

Does the motorway traffic rule “overtake only on the right” affect the flow?

Yulia Timofeeva (Department of Computer Science and Centre for Complexity Science)

Stefan Grosskinsky (Mathematics Institute and Centre for Complexity Science)

The UK Highway Code under the section “Driving on the motorway” states “Overtake only on the right. Do not overtake on the left or move to a lane on your left to overtake”. This rule might work well as long as everyone obeys another rule: “You should always drive in the left-hand lane when the road ahead is clear”. However, some slow drivers prefer to stay in the middle lane and therefore force faster driver to do additional manoeuvres in order to obey the UK overtaking rule. Intuition suggests that the traffic flow will be affected and slowed down under such scenarios.

The main goal of this project is to investigate how much the motorway traffic flow might be affected in the presence of this asymmetric overtaking rule and some slower drivers who prefer to block faster lanes. It is proposed to use a cellular automaton (CA) type model for traffic flow [1, 2]. CA models for simulating motorway traffic proved to be successful in reproducing many of the empirically observed traffic states. Most earlier studies on lane-changing behaviour consider that all drivers obey the rules of the Highway Code. We propose to start from a development of a model that consists of three traffic lanes and incorporates a small minority of road participants who tend to block the middle lane. The developed model will be investigated under the asymmetric overtaking rule (as in the UK, Germany etc) as well as under the symmetric overtaking rule (as in the USA). The obtained model data from both cases will be analysed and compared in order to draw conclusions about traffic flow behaviour under two different overtaking rules.

Some relevant publications:

1. K. Nagel and M. Schreckenberg (1992) A cellular automaton model for freeway traffic, *J. Phys. I France* 2, 2221-2229.
2. W Knospe, L Santen, A Schadschneider and M Schreckenberg (2002) A realistic two-lane traffic model for highway traffic, *J. Phys. A: Math. Gen.* 35, 3369-3388.