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## ABSTRACT BOOK



## Symposium - Behavioural Adaptation: Translating theory into action 1

Wednesday 29th of August, Blauwe zaal, 10:30-12:30

### Contemporary Models of Behavioural Adaptation

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Traffic Psychology, much like Psychology as a whole, is without a central guiding theory or model, and as a result much of Traffic Psychology is atheoretical in nature. This creates a fragmented picture of driver behaviour and contributes to the difficulties in understanding and accounting for the behavioural adaptation of drivers to road safety initiatives.

In the last decade or so many new models to explain driver behaviour have been published, and a selection of these will be addressed. The differences between these models in terms of behavioural adaptation will be covered. However the main focus will be on the similarities and agreement amongst these models, such as the increasingly functional view of the role of emotion and feelings in driver behaviour and behavioural adaptation.

### Experimental considerations when designing theoretically-based behavioral adaptation studies

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There has been an increased focus on the theoretical foundations and practical implications of behavioral adaptation relative to vehicle and infrastructure-based systems. Studies examining behavioral adaptation have employed a variety of methodology and measurement techniques, however, there has been no formal work discussing the variations and utility of these techniques. The current work will identify and discuss prominent methodological and measurement issues within behavioral adaptation studies. Relative to measurement techniques it is important to consider specific behavior types, in terms of discrete, serial, and continuous motor skills, that may be indicative of behavioral adaptation. In addition, measures should be sensitive to the frequency with which behaviors may change, the timeframe over which behavioral adaptation may occur, and the potential for behavioral adaptation due to discontinuation of system use. Methodological issues to be addressed include the use of control groups to isolate the presence of behavioral adaptation, the period of time over which a study is conducted, testing environments, and the identification of confounds that may influence measure variables under investigation. Collectively, addressing methodology and measurement issues is important so that so that valid study measures can be selected and so that internal validity and generalizability can be maximized.

### Behavioural adaptation and roadway ITS: the forgotten chapter

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Although quite some attention is paid to behavioural adaptation issues for driver support systems, BA to roadway ITS is less well documented. Roadway ITS is introduced for its beneficial effects on throughput, safety and emissions. However, negative effects are often neglected. This paper

illustrates revealed and theoretical examples of ITS effects that were not designed for. For example: Even though dynamic speed limits are designed to provide throughput benefits during periods of high flow, the presence of the signs and speed enforcement cameras reduce the average speeds also beyond peak hours, increasing general travel times, so even if speed limits are not displayed. Also, dynamic adaptation of speed limits has unexpectedly shown to decrease capacity on some sections and to increase the percentage of rat running traffic to avoid the road section. A more dramatic illustration of BA is shown in case of weather warnings. An automatic fog detection warning system even had an adverse impact in the case of heavy fog with extremely low visibility distances. The activated system resulted in an increase in speed compared to the situation without the fog warning system. Different applications and BA effects are discussed.

### Behavioural adaptation to roadway countermeasures

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Most roadway countermeasures taken intent to adapt drivers' behaviour in a safe and efficient manner. Usually, increasing traffic safety and improving traffic efficiency should go together for interventions in the roadway infrastructure. The driving task becomes more and more complex, traffic management scheme vary over the day and night and also the drivers' population will change the coming years with an increasing share of older road users. This paper will mainly focus on roadway countermeasures but now and then in combination with traffic management measures.

Examples of measures that illustrate behavioural adaptation effects include the Probability of stopping as a function of type of traffic signal control (fixed-time versus vehicle-actuated), the removal of reflector posts along rural roads in Finland, open asphalt road surfacing of motorways, the removal of centre-line markings on access roads according to the Sustainable Safety concept, the application of raised pavement markings and profiled edge markings on motorways, switching off public lighting on motorways, and the effectiveness of the A16 fog-signalling system.

From the examples given it can be concluded that road designers and traffic engineers should take behavioural adaptation effects (both positive and negative) into account when evaluating the effectiveness of their traffic safety measures.

### The role of acceptance in behavioural adaptation

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There are numerous models of acceptability, which have been used to attempt to explain or predict the likelihood that a user will find a system attractive enough to use or buy and hence how might their behaviours adapt as a result. Neilsen's (1993) framework of acceptability is rooted in usability engineering and fundamentally asks "can an individual use the system?". It focusses on issues such as ease of use and reliability. In contrast, Rogers (1995) model of patterns of adoption poses the question "who will use the system?". Researchers have sought to integrate these and other models (e. g. Adell, 2009) and it is noteworthy that several key constructs overlap (perceived usefulness and usability feature regularly) and that several models include an intervening variable which reflects an