provide enough spaces for escaping in dangerous conditions. From traffic flow point of view, it can affect the flow characteristics such as density and volume.

In this paper, non-lane-based driving behavior is divided into two categories based on the direction of lateral distance. Consequently, overtaking behavior was studied as a transient non-lane-based maneuver. Even though there are many researches about modeling non-lane-based behavior, here it has been tried to investigate why, where and how it happens.

Firstly, in this paper the relationship between the frequency of happening non-lane-based car-following and macroscopic characteristics of traffic flow will be estimated. Then, microscopic data will be studied to know how it happens. Consequently, it can illuminate whether the non-lane-based behavior is an intrinsic behavior of Iranian drivers. In other words, it shows that obeying rules and orders is not important for the drivers or non-lane-based car-following is due to environmental conditions and drivers' personal experiences.

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