ABSTRACT

This paper describes the research attempt to understand driver behaviour in untidy traffic situations in the Greek cities of Lamia and Athens through simulation. The paper investigates the driver behaviour in an undisciplined traffic environment. It tries to quantify the level of ‘aggressiveness’ in a particular driver-vehicle environment and proposes a simulation package to understand it. Both the case locations exhibit poor lane discipline and extreme degree of ‘traffic aggression’. The study covers a comprehensive study of various traffic components such as headway distribution, gap acceptance and driver-vehicle typologies. A modified Tetris approach has been developed to simulate heterogeneous and untidy traffic.

The study looks into the uncertainty of driver behaviour in untidy traffic. It proposes a simulation package based on probability theory and cellular automata, to generate varying driver responses in context of untidy traffic.

The research attempts to quantify untidiness and proposes a relative scale explaining the traffic situation in a particular driver-vehicle environment and country. It concentrates on developing a simulation model that is validated against observed data from case locations, and sensitivity analysis conducted against indicators of lane changes, delay, driver aggression, waiting times, stoppages, travel times, and signal cycle times.

The study concludes that while mixed traffic increases vehicle delays, and stops at the signalised links, untidy traffic reduces it. The combined effect of heterogeneity and untidiness cancel each other.

The simulation reveals that provision of cycle lanes and bus lanes, increases link efficiency and in effect reduces driver aggression. It asserts that segregation of traffic based on vehicular typologies and speeds leads to optimisation of link performance and environment.
The study reveals that age, and driver experiences are a significant factor in determining level of driver aggression. The driver response in a particular environment is a system optimum response of his individual state, in relation to the performance of system’s ‘driver-vehicle environment’.

The level of driver aggression in an environment is derived as a function of level of heterogeneity.

In summary, the research proposes a simulation model that can accurately simulate mixed and untidy traffic condition with varying degree of driver aggression and recommends its applications for modelling ‘uncertain’ traffic conditions and test various ITS solutions to the problem.