Schlag, B., Schade, J. (forthcoming). Traffic and transportation psychology. In K. Button & P. Nijkamp (Eds.) *Transport Dictionary.* Cheltenham: Edward Elgar Publishers

Traffic and Transportation Psychology

Traffic and transportation psychology (TTP) is a young expanding field in psychology. Whereas *traffic* psychology is primarily related to "the study of the behaviour of road users and the psychological processes underlying that behaviour" (Rothengatter, 1997, 223) as well as to the relation between behaviour and accidents, *transportation* psychology, sometimes referred to as mobility psychology, has its focus on mobility issues, individual and social factors in the movement of people and goods, and travel demand management.

There is no single theoretical framework in TTP, but many specific models explaining, e.g., perceptual, attentional, cognitive, social, motivational and emotional determinants of mobility and traffic behaviour. One of the most prominent behavioural models divides the various tasks involved in traffic participation into three hierarchical levels, i.e. the strategic, the tactical and the operational level. The model demonstrates the diversity of decision and control tasks which have to be accomplished when driving a vehicle. However, until now, most of the psychological models have a rather heuristic nature, e.g. risk theories like Wilde´s risk-homeostasis, Fuller´s task capability model, and thus are not sufficiently precise to allow for concrete behavioural prediction and control. This is partly due to the importance of individual differences, a major topic of psychology which in traffic and transportation has not yet been sufficiently accounted for. On the other hand, social-psychological attitude-behaviour models, such as Ajzen´s theory of planned behaviour, have been helpful in identifying determinants of mobility decisions.

Bringing together the scientific and practical lines of TTP, six areas of traffic and transportation psychology can be distinguished (Schlag, 1999):

1. *Behaviour and accident research*,
   particularly in relation to different groups of road users (age groups, modes of transport), but also in relation to road design and motor vehicles. Explaining and predicting road user behaviour depends on the development of valid and reliable models about the role of human factors in mobility behaviour and especially driver performance. Psychological traffic accident and behaviour research deals with, e.g.,
   - analysis of the driving task, changing conceptually from a traditionally rather sensomotoric task to a task with high monitoring impact,
   - perception, cognition and attentiveness when driving, driver information processing and expectations,
   - driver state, workload, alertness and fatigue,
   - driver personality, risk-taking, attitudes, motives for driving, arousal and emotion,
   - interactions and the social psychology of driving,
   - the relation between the personal and environmental background of behaviour, overt behaviour, emerging conflicts and accidents.
2. *Accident prevention and improvement of traffic safety,*
   education and information, but overall following the "4 E's": enforcement, education, engineering, encouragement/economy. Main goal is promoting safety by influencing and modifying behaviour with legal, educational, vehicle- and road-specific measures; driver training, driving-instructor education, information on traffic issues, campaign design and marketing, effective enforcement.
3. *Research and counselling* in questions of *mobility*, *transport economy* and *engineering*:
   Main objective is user-oriented and best-usable supply and design. This includes differentiation between transportation needs of special groups (elderly, handicapped, young people etc.). Main topics are
   - mobility needs and travel demand, choice of means of transport,

- travel behaviour research, above all activity-based approaches,
- altering mobility behaviour and modal split, problems of habituation and resistance to change, car dependence,
- design and acceptance of travel demand management, above all of pricing measures Schade & Schlag, 2003),
- psychological aspects in road design and traffic environment,
- quality management, especially quality of service, usability and well-being.

4. *Vehicle construction and design*:
   Psychology in car manufacturing traditionally deals with questions of ergonomics, but since the 1980´s new in-car devices as well as related new infrastructure has emerged as a rapidly growing field. Advanced Driver Assistance Systems (ADAS) and new information systems are designed to support the driver in a suitable and user-oriented way. Based on analyses of driving tasks which drivers have to cope with, e.g. multiple tasks requiring divided attention, psychologists' primary orientation in the design process is towards human needs defining the technical requirements, human-centred development, usability of ADAS, operability of human-machine interfaces, behavioural adaptation and risk compensation, acceptance of innovations, and social impacts.
5. *Psychological assessment and counselling / rehabilitation*
   for drivers who have become conspicuous: driver selection, training and rehabilitation, above all for drivers with offences (driving while intoxicated, severe offences against traffic laws), aptitude assessment for driving, selection and training for professional drivers.
6. *Rail and flight psychology:*
   Parts of the mentioned domains not only apply to road traffic but also to rail and air transport. Nevertheless, rail and flight psychology have historically developed in part separately from the dominantly road-related TTP. One major new direction in rail as well as in flight psychology is the focus shift from the professional operator (selection and training) to the customer perspective (quality of service, usability).

From its very beginning, TTP in research and practice has followed an interdisciplinary approach and has shared common topics especially with medicine (e.g. related to driving aptitude), engineering (ergonomics of cars as well as human factors in traffic planning), and economics (e.g. travel demand management). People as traffic participants are seen as the core of an interactive traffic system also comprising transportation means, routes, traffic environment and regulation. Thus mobility, including its positive as well as detrimental impacts, has its origin in people's desires, decisions and behaviour – and these might be influenced. The main accident causes are human errors and maladaptive behaviour, accounting alone or in interaction with roadway or vehicle-related causes for more then 90% of all traffic accidents. Recognizing the possible impact of psychology in studying and solving transport problems, traffic and transportation psychology has emerged rapidly since the 1980´s.

References

Rothengatter, T. (1997). Psychological aspects of road user behaviour. *Applied Psychology: An International Review*, 46, *3*, 223-234.

Schade, J., & Schlag, B. (eds.) (2003). *Acceptability of transport pricing strategies*. Oxford, Elsevier.

Schlag, B. (ed.). (1999). *Empirische Verkehrspsychologie [Empirical Traffic Psychology]* . Lengerich, Berlin, Pabst Science Publishers.