Habilitation Thesis

English Summary

The Human Factor in Traffic – Possible Ways of Influencing People's Behaviour

by

Matúš Šucha

Charles University Prague

2019

This text is the English summary of a habilitation thesis, titled "The Human Factor in Traffic – Possible Ways of Influencing People's Behaviour", which the author successfully defended on 18 January 2017 before the Scientific Board of the Faculty of Arts of Charles University. The full text of the thesis has been published in Czech.

INTRODUCTION

The present habilitation thesis reviews the latest empirical knowledge concerning the human factor in traffic, specifically people's behaviour within the traffic system and possible ways of influencing such behaviour. The objective of the thesis was to describe the traffic system as a highly social proposition, define the role of the human factor in traffic, and summarise empirical evidence pertaining to people's behaviour in traffic and possible ways of influencing it (in psychological terms). An additional goal was to introduce a model which conceptualises possible ways of influencing human behaviour in traffic, as well as proposing specific measures leading to viable significant improvement of traffic safety. The model should provide a straightforward and convenient theoretical framework for the development and implementation of traffic safety campaigns intended specifically for practical use.

The opening section focuses on a description of the traffic system from the perspective of the humanities. The scope of the activities pursued by traffic psychology is defined and the relevant traffic psychology theories, with a particular focus on the human role in traffic, are presented. General psychological theories and their implications for the field of transport and traffic safety are outlined. Different groups of road users and their specific characteristics, needs, and preferences are defined.

The second part of the thesis addresses specifically the issue of people's behaviour in traffic and possible ways of influencing it. A model is introduced which illustrates people's behaviour in relation to the traffic system and approaches to influencing such behaviour, particularly in terms of enhancing traffic safety. The model focuses on the description of situation-specific factors which affect the behaviour of road users, especially drivers. The behaviour in itself is viewed as the effect of human-specific and situation-specific factors; it cannot be influenced directly, only by means of intervention at the level of each factor. Moreover, situation-specific factors can be influenced by interventions carried out at the societal level. Hence, it is society rather than the individual that is responsible for their implementation and effectiveness.

The model was empirically tested using qualitative methods. Specifically, interviews with relevant experts in traffic safety were conducted. The resulting data was then used to adjust and finalise the model. Relations to other relevant approaches, especially 3E (*Enforcement, Engineering & Education*) and hierarchy-based models of road users' behaviour (such as the *Gadget Model*) are pointed out. The relevance of the model is supported by a summary of empirical knowledge about the ways in which the behaviour of road users (especially drivers) can be shaped.

The third part of the thesis covers different types of risk-taking behaviour in traffic (with a view to its frequency and the severity of its social impact) and defines psychological interventions stemming from the model under consideration which can be used to shape people's behaviour and prevent risky situations.

Finally, the findings are summarised and their specific implications for road safety practice outlined. Societal approaches are highlighted, which reflects the author's view of a traffic system as a social construct.

In terms of psychology, behaviour is a (visible) consequence of the action of multiple factors which can be divided into those that affect the driver from the inside and those that exert an effect from the outside. Psychology studies especially the factors which influence behaviour by affecting the driver from the inside. While innate and fixed, these factors can also be worked on to a certain degree, although this may involve long-term efforts and intensive psychological interventions (such as rehabilitation programmes) or education and training (such as driving schools). In terms of traffic safety practice, however, the key factors are those that affect the driver from the outside, as these can be shaped in an easier, quicker, and more efficient way. Additionally, the relevant interventions are targeted at the driver population as a whole, or specific groups of drivers, rather than at individuals.

An example of this can be the choice of speed. The speed chosen by a person when driving results from numerous factors. If we want to influence the choice, we need to focus on influencing the factors rather than the behaviour (which we see as an effect). Internal factors, such as attitudes towards safe versus fast driving, can be influenced mainly by means of specific long-term tailored interventions. First and foremost, these should include education and training (driving schools) emphasising principles of safe driving and psychological and psychotherapeutic interventions, such as rehabilitation programmes for drivers with repeated speeding offences. External factors are those that influence the driver's choice of behaviour from the outside. They include, in particular, traffic regulations and their enforcement, car design, road design, and the local or national traffic culture.

MODEL OF INFLUENCING ROAD USERS' BEHAVIOUR

The present model describes possible ways of influencing people's behaviour in traffic. It is based on the assumption that human behaviour results from people's efforts to satisfy their needs. Behaviour is thus shaped by individual needs, preferences, and motives. However, the choice of behaviour is influenced by other factors, which can be human-specific (internal, such as individual personality structure, values, and norms) or situation-specific (external, such as road type or vehicle performance).

The most common interventions to influence people's behaviour in terms of traffic safety at the level of human-specific factors are education (especially by driving schools), training (e.g. addressing specific driving skills), assessment of psychological fitness to drive (awareness raising, activities intended to enhance people's insight, and screening with respect to additional therapeutic interventions), and rehabilitation programmes (therapeutic and educational interventions aimed at high-risk drivers).

The rationale for these interventions is to educate drivers (provide them with information), train them (enhance their skills), and improve their insight, awareness, and sense of responsibility (safety). Interventions are delivered at the individual level, either universally (e.g. by driving schools), or selectively (e.g. through training for professional drivers or rehabilitation programmes).

The effectiveness of interventions is based on the assumption that if a person is provided with information and trained to use it in practice (skills), and develops awareness and insight (skills used to improve safety), they will opt for safe behaviour. The limitation is that the responsibility for the choice of behaviour remains with the individual; the behaviour chosen will thus always involve a certain degree of risk (because human beings are fallible, irrational, and imperfect). From the perspective of traffic safety, this is a major shortcoming, as failure on the part of an individual can have grave social consequences.

Situation-specific interventions are carried out at the societal rather than the individual level. Their implementation and effectiveness are therefore the responsibility of society, not a human being as an individual. Figuratively speaking, situation-specific interventions may provide road users with a framework in which they can subsequently choose their (more or

less risky) behaviour. However, this framework must be specific enough to prevent any individually chosen behaviour from resulting in serious social harm (e.g. death or severe injury). This principle is in line with a generally recognised traffic safety approach – *Vision Zero*.

The development of the model was preceded by a thorough search of the available empirical evidence on traffic safety responses and their actual effectiveness in terms of their positive effect on the behaviour of road users, particularly drivers. On the basis of this review, two main categories of measures were defined: those addressing the human-specific factors and those addressing the situation-specific factors. Our analysis of impact evaluation studies of the interventions under consideration led us to the conclusion that individually targeted interventions associated with human-specific factors tend to be particularly effective in relation to a very small percentage of drivers (less than 1%), who present, nevertheless, a high level of risk. On the other hand, traffic safety interventions associated with situation-specific factors do not seem to work with this group of drivers, but are effective (i.e. show a conclusively positive effect on road users' behaviour in terms of better road safety) with other road users (i.e. all but the high-risk road users mentioned above). Therefore, the model focuses on situation-specific factors.

In general, the model draws on three sources. The first is the *Diamond Model* by Ralf Risser, which proposes the formulation of individual categories in terms of situation-specific factors. The second is *Vision Zero*, which inspired the division of the sections into individual and societal responsibilities. The third source is Hegel's notion of development, which lends the model its nature of a dialectic cycle.

Subsequently, the model was empirically tested using qualitative analysis of ten interviews with experts in traffic safety and traffic psychology, the criteria for the selection of experts being at least 10 years of work experience in traffic safety and the human factor and publication activities in the field.

The objective of the interviews was to collect data used to uphold, modify, or reject the model. Given the nature of the problem under scrutiny, the semi-structured interview method was employed and the following areas and questions were looked into:

1. What do you think influences people's behaviour in traffic?

2. How do you think we can influence people's behaviour in traffic? (Especially in terms of enhancing traffic safety.)

3. What measures do you think are the most effective/suitable for ensuring people's safe/non-risky behaviour in traffic (including both drivers and other road users, such as pedestrians)?

4. Do you find this model useful/suitable for describing people's behaviour in traffic, or factors which influence their behaviour? Why is it so? Why not?

5. What that is new do you think this model brings?

6. What use do you think we can make of this model in road use practice?

The results show that the majority of the experts who were interviewed agreed that people's behaviour in traffic is conditioned by a range of factors and that a comprehensive approach is needed to change or influence road users' behaviour. Such a multifaceted approach is also believed to help in achieving sustainability of the measures, which the experts seemed to emphasise.

The model (and the results of the analysis of the experts' feedback) suggests that factors which have an impact on road users' behaviour can be divided into *individual* and *situational*, or *social*.

The model as revised in response to the feedback collected from the interviews with experts is presented below (Figure 1).
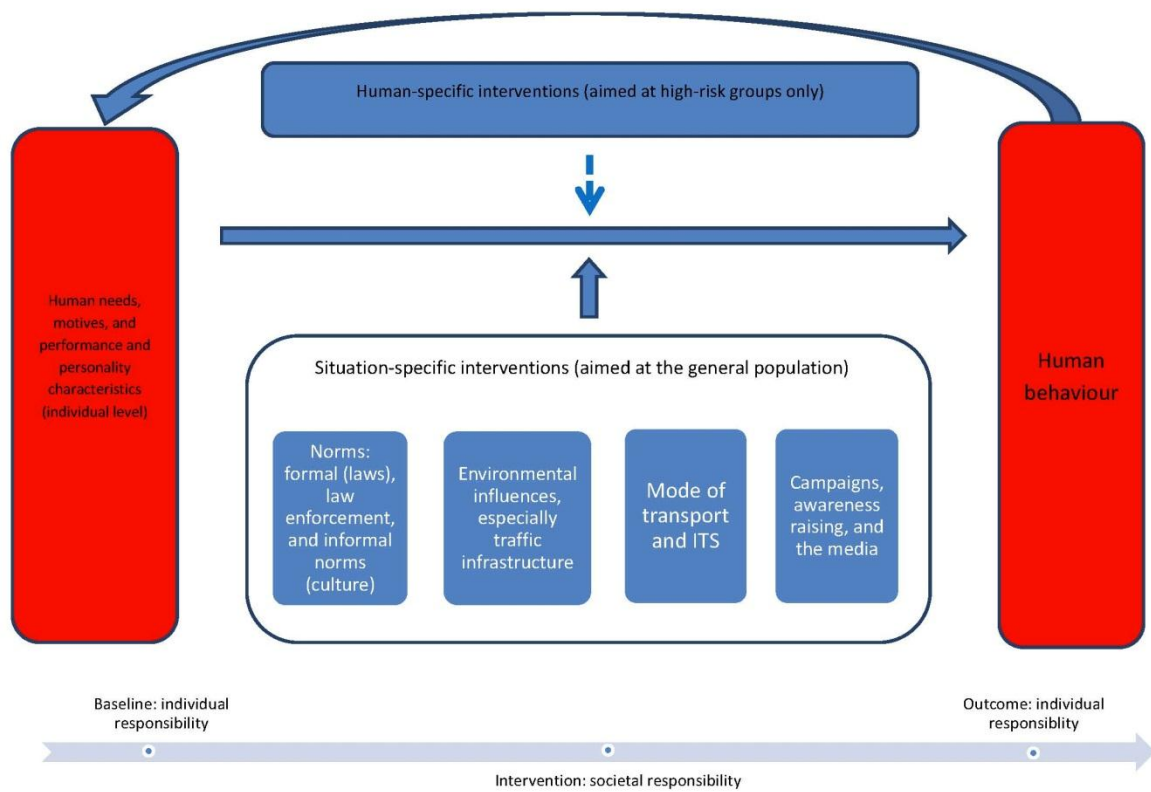
Figure 1: Model of influencing road users' behaviour following adjustments reflecting comments generated by expert interviews.

CONCLUSION

Bearing in mind the ultimate goal and responsibility of our society – to reduce the number of traffic casualties and fatalities to levels close to zero – we find it essential to *describe the behaviour of drivers* (in particular) *and define the methods for influencing such behaviour*. As previously stated, traffic is a societal phenomenon. Therefore, responses aimed at regulating it, i.e. traffic safety interventions and measures, in our case, must be undertaken at the *societal level*. Following the model of influencing road users' behaviour presented in this paper, we conclude that any effort to influence drivers' behaviour must be based on two very different points. The first is a certain *"abnormality" in drivers' behaviour*, referring to high-risk drivers, who, however, account for a minute percentage (less than 1% of all the drivers). These drivers must be addressed at the individual level (i.e. they should be recipients of road safety interventions at the individual level – e.g. assessment and rehabilitation), or excluded from motor traffic. It should be noted at this point, however, that even in the (hypothetical) case of *all* the high-risk drivers being excluded from traffic, road safety would improve to a certain degree only (distant from the zero level of fatalities or serious injuries).

The second starting point is responses intended to exert an *influence on "average" drivers* at the societal rather than the individual level. Within the model, these responses are defined as measures which have an impact on situation-specific factors. It must be pointed out, though, that all these measures are aimed at changing people's behaviour. They thus need to respect core psychological principles which are supported by robust evidence. Each observable behaviour has its causes. These causes primarily involve people's needs and motives and intrapersonal factors. If we wish to change a person's behaviour, we must influence its causes and sources – working on situation-specific factors (such as norms, culture, the traffic environment, mode of transport, ITS, campaigns, and awareness raising) in our case. Observable behaviour is then a mere consequence.

All the responses (at the societal level) must be based on the principle of *man being the measure of all things*. They must be designed and implemented in such a way as to meet the needs (motives, preferences, values, etc.) of the people they target. Psychology, specifically traffic psychology (and many other disciplines as well) plays a key role in this process.